

THE WEST AFRICAN EXAMINATIONS COUNCIL
BANJUL, THE GAMBIA



THE WEST AFRICAN SENIOR SCHOOL CERTIFICATE
EXAMINATION (WASSCE)

FOR SCHOOL CANDIDATES 2016

CHIEF EXAMINERS' REPORTS



THE GAMBIA

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THE WEST AFRICAN EXAMINATIONS COUNCIL

81ST MEETING OF THE INTERNATIONAL FINAL AWARDS AND EXAMINERS' APPOINTMENTS COMMITTEE TO BE IN APRIL, 2017

PAPER 81 IFAEAC/10/1
Item 10(1) of the Agenda

WASSCE FOR SCHOOL CANDIDATES, 2016 **RÉSUMÉ OF CHIEF EXAMINERS'REPORTS FOR THE GAMBIA**

1. STANDARD OF THE PAPERS

All the Chief Examiners reported that the standard of the papers of the various subjects was appropriate, within the scope of the syllabuses and compared favourably with those of the previous years.

2. CANDIDATES' PERFORMANCE

Candidates' performance was reported on as follows in the different subject groups:

(1) LANGUAGES

The Chief Examiner for English (page 7) reported that candidates' performance was better this year. However, the Chief Examiners for Arabic (page 1), French (page 14) and Literature-in-English 2 & 3 (page 19) & (page 22) reported that there was no improvement in candidates' performance.

(2) GENERAL SUBJECTS

The Chief Examiners for History 2 (page 52), Christian and Religious Studies (page 59) reported that there was a significant improvement on candidates' performance this year. However, the Chief Examiners for Economics (page 26), Geography 2 (page 30), Geography 3 (page 35), Government 2 (page 49) and Islamic Religious Studies (page 57) reported only a slight improvement on candidates' performance compared to the previous years.

(3) MATHEMATICS SUBJECTS

The Chief Examiners for Mathematics core (page 63) and Further Mathematics (page 77) reported an overall poor performance of candidates this year.

(4) SCIENCES

The Chief Examiners for Agricultural Science (page 82), Chemistry 3 (page 105), Health Science 2 (page 112) and Physical Education 2 (page 123) reported that candidates' performance was satisfactory this year. The performance of candidates was reported to be stagnant in Chemistry 2 (page 99) and in Physics 2 (page 129), Physics 3 (page 138). However, the Chief Examiners for Biology 2 (page 89), Biology 3 (page 93), Science 2 (page 147) and Science 3 (page 156) reported that candidates' performance was below expectation.

(5) COMMERCIAL SUBJECTS

The Chief Examiner for Business Management (page 164), reported that candidates' overall performance was better than for the previous year. However, Candidates' performance was reported to be average in Principles of Cost Accounting (page 178) and poor in Commerce (page 168) and Financial Accounting (page 171)

(6) HOME SCIENCES

All the Chief Examiners for Home Sciences reported that candidates' overall performance was poor compared to the previous year.

(7) TECHNICAL SUBJECTS

The Chief Examiners for Metalwork 2 & 3 (pages 206 & 209), Technical Drawing 2 & 3 (pages 212 & 216), Visual Art 3 C (225) Applied Electricity 3 (page 234) and Woodwork 2 & 3 (pages 242 & 245), Auto Mechanics 3 (page 240) reported that candidates' performance was good compared to the previous years. However, Candidates' performance was poor in Auto Mechanics 2 (page 237), Applied Electricity 2 (page 231, Visual Art 2, 3A & 3 B (pages 222-230.)

3. CANDIDATES' STRENGTHS

The Chief Examiners of the different subject groups highlighted few points as candidates' strengths.

(1) LANGUAGES

The Chief Examiner for English Language (page 7) reported that 95% of candidates were able to write full length essays. The Chief Examiner for French (page 14) stated that candidates performed better in letter writing compared to essay writing and that 97% of them understood the instructions. The Chief Examiner for Literature in- English 2 & 3 (pages 19 & 22) reported that most candidates showed that they had read the prescribed texts. The Chief Examiner for Arabic was silent on candidates' strengths.

(2) GENERAL SUBJECTS

The Chief Examiner for Economics 2 (page 26) reported that the candidates did well in the data response section. The Chief Examiner for Geography 2 (page 30) reported that candidates had demonstrated a mastery of the subject leading to good performance in questions 1, 4, 5, 6 and 9. The Chief Examiner for Geography 3 stated that candidates did extremely well in questions 1 and 2. The Chief Examiner for History (page 52) reported candidates' strengths on sections B and C, an indication that candidates followed the instructions and syllabus. The Chief Examiner for Government (page 49) reported that 80% of candidates did extremely well in questions 8, 10 and 15. The Chief Examiner for Islamic Religious Studies (page 57) highlighted candidates' strengths on questions 1, 4 and 5 that dealt with the daily practical aspects of the religion. As for the Chief Examiner of Christian and Religious Studies (page 59), he reported that candidates' strengths were found in sections A and B that dealt with the Gospel and part of the Old Testament.

(3) MATHEMATICS SUBJECTS

The Chief Examiners for Mathematics reported candidates' strengths as follows:

- Drawing lines of a given length.
- Constructing angles and bisecting them.
- Plotting of points on a graph.
- Calculating the common difference in arithmetic progression.
- Understanding statistics, probabilities and mechanics.
- Calculating gradients.

(4) THE SCIENCES

The Chief Examiners for the Sciences reported candidates' strengths as follows:

- Ability to follow the rubrics of the papers.
- Ability to present correct and legible work.
- Ability to interpret the questions requiring descriptive answers.
- Tabulation of readings and drawing of graphs on practical papers.
- Ability to draw correct diagrams.

(5) COMMERCIAL SUBJECTS

The Chief examiners for Commercial Subjects reported candidates' strengths as follows:

- Ability to present proper answers. (Commerce)
- Ability to present correct and legible work. (Financial Accounting)
- Ability to prepare the Process and Stock Ledger Card. (Principles of Cost Accounting)

(6) HOME SCIENCES

The Chief Examiners for Home Sciences were almost silent on candidates' strengths. However, the Chief Examiner for Clothing and Textiles reported candidates' strengths as follows:

- Candidates were able to sew with their hands when the sewing machine had a break down.
- Candidates were able to do the open seam.
- Candidates were able to attach the facing.

(7) TECHNICAL SUBJECTS

The Chief examiners for Technical Subjects reported candidates' strengths as follows:

- Proper marking out and adequate measurements. (Metalwork)
- Ability to read and draw in orthographic projection. (Technical Drawing)
- Ability to sketch in good proportion in addition to the presentation of correct and legible work. (Visual Art)
- Ability to select the right tools. (Auto Mechanic and Applied Electricity)
- Ability to finish work on time. (Woodwork)

4. CANDIDATES' WEAKNESSES

The Chief Examiners of the different subject groupings gave many reasons for the poor performance of candidates as listed below:

(1) LANGUAGES

The Chief Examiners for Languages reported candidates' weaknesses as follows:

- Misinterpretation of questions. (English)
- Re-adaptation of material from the question paper.
- Weak grammatical background.
- Improper use of quotations. (Literature-in-English 3)
- Wrong spelling, inappropriate punctuations and paragraphing, use of wrong tenses (Literature-in-English 2).
- Inability to construct simple Arabic sentences. (Arabic)
- Spelling and structural errors. (French)

(2) GENERAL SUBJECTS

Candidates' weaknesses were reported as follows:

- Misinterpretation of questions.
- Poor command of the English Language.
- Lack of detailed explanations where required.
- Inadequate preparation for the examination.
- Inability to draw simple and accurate diagrams in Economy and Geography.
- Inability to follow instructions for most papers.

(3) MATHEMATICS SUBJECTS

Candidates' weaknesses were reported as follows:

- Inability to workout equations/expressions from given information.
- Inability to work out polynomials, standard deviation and binary operations.

(4) SCIENCES

Candidates' weaknesses were reported as follows:

- Inability to answer questions involving calculations.
- Wrong spelling of scientific terms.
- Wrong scaling of axes for graphs.
- Poor command of English Language.
- Re-adaptation of material from the question paper.

(5) COMMERCIAL SUBJECTS

Candidates' weaknesses were reported as follows:

- Lack of preparation for the examination.
- Misinterpretation of questions.
- Poor command of English Language.
- Re-adaptation of material from the question paper.
- Inadequate coverage of the syllabus.
- Poor presentation of work.

(6) HOME SCIENCES

The following points were reported by Chief Examiners of the Home Sciences as weaknesses:

- Inability to follow instructions.
- Inadequate table setting.
- Inability to use appropriate cooking equipment.
- Misinterpretation of questions.

(7) TECHNICAL SUBJECTS

The various weaknesses reported by Chief Examiners of the Technical Subjects were as follows:

- Inability to do freehand sketching and to label.
- Inability to apply the required scale.
- Poor knowledge in electrical work.
- Misinterpretation of questions.
- Inability to provide safety measures where it was necessary in the workshop.
- Poor technical skills.

5. **SUGGESTED REMEDIES**

The Chief Examiners of the different subject groups proposed the following measures as way of improving on performance:

(1) **LANGUAGES**

- Candidates should be encouraged to write often to improve their writing skills. (English)
- Candidates should learn the techniques in story writing and be conversant with the basic literary devices. (Literature-in-English 3)
- Thorough reading of the prescribed texts with comprehension. (Literature-in-English 2)
- Candidates should take time to read extensively to improve their vocabulary. (Arabic)
- Candidates should be drilled on grammar, written and oral productions. (French)
- Candidates should expose themselves to French media.
- Candidates should make use of the past papers.

(2) **GENERAL SUBJECTS**

- Candidates should learn how to draw diagrams or maps.
- Candidates should be taught the difference between list, name, outline, mention, highlight, etc.
- Qualified teachers should be employed to teach the subject.
- Teachers should encourage students to do more research.
- Teachers and students should be encouraged to use the prescribed text books and not to depend entirely on pamphlets written by teachers.
- Teachers should endeavour to give more assignments to candidates and after the marking exercise, do the corrections in class.
- School authorities should provide a conducive teaching and learning environment.
- Teachers should endeavour to cover the syllabus.
- Excursions and field visits should be encouraged to expose candidates.

(3) **MATHEMATICS SUBJECTS**

- Students should be encouraged to read and understand examination's instructions before answering questions.
- Candidates should study mathematical concepts very well and retain them.
- Teachers should find sufficient time for revision before the examination.
- Candidates should familiar themselves with the use of mathematical instruments (Graph, calculators, compass, etc.) before the examination.
- Teachers should endeavour to give more assignments to candidates and take time to mark their work.

If

(4) SCIENCES

- Candidates should be encouraged to read and master the English Language.
- Candidates should be introduced to practical work in Grade 10.
- Qualified teachers should be employed to teach the subject.
- Teachers should endeavour to cover the syllabus and well prepare their students.
- Candidates should do a lot of mathematical calculations

(5) COMMERCIAL SUBJECTS

- Students should be encouraged to read and understand examination's instructions before answering questions.
- Teachers should endeavour to cover the syllabus and well prepare their students.
- Teachers and Candidates should make use of the past papers.
- Candidates should be encouraged to read and master the English Language.
- Teachers should endeavour to give more assignments to candidates and to go over
- most of the weaknesses highlighted in the chief examiners' reports.
- Schools should furnish their libraries with prescribed text books for various subjects.

(6) HOME SCIENCES

- Candidates should be offered adequate guidance and counselling in Home Science.
- Teachers and candidates should access the Chief Examiners' reports.
- Teachers should have internal in-service training course for Home Science annually.
- Teachers should endeavour to cover the syllabus.

(7) TECHNICAL SUBJECTS

- Teachers should endeavour to cover the syllabus.
- Teachers should endeavour to equip their candidates with the necessary skills.
- Teachers should put more emphasis on the interpretation of drawings using the right scale and the use of appropriate electrical equipment and hand tools.
- Candidates should be exposed to more practical lessons.
- Teachers should have in-service training and Art exhibition at school level.

LANGUAGE SECTION

WASSCE FOR SCHOOL CANDIDATES 2016
RÉSUMÉ OF CHIEF EXAMINERS' REPORTS
THE LANGUAGES

1. STANDARD OF THE PAPERS

All the Chief Examiners in the Languages section stated that the papers were within WAEC standard.

2. CANDIDATES' PERFORMANCE

The Chief Examiner for English indicated that 70% of the candidates performed better in the Essay and Comprehension section than those in previous years. However, the Chief Examiners for Literature-in-English 2, Arabic and French stated that there was no improvement in performance.

3. CANDIDATES' STRENGTHS

The Chief Examiner for English highlighted that candidates wrote full length essays and that 95% of them answered all the questions while the Chief Examiner for Arabic did not see any strength worthy of mention.

The Chief Examiner for Literature-in-English 3 stated that most candidates studied their texts and wrote something relevant and that of French indicated that a candidate scored 39% out of a possible mark of 40%.

The Chief Examiner for Literature-in-English 2 revealed that 50% of the candidates showed understanding of the texts and that 30% of them indicated clear understanding and literary precision.

4. CANDIDATES' WEAKNESSES

The Chief Examiner for English stated that 30% of the candidates misunderstood some of the questions while that of Literature-in-English 3 indicated that most candidates were unable to cite relevant quotes from the texts and had challenges with their spelling, punctuation, paragraphing and tenses.

The Chief Examiner for French revealed that most candidates exhibited weaknesses in spelling, structural errors as well as re-adaption of material from the question paper where as that of Arabic indicated that candidates copied questions as answers and were unable to construct simple sentences.

The Chief Examiner for Literature-in-English 2 stated that 30% of the candidates misunderstood the questions and that 50% of them merely recopied the questions.

5. SUGGESTED REMEDIES

- Candidates must be encouraged to write often to improve their writing skills. (English)
- Candidates should be encouraged to read extensively to improve their vocabulary (Arabic)
- Candidates should be drilled in both written and oral productions using current issues (French)
- Candidates should improve on their knowledge of literary terminologies (Literature-in-English 3)
- Candidates should be encouraged to study their texts and go over their work (Literature-in-English 2)

WASSCE FOR SCHOOL CANDIDATES 2016
CHIEF EXAMINER'S REPORT
ARABIC 2

1. GENERAL COMMENTS

The Paper was carefully set to the WASSCE standard. The numbers of candidates who have attempted the paper again this time remain the same despite the fact that more than eighty percent of Gambian populace are Muslims and the language of the holy Qur'an is Arabic. As a result, a good number of Gambians communicate to one another in local dialects such as Mandinka, Wollof and Fula in Arabic scripts. One may tempt to say that the low percentage of candidates writing this paper is attributed to the following:

- Lack of text books
- Poor foundation and non-practicing of spoken Arabic
- Lack of bilingual Arabic teachers

2. CANDIDATES' STRENGTHS

There was no strength worthy of mention however, the majority of candidates copied questions in Arabic without explanation.

3. CANDIDATES' WEAKNESSES

Candidates' weaknesses were reported as follows:

- Candidates' inability to construct simple Arabic sentences due to lack of practice of spoken Arabic.
- Candidates' inability to write required number of words for essay questions.
- Candidates inability to understand the questions due to their poor background in Arabic Language.

4. SUGGESTED REMEDIES

- Candidates should be encouraged to read widely as possible in order to improve on their Arabic vocabulary.
- Chief examiners' report should be made available to Arabic teachers.
- Candidates should endeavour to sharpen their oral, reading and writing skills.
- Candidates should read publications in Arabic and listen to Arabic programme on radio and television to build on their vocabulary.
- It will be helpful if the GRTs and other FM Radio stations come up with Arabic programmes and competitions with prizes at stake to encourage winners and urge our young people to learn Arabic Language.

5. **DETAILED COMMENTS ON INDIVIDUAL QUESTIONS**

أَجِبْ عَنْ سُؤَالٍ وَاحِدٍ مِنَ الْقِسْمِ الْأَوَّلِ وَأَرْبَعَةَ أَسْئَلَةٍ مِنَ الْقِسْمِ الثَّانِي،
وَيَجِبُ أَنْ تَكُونَ أَجُوبُوكَ بِالْعَرَبِيَّةِ.

Answer **one** question in part 1 and **four** questions in part 2
Your answer **must** be written in Arabic

الْقِسْمُ الْأَوَّلُ : الإِثْنَاءُ

PART I

COMPOSITION

اَكْتُبْ حَوَالِي مِائَةٍ وَعِشْرِينَ كَلِمَةً مِنْ وَاحِدٍ مِنَ الْمَوْضُوعَاتِ الْآتِيَةِ.

Write a composition of about **120** words on **any** of the followings topics:

Question 1

١ - قَوْلُ الْمَرْءِ يُخْبِرُ عَنْ شَخْصِيَّتِهِ

The saying of a person represents his personality.
This question was not popular among candidates.
Correct answers should include the following:

- Introduction
- Quotation from the Holy Qur'an and the Hadith.
- A sensible person speaks after careful consideration in order to be freed from mistakes.
- Prophet Muhammad (SAW) says a believer in Allah and the last Day should speak about the wellbeing of people or shut his/her mouth.

Question 2

٢ - أَفْضَلُ الْأَعْمَالِ لَدَيَّ

A good human practice to me.

This question was also not popular among candidates.

Correct answers should include the following:

- Introduction
- Description of good human practice one after the other.
- Reason for good human practice.
- Benefits of good human practice.
- Good conclusion.

Question 3

٣ - أَيُّهُمَا أَقْوَى: الْقَلَمُ أَمْ اللِّسَانُ

Which one is stronger? Pen or the Tongue.

This question was also not popular among candidates.

Correct answer should include the following:

- Introduction.
- Meaning of Pen and the Tongue.
- Benefit of Pen and the Tongue on human life.
- Good conclusion.

Question 4

٤ - أَكْتُبُ رِسَالَةً إِلَى أَخِيكَ الْأَكْبَرِ تُخْبِرُهُ فِيهَا عَنِ اهْتِمَامِكَ
بِزِيَارَتِهِ أَتَاءَ الْعُطْلَةِ الْمُقْبِلَةِ

Write a letter to your elder brother informing him your desire to visit him during these coming holidays.

This question was very popular among candidates and some scored good marks, on it.

Correct answers should include the following:

- Address and date.
- Greetings i.e. my dear brother.
- Reason for writing the letter.
- Good grammatical expression
- Good presentation
- Good conclusion to include such as sincere greetings to the entire members of the family
- Yours

PART 2
LITERATURE

Question 1

أَجِبْ عَنِ السُّؤَالِ الْأَوَّلِ وَثَلَاثَةِ أَسْئَلَةٍ أُخْرَى مِنْ الْأَسْئَلَةِ الْآتِيَةِ.

Answer questions one and any other three from the following questions.

١ - اِشْرَحِ الْأَيَّاتَ الْآتِيَةَ شَرْحًا وَاصِحًّا:

بَلَّغَ شَرِيفُ شَرِيفٍ أَمَلٍ كَاسِمِهِ # عَنَى لِشَيْخِ كَاسِمِهِ الْمُخْتَارِ
أَزَكَّى سَلَامٍ شَيْبَ مِسْكَائِهِ # رِيحُ النَّسِيمِ تَهَبُ فِي الْأَشْجَارِ
أَخْبَارُهُ فِي عِلْمِهِ وَصَلَاحِهِ # سَارَتْ بِهَا الرُّكْبَانُ فِي الْأَمْعَارِ
(عبد الله بن فودي)

Explain the following poem.

This question was chosen by some candidates.

Correct Answers should include the following:

- The poet Abdullah Bun Foday paid tribute and homage to great well known scholar in West and East Sheikh Seedy Al Mukhtar who also paid tribute and homage to Sheikh Uthman Bun Foday a great Muslim scholar who will conquer this Country. He is great because his name Al Mukhtar (chosen by Allah) is in line with his behavior.
- The poets continue to express his sincere greetings to Sheikh Uthman.
- His greetings indicate his love and sincerity to the Sheikh.
- The Sheikh is a role model and his good foot steps should be followed by travellers and pedestrians in the West and East.

Question 2

٢ - اُكْتُبْ بِإِيجَازٍ عَنْ حَيَاةِ مُحَمَّدٍ حَافِظِ إِبْرَاهِيمَ

Write a brief life history of Muhammad Hafiz Ibrahim.

Some students attempted this question without success.

Correct answer should include the following:

- The poet Muhammad Hafiz Ibrahim's father was an Egyptian and his mother was a Turk.
- His father works as an engineer.
- His date of birth was unknown.
- His guessed date of birth was February 4th 1872.
- His father passed away when he was four years old.
- His father did not leave any inheritance for the mother.
- He was later transferred with his mother to his uncle to Cairo where he attained basic education.
- They later transferred to a town called Tanta.
- After living long years in that town, he left his uncle's house and lived a simple and private life .

Question 3

٣ - اشرح الآيات الآتية شرحاً مفصلاً:

لَقَدْ كُنْتُ أَهْوَى حَتَّى تَهَيَّمَنِي # لَا أَسْتَطِيعُ لِهَذَا الْحُبِّ كِتْمَانًا
 لَا بَارَكَ اللَّهُ فِي الدُّنْيَا إِذَا انْقَطَعَتْ # أَشْبَابُ دُنْيَاكَ مِنْ أَشْبَابِ دُنْيَانَا
 كَيْفَ التَّلَاقِي وَلَا بِالْقَيْظِ مَخْضَرُكُمْ # مِنَّا قَرِيبٌ وَلَا مَبْدَاكَ مَبْدَانَا
 (جرير)

Explain the following poem.

This question was attempted by some candidates

Correct answer should include the following:

- The poet queries to his real sweetheart that he has tried for a long time to make his real love known to her.
- And his real love to her and his patience to conceal it became unbearable.

Question 4

٤ - اذْكُرْ صَاحِبَ الْخُطْبَةِ الْآتِيَةِ مَعَ الشَّرْحِ:
"إِنَّ اللَّهَ كَفَانَا مَوُونَةَ الدُّنْيَا وَأَمَرَنَا بِطَلَبِ الْآخِرَةِ
فَلَيْتَ اللَّهَ كَفَانَا مَوُونَةَ الْآخِرَةِ وَأَمَرَنَا بِطَلَبِ الدُّنْيَا...".

Explain the following sermon and life history of the Author.

This question was also attempted by some candidates

Correct answers should include the following:

- The author is Alhajaaj Bun Yousuf As-Thakafy.
- God Almighty directed us to lead a righteous life in this world.
- The author delivered this sermon during Friday prayers.
- Righteous life in this world is real, correct step to be followed.
- So that we live happily in here after.
- Allah says in the Holy Qur'an I did not create mankind and Jin but only to adore me.

Question 5

• - تَكَلَّمَ بِإِنْجَازٍ عَنْ حَيَاةِ زُهَيْرِ بْنِ أَبِي سُلَيْمٍ وَمَثَلِ بَيْتَيْنِ مِنْ مَذْهَبِهِ
لِهُرْمِ بْنِ سَنَانَ وَالْحَارِثِ بْنِ عَوْفٍ

Write in brief life history of Zuhair Bun Abi Salma and write two of his poems.

This question was also attempted by some candidates

Correct answers should include the following:

- The author was born in Arabian Peninsula.
- He was very close to his wealthy and poet uncle who has no son.
- Zuhair was one of the three famous poets in pre-Islamic era and they are Umru AlQais, Naabeghat and Zuhair Bun Abi Salma.

WASSCE FOR SCHOOL CANDIDATES 2016
CHIEF EXAMINER'S REPORT
ENGLISH LANGUAGE 1

1. GENERAL COMMENTS

The paper met the WAEC standard. The questions were well set and were within the reach of candidates who are worth their salt.

2. CANDIDATES' STRENGTHS

This year, 70% of the candidates did better than last year in the Essay and Comprehension Tests. There were more full length essays and very little gibberish. 95% of the candidates answered all the questions set.

3. CANDIDATES' WEAKNESSES

About 30% of the candidates misunderstood some of the questions. 60% of the candidates wrote unnecessarily long essays, rambling and so losing focus. This set of candidates was unable to express themselves coherently. Their grammar was poor. Some candidates misused modals, hyphenated words wrongly and were guilty of wrong amalgamation and separation of words. Some could not keep the same tense. They switched from the present tense to the past and to the future at will. Their spellings were also appalling.

It is amazing that candidates repeated mistakes which the Chief Examiner had several times drawn their attention to. Again, one wonders what schools do with the Chief Examiner's Report. The following are age-old mistakes which the candidates repeated:

- "For that being the case" for "since that is the case"
- "So therefore" instead of "so" or "therefore"
- "Secondly another reason" for either "secondly" or "another reason"
- "rule and regulations" for "rules and regulations"
- Using headings to start paragraphs e.g.
Secondly discipline. Discipline in the school is not compromised. Thirdly, the library. We have a very big library in our school.
- Unnecessary pleasantries, especially at the start of letters e.g. how are you? How are your Mum and Dad? I hope they are all well. If so, to God is the glory. How is my grandmother? Hope she is fine?
- Using dangling modifiers.
- Writing pronouns without antecedents
- Switching from singular to plural and vice versa.

4. **SUGGESTED REMEDIES**

- Candidates must be taught to write good essays.
- Teachers should not spend time giving notes to students but should practice with students the aspects they teach e.g. verbs, nouns, pronouns, the grammatical names and functions of expressions.
- Candidates should not be given set pieces with which to preface their essays e.g. It gives me a great honour and pleasure to pick up my golden pen and write on my silver paper.
or: I wish this letter will meet you in good condition of health.
or: I have the pleasure to write you this wonderful missive.
- Candidates must be encouraged to write often as they will know how to write well only by writing frequently.
- Candidates should desist from learning model essays by heart and regurgitating them in the examination.

5. **DETAILED COMMENTS ON INDIVIDUAL QUESTIONS**

SECTION A ***ESSAY***

Question 1

A friend of yours wants to study to your school and has written to you for information and advice. Write a reply to him, telling him all that he needs to know about the school.

This was the most popular question. 90% of the candidates answered it. The candidate is required to write a letter to his friend who wants to study in the candidate's school, telling him all that he needs to know about the school. It is expected that the candidate will discuss at least three aspects of the school and offer some advice.

About 90% of the candidates gave good descriptions of their schools and praised them to convince their friends to join their schools. 35% of them were unable to write full length essays. There were less gibberish this time, but 30% of them could not write the formal features of this letter correctly. It was evident that 35% of the candidates had never had any practice in writing this kind of letter.

Question 2

Some core values in your society have been eroded by modernization. Write an article suitable for publication in a national newspaper on the need to revive these values for a better society.

About 2% of the candidates answered this question. The candidate is required to write an article suitable for publication in a national newspaper on the need to revive core values of his/her society which have been eroded by modernization. The candidate should mention at least, three such values, explain why they should be revived and he/she may suggest ways of doing so. This question was not well done by the few candidates who attempted it. They misunderstood the question. Some of them wrote letters for articles and wrote no name or title of the article. Candidates should be advised against attempting questions which they do not understand.

Question 3

*The Parent-Teacher Association of your school has decided to transform the school into a single-sex school. As the Senior Prefect, write a letter to the Chairman giving, at least, **three** reasons why you disagree with the decision.*

About 4% of the candidates answered this question. The candidate is required to write a letter to the Chairman of his/her school's Parent-Teacher Association (PTA), giving him/her three reasons why the school should not be transformed into a single-sex school.

Many candidates gave good reasons why the school should not be transformed. They stated what will be lost if the school is transformed e.g. freedom of association with members of the opposite sex and depriving students of learning disciplines they might have a liking for. Girls might be deprived of learning Woodwork or Metalwork since the school authorities might think that girls should not learn such skills. Boys might be deprived of studying Home Science which the school authorities might feel is for only girls. Two percent of those who attempted this question misunderstood the word "sex" and felt the authorities wanted to transform the school into a brothel.

Question 4

*You are the main speaker in a debate on the topic: **Education is the best legacy a parent can give a child.** Write your argument for **or** against the motion.*

About 3% of the candidates answered this question. As the main speaker in a debate, the candidate is required to write his/her argument for or against the motion, "Education is the best legacy a parent can give a child." The candidate is expected to adequately develop at least three points for or against the motion.

The majority of the candidates who attempted this question performed woefully. For example, they did not use the vocatives or wrote them incorrectly. 15% of them took no stance and did not know how to close their argument. The word "legacy" beat them and it was evident that 50% of them did not understand the question.

Question 5

*Write a story to illustrate the saying: **Pride goes before a fall.***

Only 1% of the candidates attempted this question. The candidate is required to write a story to illustrate the saying, "Pride goes before a fall." Candidates did not write good stories in most cases. The stories did not illustrate the saying.

SECTION B
COMPREHENSION

Question 6

Read the following passage **carefully** and answer the question on it.

We believed that the teacher would not be home that weekend. My father had strictly wanted us not to go out at night since recent happenings had shown that it was unsafe. However the thought of those mouth-watering fruits in the teacher's compound made us spend many sleepless nights. We decide that fateful night to sneak out and get some delicious mangoes to feast on.

Towards midnight, my two cousins and I crept stealthily out of the house. The fresh air invigorated us. The moon shone with unusual brightness and that enabled us to see our way clearly and the ripe mangoes as well. We soon reached the teacher's house, a stone's throw from ours. We climbed over the wall, as nimbly as monkeys. Since I was skilled in climbing, my cousins asked me to go up the tree which was laden with ripe mangoes. In no time, I reached the branch which appeared to be most heavy with fruits. I shook it and many juicy mangoes fell to the ground. My cousins gathered them into their bags and we blessed our stars for this windfall.

Suddenly, the powerful headlights of an approaching car warned us of impending danger. To our amazement, it was the teacher and he had already spotted us. In my house to get down, I lost my balance and fell heavily, injuring my arm. My cousins ran like the wind and escaped, leaving me to my fate. I attempted to run away but could not. I lay on the ground groaning in pain.

The teacher raised an instant alarm and the neighbours came rushing to the scene. I pleaded with them not to harm me. The teacher and another man lifted me up and brought me to my father's house. The teacher called my father to open the door but he did not answer.

'We have your son here and he is wounded,' the teacher explained.

'My son is sleeping peacefully in his room,' my father retorted.

My mother, who had been awake all this while and listening to these exchanges, went into our room to verify the truth. My cousins pretended to be fast asleep. When she discovered my absence, she gave a heart-rending cry which at last brought my father out. He took the whole scene in at a glance and stood speechless, gazing at me in shock and disbelief. He thanked the teacher profusely. After my mother had bandaged my arm, my father sat me down and rained abuses on me. I broke down in tears and made a clean confession. This softened him but did not prevent him from giving my cousins the spanking of their lives.

This is the Comprehension Test and it was done well by the majority of the candidates. 75% of them did well. However, there were a few very wrong answers. These are as follows:

(a) Why did the writer's father warn the boys against going out at night?

The correct answer is "The writer's father warned the boys against going out at night because it was risky/dangerous/unsafe."

Examples of wrong answers were:

- The incidents were unsafe
- Society was unsafe
- It was late at night.

(b) *Quote a phrase in the second paragraph which shows that the teacher's house was not far from the writer's own.*

The answer was "..... a stone's throw from ours".

About 90% of the candidates could not quote the phrase correctly.

(c) *What enabled the teacher to discover the boys?*

The correct answer is "The (powerful) headlights of the teacher's car enabled him to discover the boys."

Some wrong answers were:

- The moonlight.
- The headlights of an approaching car.
- The headlights of the approaching car.

(d) *Describe what led to the writer's injury.*

The candidate is expected to give a description of how the boy fell i.e.

- He was in a hurry.
- He lost his balance.
- He fell heavily.

All three of the above are to form the correct answer.

(e) *Why did the writer's father refuse to open the door?*

The correct answer for this question is: "The writer's father refused to open the door because he thought/believed that his son was sleeping (peacefully) in his room."

The following were some of the wrong answers candidates gave:

- He thought they were criminals.
- He thought they were telling lies.
- He had previously warned them not to go out.

From the wrong answers mentioned above, it is evident that candidates answered the question from their own versions. Candidates should stick to the passage they are given.

...an instant alarm...

(f) *What is the grammatical name given to this expression as it is used in the passage?*

Many candidates did not identify this phrase correctly. Candidates are advised to learn this aspect of grammar well.

(ii) What is its function?

Interestingly enough, the majority of the candidates could state the correct grammatical function of the phrase.

(g) ...*like the wind*...

(i) What figure of speech is contained in this expression?

(ii) What does it mean?

About 30% of the candidates could not state the correct figure of speech. Even some of those who stated the correct figure of speech i.e. simile spelt it slimily”, simil and smile. Candidates should learn to spell these figures of speech correctly.

About 90% of the candidates could not give the correct answer which is “very fast.”

(h) For **each** of the following words, find another word or phrase which means the same and which can replace it as it is used in the passage:

(i) recent;

(ii) delicious;

(iii) stealthily;

(iv) approaching;

(v) spotted;

(vi) verity.

This was a question that the candidates did not perform well in. 90% of them could not give correct substitutes for the lexical items.

SECTION C SUMMARY (30 MARKS)

Question 7

Read the following passage **carefully** and answer the question on it.

The announcement in 2011 that the world population had hit the seven billion mark seemed to have taken many people by surprise. Most people wondered how humanity could have grown by a billion within two decades. However, anyone conversant with factors relevant to human growth should understand this phenomenal increase. Let us examine the factors that have prompted the rise in population.

To begin with, think of the health facilities obtainable some centuries earlier compared with now man’s knowledge of medical care was appalling some centuries ago. Today, with medical centres within easy reach of most people, and with drugs available to combat virtually all forms of diseases, death rate has been drastically reduced, while life expectancy has risen significantly in most countries. This has caused the great reduction in infant mortality and subsequently increased the number of senior citizens.

Similarly, there is the vital role of education. The spread of education has created a great level of awareness about human welfare and health. Even primary school pupils know the dangers of drinking unwholesome water, living in an unclean environment and ignoring simple rules of hygiene. Beside, education has deflated the various myths and superstitions that pervaded our fathers' lives.

Nutrition is also a significant contributor. As agricultural practices continue to be aided by serious research efforts, and as tools for farming the land continue to be more available, food supply has been greatly enhanced in an unprecedented way. Today, more food crops can be available on less land area than was the case. Thus, the monster of hunger that used to cause starvation and death is being progressively tamed

Finally, think of the relative security humanity has enjoyed in the past few decades. In the past centuries, major wars were a common phenomenon. Wars that ravaged Europe and Africa for many decades have almost been forgotten. Although there are still some skirmishes in some parts of the world, these have not been serious enough to bring about a significant change in population.

What then is the net result? Each factor translates to a healthier, safer and longer life. Consequently, our population multiplies at a consistent rate. So, we need not be surprised that the world population is seven billion. Indeed, in the next quarter of a century, another billion may be added, and by the end of this century we may have double the present number. But in this lies another danger: that of gross over population. If the present trend continues unabated, the planet Earth may soon become too small to house mankind. For example, arable land may be grossly inadequate to support food production for the very large population. Also, if the population continues to grow unchecked, there will be too many people who may contribute to polluting the environment. Just imagine the amount of waste that would be generated daily by homes, industries and institutions. These waste and debris, if not collected regularly and disposed of properly, may lead to environmental degradation. We should, therefore, watch it.

- (a) In **four** sentences, one for each, summarize the factors that have prompted the rapid increase in world population.*
- (b) In **two** sentences, one for each summarizes what is likely to follow the continuing rapid population growth.*

This is the Summary Test. 90% of the candidates scored zero in this test. They could not summarize the points they were required to summarize. This was the worst performance in WAEC's Summary Test for the past five years. Candidates should be meticulous and make a desperate effort to understand passages set.

WASSCE FOR SCHOOL CANDIDATES 2016
CHIEF EXAMINER'S REPORT
FRENCH 2

1. GENERAL COMMENTS

This report is based on Section A of this paper, which required the candidates to write one essay (from questions 1-3) and one letter (from questions 4-6). A total number of 818 candidates sat this paper. The number of candidates increased significantly compared with last year's 526 candidates. Approximately 97.6% of the candidates wrote one composition and one letter while about 2.4% either created their own questions or did not answer any question at all. It is important to note that although there has been a significant rise in the number of candidates who opted for French, scores in this paper are hardly better than those of 2014 and 2015 on the average. That is to say, there has not been any marked improvement in the overall performance of the candidates in this paper: only about 45 % of the candidates scored between 20 and 37 out of 40. However, one candidate recorded a sterling performance: he scored 39 out of 40.

The statistics above show that candidates who sat this paper were average and above average and that 55% of the candidates were below average. Although there is evidence of success in the teaching and learning of French in some schools, particularly some private schools in the Kanifing Municipal Council, there is still room for improvement even in those schools. The overall performance, especially in public schools, can tempt one to question the qualifications of some teachers. During the conduct of the French Orals, it was also detected that most of the candidates in the Senior Secondary School never did French in the Upper Basic and were only asked to do it in the Senior School so that they could have the required number of subjects for admission, thus the apathy towards French.

2. CANDIDATES' STRENGTHS

Candidates demonstrated these two strengths:

- About 97% of the candidates understood the instructions as well as the questions and answered them appropriately.
- Candidates did better in letter writing than in the essay.

3. CANDIDATES' WEAKNESSES

- All the candidates committed grave spelling and structural errors, in addition to their weak and inappropriate use of vocabulary.
- Whole sets of candidates from certain schools wrote ready-made essays which they could have prepared with their teacher(s).
- The just-mentioned category of candidates, who resorted to memorizing and reproducing ready-made material, ended up writing out-of-topic.
- Candidates, especially those from problem schools (schools that are poorly staffed or admit mainly mediocre students, or both cases), readapted material from the paper in order to have something to write.

- Weak grammatical background.
- About 2.4% of the candidates did not understand the questions.
- About 2.4% of the candidates did not obey the instructions.

It is important to note that the mistakes/errors are either slightly different from those committed by previous candidates or exactly the same. Below, in table format, is a non-exhaustive catalogue of errors detected in the scripts of the candidates, with proposed corrections against each error/mistake:

Error	Proposed Correction
indépendance c'est très bon fête ...	l'Indépendance a été bien fêtée.
tout le monde c'est danser la nuit et manger boucoup	on a dansé toute la nuit et on a beaucoup mangé
je suis porté vêtements spéciaux pour la fête	j'ai mis des vêtements spéciaux pour la fête
dous ma dous ma	doucement, doucement
se jour la	ce jour-là
moi amie, je treincontante	mon amie, je suis très contente
je suis contant/je suis contan	je suis content(e)
j'aitrès content	... je suis très content(e)
ma cher père, je suis ecrit	Mon cher père, je vous écris cette lettre
mon frère sappelle	mon frère s'appelle
mon nouveau professeur de mathématiques c'est parle bien anglais et c'est sympath aussi.	mon nouveau professeur de mathématiques parle bien anglais et est sympa aussi.
mon nouveau ecole	ma nouvelle école
a la university	à l'université
il adore danser	il aime trop danser
il respectes sont parent et aime sont frere et soeur	Il respecte ses parents et aime ses frères et sœurs
ze veut partir Dakar la vacance pour improver mon francais. C'est un langue qui j'aim	je veux partir à Dakar pendant les vacances pour améliorer mon français
au Dakar/elle habite en Dakar	Elle habite à Dakar
...au Bamako	...à Bamako
mon frere est le 18 ans	mon frère a 18 ans
elle à mariée et à dix-huit ans	Elle est mariée et a dix-huit ans
que vous Dieux protégé	Que Dieux vous protège
actuellement je suis très content	Je suis très content à présent
il ne rude pas	Il n'est pas impoli/ Il est très poli
il joue la balle	Il joue au ballon
beaucoup de vie on été perdu	beaucoup de vies ont été perdues
Je vous attend ton repond	J'attends votre réponse
sac jour	chaque jour
...chaque un	...chacun
il aide moi	il m'aide
il aime lui	il l'aime
tu le monde la ba est bien	tout le monde là-bas va bien
il encourage moi	il m'encourage
... tout le monde porte bien	... tout le monde se porte bien
Abientot	A bientôt
je vaisécrit	je vais écrire

Je veux écrire à toi cet lettre	Je veux t'écrire cette lettre
je tres heureux aecrivez le lettre	Je suis très heureux (euse) content(e) de t'écrire cette lettre
je me faitplasir	cela me fait plaisir
je t'embrage/ambrase	je t'embrasse
... je veuxsalué	... je veuxsaluer
... je vous écrivez	... je vous écris
... pour vous demandé	... pour vous demander
...sa	...ça
...la	...là
...issi	...ici
... je pourquoi	... c'est pourquoi
...pasque,passki, paskay, parsas que, etc.	... parce que
... jespere	... j'espère
... commentvatu?	Comment vas-tu?
toujour	toujours
... depi	... depuis
... il faux que	... il faut que
... il yabocup de les élèves	... il y a beaucoup d'étudiants
... jisca	... jusqu'à
dans le villace	au village

4. **SUGGESTED REMEDIES**

The following suggestions shall help future candidates minimize making mistakes in basic French if taken seriously:

- Teachers should update themselves on the new methods of teaching French as a foreign language (The Ministry of Basic Education should organize teacher training workshops).
- Candidates should do more grammar exercises.
- Candidates should be drilled systematically in both written and oral productions using on current issues.
- Candidates should be taken through cognate words.
- Candidates should cultivate the practice of reading French magazines, listening to French programme son radio and watching French programmes on television stations as well.
- Candidates should access French past papers for better guidance and preparation.
- Above all, since French has been made compulsory in certain schools, it is advisable for those schools to improve the teacher-pupil ratio for better results. In addition to proper staffing, it is important that in-service training workshops on the teaching of French as a foreign language be organized for untrained teachers.
- Candidates who did not opt for French in the Upper basic Schools should not be permitted to start French in the Senior Secondary Schools.
- The books listed below could be of immense help to candidates; it is hoped that these books (the list is far from being perfect and exhaustive) can help minimize the damage brought to bear on the French language by the WASSCE candidates:

- (1) Bérard Evelyne, Yves Canier, Christian Lavenne Gilles Breton and Christian Tagliante, *Studio 60 1&2, Studio 100*, Paris, Edition Didier, 2002.
- (2) Bérard Evelyne, Yves Canier and Christian Lavenne, *Tempo 1&2*, Paris, Edition Didier, 1996.
- (3) Bhely - Quenom O and SAM Pratt, *New Practical French 4&5*, London, Longman, 1975.
- (4) Brachet ML and J de Grand saigne: *France Afrique 4*, London, Macmillan Publishers, 1988.
- (5) Chapman RHB, *A French Vocabulary for West Africa*, Cambridge, Cambridge University Press, 1964.
- (6) Penfornis, Jean-Luc, *Vocabulaire progressive du français des affaires*, Paris, CLE International, 2010.

5. COMMENTS ON INDIVIDUAL QUESTIONS

SECTION A: ESSAY

Question 1

Vous venez d'être transféré(e) à une nouvelle école. Présentez votre nouveau professeur de mathématiques.

337 candidates attempted this question and about 45% of this number answered the question appropriately both in terms of content and form.

Question 2

Comment le Jour de l'Indépendance est-il fêté dans votre pays?

221 candidates attempted this question and about 42% of them answered it satisfactorily both in terms of content and form.

Question 3

Un(e) ami(e) vous a invité(e) au cinéma le week-end passé. Racontez votre expérience?

249 candidates attempted this question and about 58% of this number answered the question well appropriately both in terms of content and form.

SECTION B: LETTER WRITING

Question 4

Vous venez de déménager à la nouvelle maison de votre père. Ecrivez une lettre à votre frère à l'étranger pour lui décrire la maison.

191 candidates attempted this question. Approximately 48% of this number answered this question satisfactorily both in terms of content and form. The remaining 52% either regurgitated out-of-context classroom materials or readapted materials from the question booklet in a rather confused manner.

Question 5

Vous êtes interne et vous serez bientôt en vacances. Ecrivez une lettre à vos parents pour leur parler de ce que vous aimeriez faire pendant les vacances.

168 candidates attempted this question and out of this number, approximately 35% of them proved satisfactory both in terms of content and form. The remaining 65% of the candidates scored low marks and more than half of this 65% of the candidates could not do more than copy down the questions contained in the question booklet or reproduce model letters they probably learned in class.

Question 6

Les jeunes de votre quartier vont organiser une soirée dansante. Ecrivez une lettre à votre cousin(e) pour l'inviter à la soirée.

378 candidates attempted this question and approximately 45% of them did well both in terms of content and style; and about 35% of the candidates reproduced ready-made letters that had no relevance to the question.

WASSCE FOR SCHOOL CANDIDATES 2016
CHIEF EXAMINER'S REPORT
LITERATURE-IN-ENGLISH 2

1. GENERAL COMMENTS

This year's paper, being the first in the new syllabus, compels us to treat candidates' performance with some cautious reserve. In fact, the rather late availability of the texts created a corresponding late accessibility of these texts to the candidates for proper and profound study. As such, some of the candidates (about 15%) showed very little or no textual knowledge in one or 'both' questions. However, the positive side clearly shows that at this initial stage, the new syllabus, like the previous ones has stood the test of time and challenges.

This year's paper sits comfortably within the four corners of the new syllabus and fully meets the expected standards of the examination. The questions suited the contents and literary scope of the prescribed texts. They are not in any way found wanting either in the high or low level of assessment. Also, the questions compare quite favourably and positively with those of the previous years.

2. CANDIDATES' STRENGTHS

As a first attempt, the general performance of this year's candidates was quite fair- neither very good nor very bad. Over 50% of these candidates showed clear understanding of the text (even if inadequate in some cases) in at least one of the questions answered. About 35% of the candidates showed understanding of the questions' requirements. The good candidates about 30% of them showed their clear understanding of the texts and literary precision in handling the questions within average acceptable length.

Also, about 40% of the candidates registered an average pass grade in at least one of the questions answered and showed varying degrees of understanding the texts and questions as per average language control through varying lengths in content matter. On the positive side therefore, one can say that these candidates have a general fair start in the syllabus.

3. CANDIDATES' WEAKNESSES

On the negative side however, the candidates manifested serious weaknesses which deprived them from scoring higher grades. Of great concern over the past few years is the growing number of candidates who fail to provide adequate content matter length in both questions. A good number of candidates put full concentration only on their first answer. The second answer was only half, one third and a quarter of the first in content matter.

For some candidates, over 20% of the candidates answers were less than ten lines long. About 15% of all the candidates answered only one question which was less than ten lines long. Some others about 5% of them merely copied the questions and left it at that. There was also a profuse interpretation of questions. About 30% of these candidates misinterpreted one or both questions.

They delved on irrelevances and narrations which completely deviated from the requirements of the questions. There were also weaknesses in organization of ideas, use of language and much ignorance of either the text or the question. On the whole, these weaknesses adversely affected the grades of candidates over 15% of the candidates had less than 10 out of 50 marks. Certainly, these weaknesses had a serious negative impact on the general performance.

4. **SUGGESTED REMEDIES**

The glaring weaknesses in this year's performance show the need for obvious and urgent improvement. Careful reading and organized writing will certainly alleviate them drastically. Careful reading should be fully applied to the texts, notes, commentaries, questions and candidates' answers as well.

Equally so, candidates must fully understand a question's requirements before attempting an answer. This will sharply reduce narrations, misinterpretations and other inaccuracies which tend to pollute the correctness of essays.

Finally, but equally important, candidates must carefully read over each essay they write to provide orderliness and language aptitude in their answers. These are suggestions which if carefully applied can create a drastic change for the better in future performances.

5. **DETAILED COMMENTS ON INDIVIDUAL QUESTIONS**

Question 1

Discuss the relationship between Nii Kpakpo and Maa Tsuru in the novel.

This was one of the most popular questions. 30% of the candidates answered the question. The question required candidates to discuss the relationship between NiiKpakpo and MaaTsuru. 25% of the candidates discussed it well, the remaining 5% simply narrated.

Question 2

Examine the significance of Vickie and Kabria's visit to the police station.

This question required candidates to examine the significance of Vicky and Kabria's visit to the police station. 60% of the candidates attempted the question. The whole 60% of the candidates demonstrated that they did not understand the question. They rather gave reasons why they think Kabria and Vicky went to the police station. They, therefore, failed to answer the question or earn any good mark.

Question 3

Discuss the theme of loneliness in the novel.

This was one of the most popular questions. 30% of the candidates' attempted it. The question required candidates to discuss the theme of loneliness in the novel. 28% of the candidates answered the question well enough to earn high marks.

Question 4

Comment on the writer's narrative style in the novel.

Only 2% of the candidates attempted it. The question required candidates to comment on the narrative style in the novel. The 2% of the candidates demonstrated that, either they were not taught anything on narrative style or they did not understand the question. Consequently, they failed to earn good marks.

*NON – AFRICAN PROSE
RICHARD WRIGHT: Native Son*

Question 5

Consider the view that it is the society that makes Bigger a murderer in the novel.

This was another very popular question. 30% of the candidates attempted the question. The question required candidates to consider the view that it is society that makes Bigger a murderer in the novel. 15% of the candidates answered the question well enough to earn high marks. The remaining 15% simply narrated.

Question 6

What is Max's attitude toward racial relations in the novel?

This question was not popular. Only 2% of the candidates attempted it. The question required candidates to identify and explain Max's attitude towards racial relations in the novel. Less than one percent of candidates earned good marks on the question.

WASSCE FOR SCHOOL CANDIDATES 2016
CHIEF EXAMINER'S REPORT
LITERATURE-IN-ENGLISH 3

1. GENERAL COMMENTS

The following points were noted:

- The questions set, as usual, reflected WAEC's commitment to quality education as they were standard questions.
- Most questions were about characterization and themes and were therefore within the Knowledge and scope of those candidates who had endeavored to study the recommended texts.
- For African Drama, most schools opted for '*harvest of corruption*' whilst very few schools studied '*the blood of a stranger*'.
- For Non-African Drama, most schools studied '*she stoops to conquer*' whilst very few schools studied '*a raisin in the sun*'.
- In the area of African Poetry, most candidates attempted the question on '*the panic of growing older*' and fewer candidates attempted the question on '*piano and drums*'.
- For Non-African Poetry, most candidates attempted the question on '*shall I compare thee to a summer's day*' and fewer candidates attempted the question on '*birches*'.

2. CANDIDATES' STRENGTHS

There was evidence to indicate that most of the candidates, if not all of them, had at least read, if not studied the poems and plays. Because of this, they were able to write something in relation to the questions posed.

3. CANDIDATES' WEAKNESSES

The above, notwithstanding, most of the candidates were not able to identify relevant evidences from the texts and use them aptly in answering the questions. There were also the perennial problems associated with grammar and expressions, such as spelling, tense, agreement, punctuation, and paragraphing.

4. SUGGESTED REMEDIES

In the light of the above observations, the following recommendations are made herein:

- Candidates should be encouraged not just to read the texts and poems but really study them.
- Candidates should make every effort to improve on their knowledge of literary terms, especially those associated with drama and poetry.
- Candidates should endeavour to improve on their competence in the use of English as this would enable them score better grades.
- Books selected by Council should be easily available in the market for easy access.

5. DETAILED COMMENTS ON INDIVIDUAL QUESTIONS

SECTION A AFRICAN DRAMA

Question 1

Consider the view that the play exposes the colonialist exploitation of Africa.

This question, on how *the blood of a stranger* exposes the colonialists' exploitation of Africa was less popular as it was attempted by only 20% of the candidates, who did so very badly. From the onset, it was obvious that most of them had not read, let alone studied the text. They therefore wrote down what they had studied in their History lessons about colonialism in Africa and as a result, scored badly.

Question 2

Examine the role of Kindo as a warlord in the play.

This question, on the role of Kindo as a warlord in *the blood of a stranger* was more popular as it was attempted by about 80% of the candidates, who also did so badly. As in the case of question 1, it was obvious that most of the candidates had not studied the play and so they wrote a general account of what in their opinion warlords do, based on their knowledge about warfare and rebellion in the Sub-region.

Question 3

FRANK OGODO OGECHÉ: Harvest of Corruption

Comment on Aloho as a victim of circumstance in the play.

This question on Aloho as a victim of circumstance in *harvest of corruption* was more popular as it was attempted by about 60% of the candidates, who had studied the text. From the onset, it was very obvious that they had detailed knowledge about Aloho, but could not isolate instances in which she is portrayed as a victim of circumstance. Instead, they presented a narrative summary of the entire play during instances in which Aloho is shown as a victim are mentioned, albeit superficially. As a result of this, they scored only high credit or less marks.

Question 4

Discuss the role Chief Maladu Ade-Amaka in the play.

This question, on the role of Chief Haladu Ade-Amaka in *harvest of corruption* was less popular as it was attempted by only about 40% of the candidates. Again, it was obvious that the candidates knew something about the Chief and his negative role in the play. However, since they could not isolate those roles but rather wrote a narrative summary of the play, they could only score, at best high credit marks.

SECTION B
NON-AFRICAN DRAMA
LORRAINE HANSBERRY: *A Raisin in the Sun*

Question 5

What impression do you form of Mama's character in the play?

This question, on Mama's character in *a raisin in the sun* was less popular as it was tackled by 40% of the candidates. It was obvious from the onset that they had not read the text as they did not even know who Mama is in the play. They therefore wrote a general essay on the role of mothers in the home. As a result of this, they scored very low marks.

Question 6

Consider the importance of the check in the play.

This question, on the importance of the check in *a raisin in the sun* was more popular and equally very badly answered. Since most of the candidates had not studied the text, all what they could write was based on their general knowledge about checks from the world of banking. Therefore they could only score bad marks.

OLIVER GOLDSMITH: *She Stoops in Conquer*

Question 7

Examine the use of dramatic irony in the play.

This question, on the use of dramatic irony in *she stoops to conquer*, was less popular as it was treated by about 45% of the candidates. Unfortunately, most of them did not know the meaning of the literary expression dramatic irony and so they settled for a narrative account of the entire play, during which some instances of dramatic irony were mentioned. As a result of this, they scored at best high credit marks.

Question 8

Assess the character of Mrs. Hardcastle in the play.

This question on the character of Mrs. Hardcastle in the play was more popular as it was attempted by about 55% of the candidates. Once again, they knew something about her but they could not write about her character in detail and so did not score impressive marks.

SECTION C

AFRICAN POETRY

Question 9

Discuss the clash of cultures in “Okara’s Piano and Drums”

This question, on the clash of cultures in *Okara’s piano and drums* was less popular as it was tackled by 40% of the candidates. Most of them correctly observed that the Piano represents western culture and that the drums symbolize African culture but could not elaborate on how the clash of cultures is revealed in the poem. As a result of this, they scored at best pass marks.

Question 10

Examine the persona’s view of ageing in “The Panic of Growing Older”.

This question, on the persona’s view of ageing in *the panic of growing older* was more popular as it was attempted by about 60% of the candidates. Although it was obvious that they knew something about the poem, they could only come up with badly written paraphrases of the entire poem and so could only score at best pass marks.

SECTION D

NON-ARRICAN POETRY

Question 11

Comment on the poet’s attitude to nature in Frost’s “*Birches*”.

This question on the poet’s attitude to nature in *birches* was less popular as it was only attempted by about 20% of the candidates who did so very badly. It was obvious that most of them had not read the poem and so did not even know that Birches are trees, not birds. So they wrote completely irrelevant answers and scored bad failure marks.

Question 12

Examine the theme of beauty in the poem “shall I Compare Thee to a summer’s Day”.

This question, on the theme of beauty in the poem *shall I compare thee to a summer’s day* was very popular as it was attempted by about 80% of the candidates, who did not score good marks. The reason for this is that instead of focusing on the theme of beauty in the poem, they wrote long and confusing paraphrases of the entire poem. Therefore, the best mark scored in most cases was a pass mark.

GENERAL SECTION

WASSCE FOR SCHOOL CANDIDATES 2016
RÉSUMÉ OF CHIEF EXAMINERS' REPORTS
THE GENERAL SUBJECTS

1. STANDARD OF THE PAPERS

All the Chief Examiners reported that the standard of the papers compared favourably to the previous years. Generally, the questions were straightforward and within the scope of the syllabus.

2. CANDIDATES' PERFORMANCE

The Chief Examiners for Geography 2, Economics, Islamic Studies, History and Government reported a slight improvement on the general performance of the candidates compared to the previous years.

3. CANDIDATES' STRENGTHS

The Chief Examiner for Geography 2 reported that the candidates displayed an in-depth knowledge of the subject matter and scored above 50 out of 80 marks allocated to the paper. In general, the candidates did extremely well in questions 1, 4, 5, 6, 7 and 9.

The Chief Examiner for Geography 3 reported that the candidates displayed a good understanding of mathematical geography. This was clearly shown in questions 1 and 2. All those who attempted the said questions scored high marks. The candidates' answers were presented legibly.

The Chief Examiner for Economics 2 reported that the candidates showed a marked improvement in the data response section (i.e. Section A).

The Chief Examiner for Christian Religious Knowledge reported that over 50% of the candidates demonstrated a good knowledge of the subject in the old testaments, the Gospel and Acts of the Apostles (sections A and B). Their answers were precise and well presented compared to the answers given in section C (the Epistles).

The examiners for Islamic Studies reported that candidates' strengths were centered on questions 1, 4 and 5. Most of them answered question 1 very well, because it relates to the practical aspects of the religion which they perform daily.

Generally, the performance in History has improved considerably as some of the candidates have read widely as noticed in their marks in sections B and C. The number of candidates who answered questions for Nigeria has dropped significantly. This has clearly indicated that they were getting more familiar with the instructions and the syllabus.

The Chief Examiner for Government 2 reported that about 80% of the candidates attempted questions 2, 5, 6, 7, 8 and 9 with adequate answers. They also scored high marks in question 8, 10 and 15.

4. **CANDIDATES' WEAKNESSES**

All the Chief Examiners for the General Subjects highlighted the following weaknesses:

- Generally, poor command of the English Language as shown in the use of shortened words and phrases. Poor Language expressions and spellings errors were partly responsible for the low grades scored, by some candidates.
- Where the candidates were required to list and explain a good number of them only listed without explanations.
- Candidates lacked access to adequate reading materials such as text books, WASSCE past question papers which could have led to inadequate preparation for the examination.
- Due to misunderstanding of the instructions, some candidates answered more than the required number of questions, while others answered less than the required number. (i.e. failure to adhere to the rubrics)
- Candidates could not draw simple and accurate diagrams especially in Economics and Geography.

5. **SUGGESTED REMEDIES**

- Candidates and teachers should be encouraged to use the prescribed textbooks and not to depend entirely on pamphlets written by teachers.
- Teachers should be giving enough assignments to candidates which should be marked and corrected together with the candidates in class. This will help them better understand what they are taught.
- School authorities (Principals) should show greater commitment and support to teachers and candidates by motivating and urging them to give of their best. This can be done by organizing extra classes/lessons for their candidates and ensuring that more than 80% of the syllabuses are covered.
- Excursions and field visits should be encouraged to help widen the scope of the candidates' understanding.

WASSCE FOR SCHOOL CANDIDATES 2016
CHIEF EXAMINER'S REPORT
ECONOMICS 2

1. GENERAL COMMENTS

About 90% of the candidates scored very low marks across most of their answers which suggested a lack of preparation. Also, there were discouraging signs in the fact that most of the candidates were using list-like responses and using bullet points as their main method of answering questions.

2. CANDIDATES' STRENGTHS

Candidates showed strength in answering some areas of the data responses questions such as questions 1a, 1c, 2a and 2b. Questions 4 were also well answered.

3. CANDIDATES' WEAKNESSES

The performance of 90 percent of the candidates was below average. This poor performance was due to the following factors.

- Candidates lack of reading materials, such as text books, access to past WASSCE examination papers which leads to inadequate preparation for the examinations.
- Inadequate parental support and monitoring at home.
- Candidates' lack of understanding of the basic Economics concepts shows either failure on the part of the teachers to cover the syllabus or the lack of qualified teachers to teach the syllabus.

4. SUGGESTED REMEDIES

The following recommendations are suggested:

- The development of websites with adequate e-books, summary notes, past question papers may be of great help to Candidates.
- A strict monitoring system by schools to ensure comprehension and coverage of the entire syllabus is necessary.
- Establishment of "Open Days" at the end of each school term, which, will be geared towards encouraging parents to visit school and interact with teachers. This can help change the attitude of most parents by urging them to strictly monitor their children's performance.

SECTION A

5. DETAILED COMMENTS ON EACH QUESTION

Question 1

The following data shows the budget of a hypothetical country in 2006. Study the data and answer the questions that follow:

<i>Revenue</i>	<i>[\$millions]</i>
<i>Company tax</i>	<i>2410</i>
<i>Workers' income tax</i>	<i>160</i>
<i>Excise duties</i>	<i>80</i>
<i>Taxes on exports</i>	<i>100</i>
<i>Value added tax</i>	<i>150</i>
<i>Import duties</i>	<i>90</i>
<i>Non-tax revenue</i>	<i>40</i>

<i>Expenditure</i>	<i>[\$millions]</i>
<i>Construction of roads</i>	<i>100</i>
<i>Building of schools</i>	<i>120</i>
<i>Payment of workers' salaries</i>	<i>150</i>
<i>Government Administration</i>	<i>200</i>
<i>Maintenance of health facilities</i>	<i>220</i>
<i>Extension of electricity to rural areas</i>	<i>180</i>
<i>Maintenance of official vehicles</i>	<i>70</i>

- (a) *How much revenue was realized from:*
 (i) *Direct taxes;*
 (ii) *Indirect taxes?*
- (b) *Calculate the total:*
 (i) *Recurrent expenditure;*
 (ii) *Capital expenditure.*
- (c) *What percentage of total revenue was collected as indirect tax?*
 (d) *State **two** examples of non-tax revenue.*
 (e) *What was the budget surplus or deficit? Explain your answer.*

This was a data response question that was attempted by about 55% of the candidates. Most of the candidates were able to score half of the total mark allocated to this question. About 25% of the candidates could not clearly distinguish between revenue realized from direct and indirect taxes. Also, the different types of revenue and capital expenditure posed problems for candidates.

Question 2

*The utility schedule of a consumer for a brand of ice cream is shown in the table below:
 Use the information to answer the questions that follow:*

<i>Units Consumed (Q)</i>	<i>Total Utility (TU)</i>	<i>Marginal Utility (MU)</i>
<i>0</i>	<i>0</i>	<i>-</i>
<i>1</i>	<i>10</i>	<i>10</i>
<i>2</i>	<i>19</i>	<i>R</i>
<i>3</i>	<i>P</i>	<i>6</i>
<i>4</i>	<i>30</i>	<i>5</i>
<i>5</i>	<i>31</i>	<i>\$</i>
<i>6</i>	<i>Q</i>	<i>0</i>
<i>7</i>	<i>29</i>	<i>-2</i>

- (a) *Calculate the values of P, Q, R and S.*
 (b) *Given that the price of ice cream is \$1.00 per unit, at what level of consumption is the consumer in equilibrium? Explain your answer.*
 (c) *Using a graph sheet draw the marginal utility curve.*
 (d) *State the law of diminishing marginal utility.*

This data response question was attempted by about 45% of the candidates. Good marks were scored by candidates in part (a) that required the calculation of Total Utility and Marginal Utility though, many of the candidates lost marks for failing to show workings.

Indicating the equilibrium of the consumer, drawing of the marginal utility curve and correctly stating the laws of diminishing marginal utility were difficult areas for candidates.

SECTION B

Question 3

- (a) *What is a production possibility curve?*
- (b) *Draw a production possibility curve and indicate any:*
 - (i) *Point P, where resources are fully utilized;*
 - (ii) *Point U, where resources are under-utilized*
 - (iii) *Point X, where production is not feasible.*
- (a) *Explain any **two** factors that can make production at point X feasible.*
- (b) *Why is the production possibility curve negatively sloped?*

This question was attempted by over 60% of the candidates. Most of the candidates scored half of the marks allocated to this question by drawing the PPC and indicating points P,U and X. Most candidates could not explain the factors that can make production at point X (outside the curve) feasible. Also, why the PPC is negatively sloped could not be explained by most candidates.

Question 4

- (a) *What is:*
 - (i) *Peasant farming;*
 - (ii) *Co-operative farming?*
- (b) *Identify any **five** ways through which the government can assist peasant farmers.*

A popular question attempted by all the candidates although scores were low. The meaning of Peasant and Co-operative farming was a problem for candidates. Many candidates only listed the points in 'b' but could not explain them.

Question 5

- (a) *What is price elasticity of supply?*
- (b) *Differentiate between joint supply and competitive supply.*
- (c) *Explain any **four** determinants of elasticity of supply.*

This question was attempted by over 60% of the candidates but the marks scored were low. Price theory has always posed a challenge to candidates. The candidates could not distinguish between Joint supply and competitive supply; factors affecting supply were stated as factors affecting price elasticity of supply.

Question 6

(a) *Define:*

- (i) *Building society;*
- (ii) *Central bank.*

(b) *Highlight any **five** instruments of the central bank in regulating the supply of money.*

This was also, a popular question but the students could not score high marks. They did not know the definition of building society. Some could mention the instruments used by the central bank to regulate money supply but could not explain how they are used.

Question 7

- (a) *What is a discriminating monopolist?*
- (b) *Explain any **four** conditions necessary for a monopolist to practice price discrimination.*
- (c) *Explain any **two** benefits enjoyed by a discriminating monopolist.*

Only 2% of the candidates attempted this question and they showed no knowledge of the concept of discriminatory monopoly.

Question 8

Explain the following National income concepts:

- (a) *Gross domestic Product (GDP);*
- (b) *Gross National Product (GNP)*
- (c) *Cost of living;*
- (d) *Per Capital income;*
- (e) *Standard of living.*

This was another popular question responded by over 70% of the candidates. Most of the candidates displayed little knowledge in defining GDP, GNP, Cost of Living, Per Capita Income and Standard of Living.

WASSCE FOR SCHOOL CANDIDATES 2016
CHIEF EXAMINER'S REPORT
GEOGRAPHY 2

1. GENERAL COMMENTS

This year's paper was of equal standard with the previous years. All the questions were straightforward and clear. The questions covered about 95% of the syllabus.

However, the performance of about 65% of the candidates was unimpressive despite the fact that the standard of the paper was of the level of the candidates.

There was enough evidence from the scripts that about 55% of the candidates were not prepared for the examination.

2. CANDIDATES'S STRENGTHS

Some candidates displayed an in-depth knowledge of the subject matter and scored more than 50 marks out of the 80 marks allocated to this paper.

Some candidates demonstrated better understanding of the requirements or demands of the questions. They drew good maps and adhered to the rubrics.

In general terms, the performance of candidates in questions 1, 4, 5, 6, 7 and 9 was better than the other questions. Most of the candidates that attempted these questions scored at least 50% of the total marks allocated to them.

3. CANDIDATES' WEAKNESS

- Poor knowledge of the subject matter.
- Inadequate coverage of the syllabus.
- Disregard for the rubrics and incorrect interpretation of questions.
- Mere listing of points by candidates as answers to questions that required detailed explanations.
- Misunderstanding of some words used in the questions such as retard, constraints, hindering, modes etc.
- Some candidates answered less than the required number of questions, while some answered more than the required number.
- Some candidates answered more than two questions from one section thereby disobeying the rubrics.
- There is this perennial problem of drawing maps. About 60% of the candidates could not draw the maps for questions 4 and 7 correctly. Even where some candidates drew the maps correctly, they failed to locate and name the required features correctly.
- Most of the candidates failed to provide keys to their maps.

4. SUGGESTED REMEDIES

- Teachers should endeavour to cover the prescribed syllabus.
- Subject teachers should also endeavour to teach their students the basic rubrics of the Geography 2 paper e.g. total number of questions to answer in all and the number of questions to answer from each of the three sections.
- Candidates should obtain and study the prescribed textbooks and other necessary reading materials before the examination.

- Excursions or field trips should be encouraged in schools to stimulate the interest of the students in the subject.
- Teachers should give their students a lot of assignments and class work to improve their writing skills.
- Teachers should be encouraged to read the Chief Examiner's Reports and learn from them in order to improve on their teaching.
- Candidates should be made to know that full marks are not awarded for mere listing of points e.g. employment, revenue, income, foreign exchange etc.
- Candidates should be exposed to WAEC syllabus and pass examination questions.

5. DETAILED COMMENTS ON EACH QUESTION

Question 1

(a) Write explanatory notes on any **two** of the following:-

- (i) Population density;
- (ii) Birth rate;
- (iii) Optimum Population;

(b) In what **four** ways can the problems of under population be solved?

This was the most popular question and more than 90% of the candidates attempted it.

Part (a) of this question was poorly answered by about 60% of the candidates that attempted it. Most of them scored very low marks as they could not give the definition of population density, Birth rate and Optimum population.

However, some candidates managed to score more than half of the 12 marks allocated.

About 50% of the candidates scored good marks in part (b) of the question. However, about 40% of the candidates scored 10% marks in part (b) because they merely listed their points such as early marriage, polygamous marriage, medical facilities etc.

Question 2

(a) List **four** modes of transportation

(b) Identify **four** constraints of inland water navigation

(c) In what **four** ways can the constraints identified in 2 (b) above be solved?

This was not a very popular question and only 60% of the candidates attempted it. Out of the 60% of the candidates that attempted this question, about 70% of them scored very low marks.

Part (a) of the question was well answered by a good majority of the candidates. Most of them scored the four marks allocated to this part of the question as they were able to list the four modes of transportation. However, some of the candidates gave answers like land transportation, river transportation, ocean transportation, etc.

Part (b) of this question was poorly answered by about 70% of the candidates. They scored very low marks. Most of the candidates did not understand the meaning of the word constraints.

Part (c) of this question was also poorly answered by a majority of the candidates and they scored very low marks. This Part (c) is directly linked to part (b) and as long as they failed to give the correct answers for Part (b), they would obviously give incorrect answers for Part (c)

Question 3

- (a) Outline **two** characteristic features of each of the following:
 - (i) Conurbation
 - (ii) Megapolis
- (b) With specific examples, explain any six functions which settlements perform

This was a very unpopular question. About 25% of the candidates attempted it and scored very low marks.

Part (a) of this question was very poorly answered by a large majority of the candidates as they failed to explain the characteristic features of conurbation and megapolis as required by the question.

Part (b) of the question was far better answered than part (a). Some of the candidates scored good marks as they were able not only to explain the functions of the settlements, but they also gave examples to support their answers. However, again, some candidates scored no marks at all for this part of the question as they gave answers such as fishing, agriculture, lumbering, trading as functions which settlements perform.

Question 4

- (a) Draw a sketch map of Senegambia
 - (i) On the map, show and name:
 - (ii) Rivers Senegal and Gambia
 - (iii) Jahally – Pacharr irrigation project
 - (iv) Banjul
- (b) Explain **three** factors which favour the development of the Jahally - Pacharr rice irrigation projects in The Gambia.
- (c) State **three** economic benefits of the Jahally - Pacharr rice development projects

This was a very popular question and about 75% of the candidates attempted it. Most of the candidates that attempted this question scored good marks especially for the part (c) of this question. Most of the candidates scored low marks in part (a) because they failed to draw the map of Senegambia correctly and to insert the features required by the question. Majority of the candidates inserted River Senegal in the middle of the map while a sizeable number of them inserted Banjul in the Atlantic Ocean. A large number of the candidates did not even know the location of the Jahally - Pacharr rice irrigation project.

Part (c) of the question was favourably answered by about 50% of the candidates that attempted this question and they scored very good marks. However, some of the candidates scored low marks as they merely listed their points instead of explaining them in detail as required by the question. They gave answers such as income, revenue, employment, food supply etc.

Question 5

- (a) State **two** advantages of industrialization in The Gambia
- (b) Explain **four** problems that retard industrialization in The Gambia
- (c) In **four** ways, describe how the problems in 5(b) above can be solved.

This was a very popular question and about 70% of the candidates attempted it.

Part (a) of this question was favourably answered by about 75% of the candidates that attempted it. Most of them scored the four marks allocated to this part of the question. However, some of the candidates scored low marks as they merely listed their points such as employment, income, revenue, growth of towns, infrastructural development etc. as answers to this question.

Part (b) of this question was favourably answered by about 50% of the candidates that attempted this question and they scored good marks. Some of them scored the 8 marks allocated to this part of the question. However, some of the candidates scored low marks because they wrote things such as lack of capital, lack of river supply, lack of raw materials etc. as answers. Most of the candidates scored low marks in part (c) of the question. Most of them gave answers such as government should provide raw materials, good transport, capital, etc.

Question 6

- (a) State **two** objectives of the Economic Community of West African States ECOWAS
- (b) Identify **four** problems hindering the achievement of the objectives of ECOWAS
- (c) In what **four** ways can the problems identified in 6 (b) above be solved

About 65% of the total candidates attempted this question. About 50% of them scored average marks.

Part (a) of this question was favourably answered by about 65% of the candidates that attempted this question. Most of the candidates scored the full 4 marks allocated to this question.

Part (b) of the question was also favourably answered by about 60 % of the candidates that attempted this question. Most of them were able to give the four problems hindering the achievements of the objectives of ECOWAS and they scored good marks.

Part (c) of this question was equally favourably answered by about 60% of the candidates and they scored good marks.

SECTION C

AFRICA

Question 7

- (a) *Draw an outline map of Africa.*
On it, show and name:
(i) *Your home country and one other country;*
(ii) *The capitals of the countries in 7 (a) (i) above.*
- (b) *Describe the continent of Africa under the following:*
(i) *Size;*
(ii) *Position.*

This was a very popular question. About 80% of the candidates attempted it. About 60% of the candidates that attempted this question scored low marks.

Part (a) of this question was poorly answered. Most candidates scored less than half of the 8 marks allocated to this part.

Only about 30% of the candidates were able to draw the outline map of Africa correctly. However, majority of the candidates that drew the outline map could not show and name the features required by the question. About 50% of the candidates that attempted this question scored less than half of the 12 marks allocated to part (b) of the question.

Question 8

- (c) *Describe the Savanna belts of Africa under the following headings:-*
(i) *Location;*
(ii) *Vegetation characteristics;*
(iii) *Uses.*

This was the most unpopular question and less than 10% of the candidates attempted it. Most of the candidates that attempted this question scored no marks at all. They were not able to describe the location, vegetation characteristics and uses of the Savanna belts of Africa as required by the question.

Question 9

- (a) *Highlight any **three** features of Plantation Agriculture;*
(b) *Identify any **four** features which favour Plantation Agriculture in Kenya;*
(c) *Identify **three** contributions of Plantation Agriculture in Kenya.*

About 50% of the total candidates attempted this question. Out of this number, about 60% of them scored good marks.

Part (a) of this question was fairly answered by about 60% of the candidates that attempted this question and they scored average marks.

Part (b) of this question was equally fairly answered by a majority of the candidates and they also scored average marks.

Part (c) of this question was favourably answered by about 70% of the candidates that attempted it and they scored good marks. However, some of the candidates scored low marks as they merely listed their points such as provision of income, revenue, foreign exchange etc. without explaining how these things are provided

WASSCE FOR SCHOOL CANDIDATES 2016
CHIEF EXAMINER'S REPORT
GEOGRAPHY 3

1. GENERAL COMMENTS

This year's Geography 3 paper is not quite different from that of previous years in terms of standard. The difficulty level of the questions is almost the same. The question paper covered almost 80% of the syllabus, within the scope of average candidates. Additionally, the paper lacked ambiguity.

2. CANDIDATES' STRENGTHS

The candidates displayed a good understanding of Mathematical Geography. This was clearly demonstrated in questions 1 and 2 in which they showed a clear understanding of mathematical calculations, and presentation of statistical data. All those who attempted the aforesaid questions scored very good marks.

There was less contravention of the rubrics this time round. Candidates also presented legible answers.

3. CANDIDATES' WEAKNESSES

Candidates' weaknesses were reported as follows:

- The problem of language (i.e. expressions and spellings) is still a concern and this is partly responsible for the low grades scored by certain candidates.
- About 95% of the candidates were unable to describe the drainage of the mapped area.
- Candidates found it difficult to draw simple and accurate diagrams.
- Most of the candidates were unable to fully amplify their points. They were simply putting down 'bullet points'. Such points attracted only 50% of the candidates' possible scores at best. Candidates failed to answer required questions.
- Answers were unstructured and did not follow the structure of the questions.
- Many candidates made a poor choice of specific examples.
- Key instructions (command words) such as 'highlight', 'describe', 'explain', etc. were ignored.

4. SUGGESTED REMEDIES

(1) Candidates (students) need to learn how to study for an examination and below are some suggestions:

- Candidates should plan reasonable targets which they can achieve in each study session. A learning period of about 45 minutes produces the best relationship between understanding and remembering. So it is advisable to take a break of 15 minutes before attempting another period of work.
- Focus on essentials.
- Select key words and phrases. When reading a section of a book always select phrases or words which will help you to remember what the section is about.
- Note taking. Always record only the key words, concepts and phrases which need to be remembered.
- Practising techniques. Many aspects of practical Geography and statistical mapping cannot be effectively learned by seeing examples or reading about

them in books. To understand the techniques involved, it is essential to practise such things as drawing sketch maps/diagrams, plotting graphs etc.

(2) Selecting the questions

Poor choice of questions is usually the main cause of poor scores. The Procedure below can help candidates to overcome such difficulties:

- Read the rubric (instruction) at the top of the paper.
- Read all the questions on the question paper carefully.
- Tick all the questions you think you will be able to answer.
- Reduce the number of questions you have ticked to the number required by the rubrics.
- Underline the key words and phrases to ensure that you actually do understand what the question is demanding.
- Select an order in which you will answer the questions, leaving the weakest until last.

(3) Answering the questions

- Read the questions carefully, taking note of the words/phrases you have earlier underlined.
- Check the question to see whether it has sub-sections that could be dealt with separately. Decide whether the answer to the question will require maps and diagrams.

5. **DETAILED COMMENTS ON INDIVIDUAL QUESTIONS**

Question 1

Study the map extract provided on a scale of 1:50,000 and answer the following questions.

- (a) *In your answer booklet, draw the outline of the mapped area to a scale of 1:150,000.*
- (b) *In your new outline, insert and name:*
- (i) *The main road from **UGE** junction to the north-western end of the map;*
 - (ii) **CROSS RIVER;**
 - (iii) *100 ft contour line in the south-eastern part of the map.*
- (c) *Describe the drainage of the mapped area.*
- (d) *Using evidences from the map, identify any **two** possible economic activities of the mapped area.*

This is the compulsory question based on a map extract of a region in West Africa. This question is often meant to test the candidates' abilities to read and interpret basic information provided by contour lines and dot symbols.

Understanding the question

- 1(a) Candidates were required to reduce the mapped area to one-third of its original size by drawing a square. The square is expected to be drawn on a graph sheet. Measurements for the square are acquired by measuring the length and breadth of the original map and divide each result by three as follows:
- I. Length of original map = 36.9 cm
 - II. Breadth of original map = 36.9 cm
 - III. New outline:

Length: $36.9 \div 3 = 12.3$ cm
Breadth: $36.9 \div 3 = 12.3$ cm
 - IV. Use the results above, that is, 12.3 cm for the length, and 12.3 cm for the breadth to draw the new outline.
 - V. Below the new outline, write down the scale of the outline, i.e. 1: 150,000
- (b) (i) This question wanted the candidates to draw a single line representing the main road from urge junction to the north-western end of the map. Candidates must also write down the name of the road along this line or in the key.
- (c) (ii) This question asked the candidates to draw a double line to represent the cross river. Candidates are also required to write down the name of the river along the river or in the key.
- (d) (iii) This question required candidates to draw and name the 100 ft contour line.
- 1(c) this question asked the candidates to describe the drainage of the map. That is, to name the major river, its tributaries if any, to identify the stage of the main river (upper, middle or lower), its direction of flow, etc.
- 1(d) candidates were required to identify what people in the mapped area do for living using evidences from the map only.

Comments on individual sub-questions

- 1(a) about 90% of the candidates were able to draw the required square correctly. The remaining 10% got the calculations right but found it difficult to draw the square correctly. Those who drew their diagrams in the answer booklet produced skewed diagrams. In future, centres presenting candidates must encourage their candidates to use graph sheets. Some candidates did not write down the scale of the new outline and that made them to lose some marks. Candidates should note that all maps except sketch maps must be accompanied by a scale factor.
- 1(b) the general performance here was average. This is because a sizeable number (about 45%) of the candidates did not provide the key of symbols nor write down the name of the feature alongside the feature on the outline. Additionally, features were not properly inserted on the new outline.
- 1(c) This question was attempted by only 95% of the candidates. Of this total, a staggering 90% of them performed poorly. Of the remaining 10%, 6% mentioned the dendritic drainage pattern without explaining how it is related to the mapped area. The remaining 4% described either the relief of the map or its vegetation.

Expected answers for Question 1(c)

Description of the drainage of the mapped area

- well drained
- major River is Cross River
- Cross River is at the lower stage
- drainage density of the area is high
- north-western corner of the area is liable to flooding
- the major river is located in the north-western part of the map
- some river like River Uhuru flow southwards
- north flowing rivers drain into the cross river
- watershed at the centre of the map
- major tributary of the cross river is asu
- drainage pattern is dendritic
- intermittent drainage.

NB: The above points must be amplified.

1(d) Answers for this part of the question were reasonably good and as candidates were able to score good marks. However there were few Cases of concern involving 10% of the candidates who were unable to amplify their points, naming the economic activities without mentioning the evidences. These candidates managed to score low marks.

Expected answers for question 1(d):

Possible economic activities in the mapped area

- farming due to scattered cultivation
- lumbering due to the presence forest
- fishing due to the presence of rivers
- transport services due to the presence of roads
- plantation agriculture due to presence of endc rubber estate.

Question 2

Use the data in the table below to answer the questions that follow.

Country B's population figures (in millions) by state in the year 2005.

<i>State</i>	<i>Population (millions)</i>
<i>A</i>	<i>40</i>
<i>B</i>	<i>35</i>
<i>C</i>	<i>25</i>
<i>D</i>	<i>50</i>
<i>TOTAL</i>	<i>150</i>

- (a) *Construct a pie chart to represent the data.*
- (b) *Highlight any **two** problems in the use of pie charts.*
- (c) *State **one** other method that could be used to represent the above information.*

This was one of the most popular questions attracting almost 90% of the candidates. The candidates did extremely well especially in the (a) and (c) parts of the question.

Understanding the question

- 2(a) the question required the candidates to draw a pie chart (divided circle) using the statistics in the table provided. It also required the candidates to show all mathematical calculations, involving the conversion of each state's contribution to angular variables (i.e. to degrees of a circle). They were also required to provide a key of symbols and give a title to the completed diagram.
- 2(b) this sub-question required candidates to describe two problems related to the construction and use of pie chart. That is, the problems one is likely to face when trying to draw and interpret a pie chart. The use of poor drawing materials has no relation to the question and so must not be mentioned.
- 2(c) this question asked candidates to give another method that one can use to present the data in the table.

Comments on individual sub-questions

- 1a) this sub-question was well answered by almost 95% of those who attempted it. With the exception of about 2%, they were able to get their calculations right and so were able to correctly draw the pie chart. There were few candidates (about 3%) who showed no calculations but they were able to correctly draw the pie chart.
- The main concern in this sub-question is the unnecessarily very long method used by almost 40% of the candidates to arrive at the required angles. They first converted the variables to percentages (for which they scored no marks) and then percentages to degrees. A lot of time was wasted on this cumbersome procedure to the point that they had lesser time for the other remaining questions.
- The whole exercise involves a simple mathematical calculation that takes the following format:
- $$\frac{X_i}{\Sigma x} \times 360^\circ, \text{ where } X_i = \text{first variable}, \Sigma x = \text{total of all variables}.$$

This should be done for all variables.

Expected answers for question 2(a)

Sum of country's population (in millions) = 150

$$\text{State A: } \frac{40}{150} \times 360^\circ = 96^\circ$$

$$\text{State B: } \frac{35}{150} \times 360^\circ = 84^\circ, \text{ etc.}$$

The answers arrived at are now used to draw the angles of the pie chart by using a pair of compass and a protractor.

- 2(b) Candidates did not score good marks in this part of the question. Most of them, about 80% of the candidate could not come up with any convincing problem pertaining to the use of pie chart. Of the remaining 20%, 15% of them were able to score above average marks while the remaining 5% scored no marks.

Expected answers for question 2(b)

Problems in the use of pie chart

- can only show one distribution
- comparison of sectors difficult
- mathematical calculation is tasking
- construction is difficult if sectors are many
- angular measurements are difficult
- vision is blurred when too many items are involved
- difficulty in determining actual figures

2(c) This sub-question attracted good responses. It was attempted by about 95% of the candidates. About 96% of those who attempted it scored the maximum possible marks. The remaining 4% scored no marks because they provided wrong answers such as histogram, scatter graph, etc.

Expected answers for question 2(c)

Other methods that could be used to represent the information:

- simple bar chart
- percentage bar chart
- divided/component bar chart
- pictogram

Question 3

- (a) *Highlight **three** differences between Plutonic and Volcanic rocks.*
(b) *With the aid of diagrams, describe the formation of Crater Lake.*

This is also a very popular question attracting almost 70% of the candidates. Generally, the performance was very low especially in part (b). There were, however, few outstanding performances (about 5%).

Understanding the question

- 3(a) Candidates were required to provide differences between igneous rocks formed below the earth surface (plutonic) and those formed at the surface (Volcanic). This should include differences in appearance, formation and occurrence.
- 3(b) Crater lakes are features (depressions containing water) of extrusive vulcanicity and are often associated with volcanic mountains. Candidates were required to draw a volcanic mountain with a depression at the summit and explain how the lake may have been formed.

Comments on individual sub-questions

- 3(a) scores for this sub-question were low. About 70% of those that attempt it simply tabulated the differences. Thus they were able to score only 50% of the maximum possible marks in instances where the responses were correct. Of the remaining 30%, 20% of them gave differences between igneous rocks and sedimentary rocks. The remaining 10% had no idea of what the question required of them.

Expected answers for question 3(a):

Differences between Plutonic and Volcanic rocks:

- plutonic rocks are formed beneath or within the earth's crust while volcanic rocks are formed on the surface of the earth.
- Plutonic rocks have large crystals while volcanic rocks have small crystals
- plutonic rocks are coarse grained while volcanic rocks are fine grained
- plutonic rocks are mostly basic rocks while volcanic rocks are acid rocks, etc.

3(b) this sub-question was poorly answered by the few who attempted it (about 30%). The poor performance was due to the fact that candidates had a shallow idea of what a crater lake is. The few who attempted to draw diagrams produced them poorly.

Expected answers:

Mode of formation of Crater Lake

- weakness develops in the earth crust
- molten magma is trapped within the earth crust
- cracks and joints develop in the areas of crustal weakness
- magma under pressure is ejected through a vent
- magma is composed of earth and cinder
- a cone is built around the vent by the materials
- the cone is blocked
- subsequent eruptions blow off the top of the cone
- a depression is formed
- the depression is called crater
- rain water/melting ice collects in the crater
- this forms a crater lake.

Question 4

- (a) State **three** characteristics of limestone region.
(b) Describe the formation of limestone pillars.
(c) In what **two** ways is limestone important to man?

This was also a popular question attracting about 70% of the candidates. The performance in this question indicated that what actually attracted the candidates to this question was the (c) part of the question. The performance in the (a) and (b) parts of the question was far below expectation while that in the (c) part was encouraging.

Understanding the question

- 4(a) this sub-questions required candidates to explain how a limestone region looks like and what makes it different from other physical regions. Here candidates were expected to describe the surface appearance/features as well as the underground features of limestone region.
- 4(b) in this sub-question candidates were required to explain how limestone pillars were formed from calcium bicarbonate solution in limestone caves. A diagram may be drawn to explain to help the candidate in the explanation.
- 4(c) This sub-question required candidates to state the uses of the limestone itself, the scenery and other materials associated with the limestone area.

Comments on individual sub-questions

- 4(a) about 30% of the candidates who attempted this question scored good marks. They were able to correctly describe the characteristics of limestone region. Of the remaining 70%, 40% of the candidates had a sketchy idea of what a crater lake is. The remaining 30% of the candidates gave irrelevant answers.

Expected answers:

Characteristics of limestone region:

- rocks in the region are sedimentary
- the rocks are of organic origin
- absence of luxuriant vegetation
- presence of depressions/gorges
- presence of dry valleys
- presence of scrubs and grassland vegetation
- presence of underground drainage
- presence of caves, pillars, stalactites and stalagmites
- jointed rocks
- absence of surface drainage
- presence of rugged topography, etc.

- 4(b) this sub-question was poorly attempted by 80% of the candidates. Of the remaining 20%, 17% were only able to state that limestone pillars are formed when the stalagmite and stalactite are joined. The process that leads to this joining of these two features was never explained. This sort of answer attracted only a few marks. The remaining 3% had no idea of how a limestone pillar may have been formed.

Expected answers to question 4(b)

Formation of limestone pillar:

- formed in limestone region
- formed within a cave
- rain water combined with atmospheric carbon dioxide to form weak acid
- acidic water dissolves limestone
- dissolution causes calcium bicarbonate
- intensification of rock dissolution leads to the formation of underground caves
- water drips into caves from roof of caves
- water evaporates leaving behind calcium carbonate residue
- calcium carbonate residues hang from roofs of caves to form stalactites
- some calcium carbonate residues grow upward from the floors of caves as stalagmites
- continuous growth of stalagmites and stalactites join together to form new feature called limestone pillar.

- 4(c) this question was well answered by about 80% of those who attempted it. They were able to score the maximum possible marks because they were able not only to outline their points but were also able to amplify them. The remaining 20% consists of candidates who merely listed points and those who presented irrelevant responses.

Expected answers

Ways in which limestone is important to man

- raw material for cement industry
- used as alloy in smelting tin and iron
- provides grazing land
- source of underground water
- beautiful scenery for tourism

Question 5

- (a) (i) *Highlight **two** ways in which water resources are classified.*
(ii) *In what **three** ways can water resources be used?*
- (b) *Describe **three** ways by which man's activities limit the use of water as a resource.*

About 45 – 50%) of the candidates attempted this question. The overall performance was nothing but average. However, on a question by question basis, the (a) (i) and (b) parts of the question proved to be very difficult for the candidates. The performance was only good in the (a) (ii) part of the question.

Understanding the question

- 5(a) (i) this question required the candidates to explain two possible ways of grouping water resources. In other words, they were required to put water resources into two categories based on their composition, location, size and state.
- 5(a) (ii) Here candidates are simply asked to state ways in which man can use water resources. In other words, they were to state the importance of water for man.
- 5(b) this sub-question required the candidates to describe the ways man's actions have hindered the effective use of water as a natural resource.

Comments on individual sub-questions

- 5(a) (i) the performance on this question was generally poor. A candidate demonstrated no idea of having read or studied anything on methods of classifying water resources.

Expected answers

Ways in which water resources are classified

- according to location = underground vs. surface water
 - according to composition = salt vs. fresh water
 - according to size = e.g. ocean, seas, lakes, ponds, rivers, springs, streams, etc.
 - according to state = stagnant vs. running water
- 5(a) (ii) This sub-question attracted very good scores. A lot of the candidates (about 80%) scored the maximum possible marks. The remaining 20% of the candidates were unable to amplify their points (15%) and those who wrote incomplete sentences that were at best irrelevant.

Expected answers

Ways in which water resources can be used

- sporting
- irrigation
- sources of sea food
- domestic uses
- transportation
- H.E.P generation
- industrial use
- recreation
- tourism
- sources of minerals
- research
- boundaries

5(b) this sub-question was poorly attempted. Candidates simply did not know what was required of them. As such most of them (about 85%) simply wrote down whatever came to mind. Of the remaining 15%, 10% were able to score credible marks as were able to provide acceptable answers. The remaining 5% were those who knew the causes of water pollution but could not relate it to man's activities.

Expected answers

Ways by which man's activities limit the use of water resources

- discharge of industrial waste into water bodies
- fishing with chemicals
- oil spillage
- mining activities
- waste disposals
- application of chemical fertilizers
- discharge of toxic substances into water bodies
- sharing of same water source with animals
- damming of rivers upstream
- dumping untreated sewage into water bodies

Question 6

- (a) Define the term **climate**.
- (b) Name the instrument used in measuring **each** of the following climatic elements:
- (i) Temperature;
 - (ii) Pressure;
 - (iii) Rainfall;
 - (iv) Sunshine;
 - (v) Humidity.
- (c) In what **four** ways is the study of weather and climate important to man?

This was one of the most popular questions attracting more than 90% of the candidates. The general performance was reasonably good. Candidates showed a clear knowledge of what climate is and how the various elements of climate are measured. They were also able to supply good responses on the importance of weather and climate to man. There were however, some candidates who found it very difficult to correctly spell the names of some of the instruments used to measure the elements of climate, while others had difficulties in providing all the four ways by which the study of weather and climate is important to man.

Understanding the question

- 6(a) this sub-question is asking the candidates to explain what climate is as opposed to weather.
- 6(b) in this sub-question candidates were required to name the materials that one can use to measure the elements of climate listed in the question.
- 6(c) candidates were required to explain four ways by which the study of weather and climate is useful to man.

Comments on individual sub-questions

- 6(a) the performance in this sub-question was exceptionally good as 90% of the candidates scored the maximum possible mark. The remaining 10% defined weather instead of climate.

Expected answer for question 6(a):

Definition of climate:

- the average weather condition of a place taken over a long period of time usually 30 to 40 years.
- 6(b) the performance in this sub-question was equally good. The only problem in the responses of some candidates was their inability to correctly spell the names of some instruments, e.g.:-
- ‘Thermometer’ for Thermometer
 - ‘Rain gage’, ‘rain guage’ for Rain gauge
 - ‘Sunshine recerd’ for sunshine recorder, etc.

Expected answers for question 6(b)

Instruments used for measuring weather

- (i) Thermometer = temperature
 - (ii) Barometer = pressure
 - (iii) Rain gauge - rainfall
 - (iv) Sun dial/sun shine recorder/Campbell stroke = sunshine
 - (v) Hygrometer = humidity
- 6(c) the general performance on this sub-question was averagely good. Most candidates (about 60%) were only able to provide two or three ways rather the four ways asked for. The remaining 40% of them were able to provide four or more ways by which the study of weather is important to man.

Expected answers for question 6(c)

Ways in which the study of weather and climate is important to man:

- human settlement
- health
- environmental hazards
- clothing
- vegetation
- agriculture
- cultural practices
- soil formation
- transportation
- communication
- building types
- weather forecast
- planning activities
- sporting activities

Question 7

- (a) (i) *Define the term **Solar System**.*
(ii) *List any **five** components of the solar system.*
(b) *Outline any **four** characteristics of the earth*

This was another popular question attempted by most candidates (90%). The performance was very good and encouraging. Only a few candidates (about 5%) struggled to answer the (a) (ii) part of the question.

Interpreting the question

- 7(a) (i) this sub-question required the candidates to tell what solar system is.
7(b) (ii) candidates were asked to write down any five natural features that make up the solar system.
7(c) (iii) Candidates were required to write four things that the earth has as a member of the solar system which the other members do not have.

Comments on individual sub-questions

- 7(a) (i) this part of the question was well attempted. Candidates scored above average marks.

Expected answer for question 7 (a) (i)

Definition of solar system:

- (i) The solar system consists of the sun and the nine planets with their satellites.

- 7(a) (ii) This part of the question was also well attempted by the candidates. Almost 95% of them scored the maximum possible mark. No candidate scored zero in this sub-question.

Expected answers for question 7 (b) (ii)

Components of the solar system:

- the sun
- mercury
- venus
- earth
- mars
- jupiter
- saturn
- uranus
- neptune
- pluto
- satellites
- asteroids
- meteors
- comets

7(b) the performance in this sub-question was equally good. It attracted very good responses. With the exception of a token 2%, the rest showed a clear understanding of the characteristics requested in the question.

Expected answers for question 7 (b)

Characteristics of the earth:

- spherical of geoid in shape
- has more oxygen than other planets
- the only planet that supports life
- is the 5th largest planet in our solar system
- has one natural satellite
- rotates on its axis
- rotates eastwards (from east to west)
- revolves round the sun
- completes a rotation in 24 hours
- completes a revolution in 365 ¼ days
- has different seasons
- the third planet from the sun, etc.

Question 8

- (a) *Outline three differences between **deflation** and **abrasion**.*
(b) *Using specific examples, describe the mode of formation of a deflation hollow.*

This was the most unpopular question which was attempted by only 2%. They selected this question for want of a fourth question to satisfy the rubrics but not because they knew the answers.

Interpreting the question

- 8(a) this question is asking the candidates to provide any three differences between the two main processes of wind erosion.
8(b) candidates were required to explain how a deflation hollow which is a feature of wind erosion may have been formed, stating where an example could be found.

Comments on individual sub-questions

- 8(a) this question was poorly answered by almost all the candidates who attempted it. They did not seem to know that the two processes in question were processes of wind erosion and so found it difficult to come up with differences.

Expected answers for question 8 (a):

Differences between deflation and abrasion:

- deflation involves blowing away of loose rock wastes while abrasion involves hauling rocks against rock surfaces.
- deflation involves rolling loose rock materials along the ground whereas abrasion - involves polishing, scratching and wearing away of rock surfaces.
- deflation usually results in lowering of land surfaces while abrasion is most effective at the base of rocks.
- deflation is associated with winds while abrasion is associated with winds, water and waves.

- deflation produces landforms such as deflation hollows and oases, while abrasion produces landforms such as rock pedestals, zeugens, yardangs etc.
 - abrasion occurs everywhere while deflation occurs only in arid and semi-arid regions.
- 8(b) the performance in this sub-question was equally poor. Almost all the candidates scored no marks because their responses were far too fetch. There was a general lack of understanding of the topic tested.

Expected answers for question 8 (b)

Mode of formation of a deflation hollow:

- a feature of arid region
- a product of wind deflation
- a basin or saucer-shaped desert landform
- wind exerts frictional force on loose rock particles on the surface
- involves the lifting of loose materials from the ground
- the loose materials lifted are blown away
- this action consequently lowers the land surface
- wind eddies help to deepen and enlarge the hollows particularly in soft rock zones
- the enlarged hollows are called depressions or deflation hollows.

**SCHOOL CANDIDATES 2016 WASSCE
CHIEF EXAMINER'S REPORT
GOVERNMENT 2**

1. GENERAL COMMENTS

The questions were standard and appropriately drawn from both the traditional topics and the newly introduced topics in the WASSCE Government syllabus. Although candidates should have been familiar with the topics, unfortunately their average performance did not reflect the expectations. This could be attributed to candidates' ill preparedness towards the examination, lack of proper and adequate tutoring and the use of good reading materials.

2. CANDIDATES' STRENGTHS

Candidates' strengths were reported as follows:

- Nearly 95% of the candidates observed the rubrics of the examination by not answering questions specifically reserved for candidates in Nigeria, Ghana and Sierra Leone.
- About 85% of the candidates followed the instructions on the paper by answering two (2) questions from section A and two (2) from section B.
- About 80% of the candidates provided appropriate answers to questions 2, 5, 6, 7, 8 and 9 and very good marks were scored such as 8, 10, and 15.
- Nearly 70% of the candidates exhibited a high degree of legibility and clarity of work.

3. CANDIDATES' WEAKNESSES

Candidates' weaknesses were reported as follows:

- About 40% of the candidates could not express themselves in simple and concise English Language, making their answers clumsy to read and understand.
- Examiners also observed that 10% of the candidates started answering a question, for example on page 3 of the Answer booklet and referred the Examiner to page 5 for a continuation of the same question.
- About 10% of the candidates answered more than one question on a page of the Answer booklet
- The points raised by 20% of the candidates in answering their questions were mostly mere mention of points.
- Nearly 5% of the candidates provided an unnecessary introduction to questions. Marks are not awarded for such details.

4. SUGGESTED REMEDIES

The Chief Examiner proposed the following measures as way of improving on performance:

- Candidates should be encouraged by teachers to improve upon their skills in writing the English Language.
- Candidates must desist from the practice of using two different pages for a question. Examiners made a lot of mistakes in accurately transferring marks scored for such questions on to the cover of the Answer booklet.

- Candidates should be discouraged from answering more than one question on a page of the Answer booklet. Every question should start on a fresh page.
- Candidates should be made to understand that whatever point they raised, must be explained.
- Candidates should avoid providing unnecessary introduction or excessive details to question, as marks are not awarded for such details.
- Teachers should encourage their students to read Government Textbooks on topics covered, instead of only relying on copied notes sometimes difficult to understand.
- Teachers should give out tests and assignments to students as frequently as possible. Such exercises will help to indicate possible strengths and weaknesses of the candidates before the examination.

5. **DETAILED COMMENTS ON INDIVIDUAL QUESTIONS**

Question 1

- (a) *What is fascism?*
 (b) *Highlight any **four** features of fascism.*

This question was very unpopular among 30% of the candidates. The performance was very unsatisfactory with an average score of about 3 out of 15. The definition was poorly done as 10% of them saw fascism as being feudalism. The features were equally poorly tackled as every point raised was either not properly explained or out of context.

Question 2

*Outline **five** processes by which a bill becomes law in a presidential system of government.*

This question was very popular among 85% of the candidates, but the performance was only satisfactory about 5 out of 15. About 20% of the candidates who attempted it, knew the headings of the processes but could not explain what takes place under each.

Question 3

*State **five** factors that can limit the independence of the Judiciary.*

About 40% of the candidates attempted this question. The performance was unsatisfactory with an average score of about 3 out of 15. The problem with this question was that 30% of the candidates failed to differentiate limitations on judicial independence from limitations on the Judiciary. Candidates rather raised points on factors that limit the Judiciary instead of addressing the factors that limit judicial independence and so deviated.

Question 4

*Highlight any **five** roles of minority parties in a multi – party democracy.*

This question was the most unpopular question among 20% of the candidates. The average score was poor about 3 out of 15. About 10% of the candidates wrote on the importance of multi – party and democracy. Those who wrote on the importance of minority parties could not raise convincing points to score good marks.

Question 5

*Identify any **five** roles performed by the mass media in nation building.*

This was another popular question among 90% of the candidates. The average score was equally good, about an average of 8 out of 15.

Question 6

*Outline **five** reasons for the demand for independence by The Gambians from the British.*

About 85% of the candidates answered this question with an average mark of about 5 out of 15. The points raised by about 20% of the candidates fell outside the marking scheme.

Question 7

- (a) Mention **three** former French colonies in West Africa*
- (b) Identify **four** qualifications for assimilation of indigenous Africans into French citizenship.*

About 90% of the candidates attempted this question with good average score of about 10 out of 15. It is however unfortunate that about 30% of the candidates did not know French colonies in West Africa. The qualification for French citizenship was better handled.

Question 8

*Outline **five** positive effects of colonialism on West Africa.*

Nearly 90% of the candidates attempted this question and the performance was also good, an average score of about 8 out of 15. Unfortunately about 20% of the candidates did not explain well how colonialism impacted positively on West Africa. If they had been careful and explained their points well, they could have done better than they did.

Question 9

*State **five** reasons for the failure of the Senegambia confederation.*

This was the most popular question among 95% of the candidates. The average performance was only satisfactory, an average score of about 5 out of 15. About 40% of the candidates raised good points but could not explain how these points created problems leading to the collapse or failure of the confederation. They could have performed better, if they had brought out the difficulties leading to the collapse or failure of the confederation.

Question 10

- (a) What is National Interest?*
- (b) Outline **four** objectives of your country's foreign policy*

This question was the most unpopular among all the questions, only about 10% of the candidates answered it. The performance was only satisfactory at an average score of about 5 out of 15. The definition of National Interest was poorly done and the candidates wrote more on the factors that influence foreign policy instead of the aims and objectives of foreign policy of a country.

WASSCE FOR SCHOOL CANDIDATES 2016
CHIEF EXAMINER'S REPORT
HISTORY 2

1. GENERAL COMMENTS

The standard of the paper compared favourably with those of previous years. The problem with the paper was that candidates were either not properly taught or did not understand what they were taught. Some technical words such as characteristics, disadvantageous, positive etc. were not understood as shown from the way questions were answered. These terms are related to history and therefore teachers and candidates are expected to know them.

There were no incorrect or ambiguous questions nor were there questions outside the requirements of the syllabus.

The questions were suitable for the level being examined. The only problem as already stated was the comprehension and understanding of some technical words. It was also discovered that some weak candidates attempted questions from Nigeria, Ghana, Sierra Leone and Liberia, although their number was much less than the figure noticed in the previous years.

2. CANDIDATES' STRENGTHS

Generally, some of the candidates have improved considerably as it was noticed in sections B and C. This shows that once the syllabus is updated, candidates will continue to improve. This year too, less than 2% of the candidates attempted questions outside the Gambia as it was before. It is also observed that the language of candidates has improved slightly. Candidates are therefore encouraged to read as widely as possible.

3. CANDIDATES' WEAKNESSES

It was generally observed that candidates still do not know how to spell words – even simple words. Some candidates also did not write legibly and this could prevent them from scoring good marks. It is still observed that some candidates did not fully understand the rubrics as they answered from only two sections instead of three. It was also observed that some candidates did not do well in sections A and B in particular. Some candidates only relied on pamphlets written by their teachers or others and this did not help them.

4. SUGGESTED REMEDIES

The Chief Examiner proposed the following measures as way of improving on performance:

- Candidates and teachers should be encouraged to use the prescribed text books and not to depend on pamphlets written by their teachers and other authors whose materials are not detailed enough to help them pass the examination.
- Candidates and teachers should ensure that they complete the syllabus rather than gambling among the topics with a view to passing the examination.
- Candidates should drill themselves in spelling.
- Candidates should endeavour to read all other books besides the prescribed text books so as to improve their understanding or comprehension of the English Language.

SECTION A

THE GAMBIA UP TO 1800

5. **DETAILED COMMENTS ON INDIVIDUAL QUESTIONS**

Question 1

- (a) List any **three** Mandinka States.
- (b) Outline any **four** features of political organization of the Mandinka.

This was a very popular question as about 60% of the candidates attempted it. About 40% of them scored good marks for the (a) part. However, the (b) part was poorly answered by some of the candidates who attempted it. Many of them wrote on the social organization of the Mandinka instead of the features of the political organization. For the (a) part they should have stated Jimara, Nuimi/Niumi, Jarra/Jara, Kiang, Kantora, etc. For the (b) part they should have stated that the government was hierarchical. The king was assisted by nobles; the nobles were given state lands to distribute by the Mansa, etc.

Question 2

*Highlight any **five** social traditions of the Krio (AKU) in The Gambia.*

This was a fairly popular question which was poorly answered by most of the candidates. It seemed as if they either did not understand what was being asked or they had made up their minds to answer something else. They interpreted the question stating the reasons for success of the Aku in The Gambia or the roles they played towards the development of The Gambia. Their answers included some of the following – the Aku were the first to embrace Christianity and western education. They also stated that they were wealthy merchants.

Some candidates understood the question by mentioning the type of food stuff that the Aku brought into The Gambia. They mentioned for example fufu, etc. They were expected to give some of the following points - the Krio believed in the Supreme Being or God. They took part in the out dooring of a child after birth on the eight day known as pulna do, komodo, or komojade. Regular provision of food and beverages for the deceased, the few of those who attempted this question and understood it scored good grades.

Question 3

*Identify any **five** ways by which the Europeans and The Gambians profited from trans-Atlantic slave trade.*

This was another popular question in this section as about 60% of the candidates attempted it. Generally it was very poorly answered as some of the candidates did not understand what was being asked. Most of the candidates who attempted this question, over 80% of them wrote on the effects of the slave trade instead of the ways by which the Europeans and The Gambians profited from the trade. The answers should have included some of the following – Trading companies were established by European slave dealers. Special ships were built by the Europeans for transporting slaves. Slave markets were created in both the interior and the coastal areas. Trade associations were formed by African slave dealers, etc.

SECTION B **THE GAMBIA IN THE 19TH CENTURY**

Question 4

- (a) *State any **three** characteristics of Marabout in the 19th century.*
- (b) *In what **four** ways did the Soninke - Marabout war affect The Gambia?*

This was the most popular question in this section. Most of the candidates who attempted it understood what was being asked. However, for some of those who understood it failed to answer part (a) correctly.

For part (b) the majority of them scored good marks. However some of the candidates scored low marks because they wrote on the causes of the Soninke-Marabout wars. For part (a) they should have stated the following – they were teachers in Islamic education; they served as scribes/secretaries they made amulets or charms for the people; they served as interpreters in the Mansa's court and they were preachers in Islamic religion. For part (b) some of these points should have been stated: some parts of the country were destroyed and the people became homeless; new villages and towns emerged; many people accepted Islam; farm lands were destroyed and this led to famine; it paved way for the colonization of The Gambia, etc.

Question 5

*In what **five** ways were the Christian missionary activities disadvantageous to The Gambians in the 19th century?*

This was a popular question although it was not well understood. Many of the candidates who attempted this question instead of stating ways in which the Christian missionary activities were disadvantageous wrote on the advantages of missionary activities or reasons why the missionaries did not succeed in converting many people to Christianity. They were expected to have stated that the missionaries discouraged the practice of traditional religion and culture; replacement of traditional names with Christian names; rejected and preached against Gambian art, music and marriage system; discriminated against the Gambian clergymen, etc.

Question 6

*Outline any **five** factors that led to the disruption of trade in The Gambia during the British administration.*

This was not a popular question. Most of the few candidates who attempted it did not understand it. Candidates were writing about things not related to the question. Instead of writing about the factors that led to the disruption of trade in the Gambia during the British administration. They wrote reasons for the delay in the abolition of the trans-Atlantic slave trade. They should have given some of the following reasons: the competition over trade on The Gambia River between Britain and France over Albreda; further expansion of the British into the interior brought them into conflict with Ismail and Omar who wanted to check nominal Muslim chiefs who wanted to offer land to the British; the sale of arms to the interior people which also disrupted the groundnut trade, etc.

SECTION C THE GAMBIA IN THE 20TH CENTURY

Question 7

*Highlight any **five** roles played by traditional rulers during the colonial rule in the 20th century.*

This was a very popular question as about 65% of the candidates attempted it. Most of them knew the roles played by traditional rulers in the 20th century and therefore scored fairly good marks. There were a few candidates who wrote about the roles played by traditional rulers during the pre-colonial period instead of the colonial period. Some of the points they needed to include were as follows: taking an active part in assisting the colonial government to control trade and commerce; reporting to the European officials in the districts and towns; serving as members of the legislative and provincial councils; collecting taxes for the British officials and using part of it to develop their areas.

Question 8

*Outline any **five** positive effects of the colonial economic policies on The Gambia.*

This was perhaps the most unpopular question in the whole paper as about 4% of the candidates attempted it. The majority of the candidates who attempted this question did not have a glimpse or idea of what was being asked. Those who attempted it performed very badly. May be they did not understand the terms positive and economic.

They wrote on the effects of the trans-Atlantic slave trade or the contribution of the Christian missionaries towards the spread of Christianity, western education and abolition of the trans-Atlantic slave trade. They were expected to mention the introduction of new cash crops; boosting of mining industry e.g. tin etc. development of road networks; development of ports, harbours and water ways; introduction of post and telegraph services; the growth of urban centres etc.

Question 9

- (a) Name any **three** trade unions that participated in The Gambians' struggle for independence.
- (b) In what **four** ways was Edward Francis Small important in the politics of The Gambia?

This was almost the most popular question in the whole paper as about 75% of the candidates attempted it. Generally the candidates who attempted it understood the question. Only few of them did not understand what was being asked. Some of the candidates listed correctly three of the trade unions that participated in The Gambia's struggle for independence – Bathurst Trade Union, The Gambia Workers Union, The Gambia Teachers' Union, the Rate Payers' Association. However, part of candidates mentioned individuals such as Dawda Jawara, P.S. Njie, E.F. Small, and Garba-Jahumph while others mentioned political parties such as United Party, Peoples' Progressive Party, Democratic Party, etc.

For 9 (b) the majority of the candidates mentioned ways in which Small was important in Gambian politics. However some failed to give the correct answers. Some candidates mentioned that he founded the Edward Francis Small Teaching Hospital and also formed the Peoples' Progressive Party. The answers should have included the following: he founded the first Gambian Trade Union, the Bathurst Trade Union in 1929. He established the tradition of critical and independent political journalism. He established The Gambia branch of the National Congress of British West Africa and became its secretary. He represented The Gambia at the National Congress of British West Africa held in Accra in March 1920 and he was the principal speaker at the conference.

**SCHOOL CANDIDATES 2016 WASSCE
CHIEF EXAMINER'S REPORT
ISLAMIC STUDIES**

1. GENERAL COMMENTS

The standard of this year's paper was good; the questions were within the range of the candidates and within the syllabus. They were simple and straightforward. The performance of the candidates was not as good as expected, but there is still some improvement in certain schools in the country compared to previous years. 50% of the candidates did well in question 1, 4 and 5 and they did badly in questions 2, 3 and 6. It is observed that candidates hardly performed well on Qur'an and Hadith in the previous exams.

2. CANDIDATES' STRENGTHS

The Candidates performed well on question 1, 4 and 5. Question 1 was simple for them; it was about the aspects of the Religion which they practise every day that eventually become part of their lives.

3. CANDIDATES' WEAKNESSES

They did badly on questions 2, 3 and 6. This shows that candidates still had difficulty in the areas of Qur'an and Hadith.

4. SUGGESTED REMEDIES

Candidates should take their time to read the questions and make sure that they understand what the questions required from them before they start writing. They should make extra effort to study the Qur'an and Hadith and ensure that they improve their performance on these two areas.

Teachers should make an effort to teach them some practical aspects of the syllabus like salat, wudu, hajj, etc. in order for them to actually know how to perform these acts of worship. Candidates should make their own research to know and not to depend entirely on what the teachers taught them in the class rooms.

5. DETAILED COMMENTS ON INDIVIDUAL QUESTIONS

Question 1

Describe the performance of Salatus-Subhi.

This was the compulsory question which all candidates attempted. It was an easy question. Majority of them performed it well and scored high marks on it. However, some of them did not write the performance in order while others did not write the supplications they should recite when performing Ruku, Sujud or sitting between sujuds. They also failed to include the Qunud and the Fajr prayer that follows the subhi prayer and the Iqamah.

Question 2

Comment on the lessons contained in Suratun- Nasri and Suratul-Kafirun.

As I reported earlier, Candidates did not do well in Qur'an. Their performance has always been weak in Qur'an and Hadith. Majority of those who attempted this question did not mention any of the lessons. They rather translated it or transliterated it. Only few of the candidates were able to mention one or two lessons in Suratun Nasri like seeking forgiveness from Allah and gratitude should be shown to Allah for his bounties.

Question 3

Outline the lessons in Hadith 16 of An- Nawawi.

This was another question which candidates always avoid during exams. The few of them who attempted it did not even know the content of the Hadith. They wrote about the Hadith that dealt with neighbours.

Question 4

Highlight the socio-political activities of the Jahiliyyah Arabs.

This is one of the most popular questions which almost 90% of the candidates attempted and were able to score marks on it. They were able to write about the social vices that the Arabs engaged themselves like gambling, alcoholism, women harassment, marriage without limit, devoicing at will, infanticide, women used as chattels, prostitution, the exploitation of the weak and the political system that depends on the decision of the leaders of the tribes. Only less than 15% of the candidates misunderstood the question and wrote about the religious and economic activities of the Jahiliyyah Arabs.

Question 5

Write on Islamic teachings on parent-child relationship.

This is another popular question which 70% of the students attempted and were able to score high marks. They were able to write on: 1. the responsibility of parent in upbringing the child, choosing good names for their children, educating them, providing their basic needs and to make sure that they teach them how to pray at their tender age. 2. The responsibility of the child to the parent, like to respect and obey his parents, support them at their old age, pray for them in their life time and after death and not to insult their parents or raise their voices on top of theirs when talking to them.

Question 6

Discuss the benefits of Zakat and Sadaqah to the community.

This was also another popular question attempted by about 70% of the candidates though they were not able to score high marks. Only about 15% of the candidates scored good marks. This is because most of them misunderstood the question and wrote about the individual benefits the giver gets rather than the community.

WASSCE FOR SCHOOL CANDIDATES 2016
CHIEF EXAMINER'S REPORT
CHRISTIAN RELIGIOUS KNOWLEGES

1. GENERAL COMMENT

The questions were within the prescribed syllabus. The language used was also within the range of understanding of Grade 12 candidates.

A total of four hundred and fifty-nine 459 candidates sat the paper this year. Their performance was generally fair with more mastery of the Old Testament topics than the Epistles section.

17% of the candidates scored marks ranging from 30 – 47 out of the total of 60 marks, and 27% of the candidates scored between 20 – 29 marks.

2. CANDIDATES' STRENGTHS

50% of the candidates demonstrated a good knowledge of the subject in the Old Testament, the Synoptic and Acts areas (sections A and B). Their answers were precise and with a better logical presentation than the epistles – section C. However, their scores were not high enough.

3. CANDIDATES' WEAKNESSES

A good percentage of the candidates demonstrated a lack of knowledge of the epistles stories. Their answers were mainly preaching rather than presenting the teaching of the epistle writers. This contributed to low scores in this section of the paper.

4. SUGGESTED REMEDIES

It is suggested that:

- Teachers should be firm and faithful to the Bible literature rather than giving sermons of their Churches' doctrine to candidates.
- CRS qualified teachers be posted to all schools where there are candidates.
- The prescribed Bible should be made available to candidates.
- Gambian Christian Council or Gambia Pastoral Institute should organise periodic in-service training for unqualified CRS teachers.

SECTION A
THEMES FROM THE OLD TESTAMENT

5. **COMMENTS ON INDIVIDUAL QUESTIONS**

Question 1

- (a) *Describe how Moses responded to God's call.*
- (b) *State **three** reasons why people refuse to accept leadership roles.*

This question was answered by six candidates. Though some of them had an idea about the topic, many of them could not present their responses logically.

The question was based on the call of Moses and his response but some candidates narrated his birth and some the travel to the Promised Land.

Question 2

- (a) *Recount the effects of the behavior of Eli's children on Israel as a nation.*
- (b) *What **two** lessons can be learnt by parents from Eli's attitude?*

This question was attempted by 178 candidates. Many of them performed well but others could not state lessons parents can learn such as:

- Inculcating the fear of God into their children.
- Training their children to acquire good moral values.
- Knowing that disobedience to the Lord's commandments leads to punishment.

Question 3

- (a) *Narrate the circumstances that led to the rejection of Rehoboam as a king of Israel.*
- (b) *What **three** factors can lead to the rejection of a political leader?*

This question was the least popular one. It was attempted by only 42 candidates. However, many of those who answered it had good marks. The "b" part was also well answered. Factors leading to the rejection of political leaders includes.

- Being dictatorial.
- Lack of respect for people/elders.
- Deplorable economic conditions.
- Indulging in immoral acts.

Question 4

- (a) *Relate the story of Hosea's marriage to Gomer.*
- (b) *Mention **three** factors that ensure a stable marriage.*

About 177 of the candidates attempted this question. It was a well answered question with very good marks. Only few of the candidates mixed up the names of Hosea's children and their meanings.

The factors for a stable marriage were also presented by many of the candidates. These included:

- effective communication.
- mutual love.
- faithfulness to each other.
- patience.

Question 5

- (a) *Highlight Jesus' call of the twelve disciples*
- (b) *Identify **four** good qualities of a Christian leader.*

The question was attempted by 347 candidates. It was the most popular question but the performance was below average. Many candidates could not logically present how Jesus called his disciples in any of the synoptic gospels.

However, their presentation on the qualities of a Christian leader was well done. They gave qualities like:

- uprightness.
- humility.
- selflessness.
- being exemplary.

Question 6

- (a) *“And a young man followed him, with nothing
But a linen cloth about his body and they seized him...
And ran away naked”*

Trace the events which led to this incident in the life of Jesus.

- (b) *Give **four** reasons why some people forsake their friends.*

57% of the candidates attempted this question. However, most of the candidates did not understand the. The story was on Mark's account of Jesus in the garden of Gethsemane: His agony and arrest. Some candidates presented on Jesus' care of the demonic. However, their responses on why people forsake their friends were fairly good.

Question 7

Highlight the activities of Peter in Lydda and Joppa

*Identify **two** ways by which some pastors are hiding behind miracles to cause havoc in the society today.*

78% of the candidates attempted this question. The candidates had a fair idea of the topic but were confused as to what happened at Lydda and Joppa. The visit of Peter to Lydda and curing Aeneas, a bedridden man for eight years and being sent far from Joppa due to Tabitha's death.

The "b" part was not also properly answered. The havoc some pastors caused in society through their miracles were not well presented these include:

- extortion of money from people.
- having affair with peoples' wives.
- infringing on peoples' rights.
- arrogance and use of abusive words.

Question 8

Explain James' advice to Christians to be doers of the word and not hearers only.

*State **two** factors that hinder Christians from doing the will of God.*

This was one of the most popular questions with 223 of the candidates attempting it. Having the idea of James' teaching on the topic was demonstrated by some candidates but their presentations were mainly preaching.

However, there was a fair presentation on the factors hindering Christians from doing God's will.

These factors included:

- A lack of faith.
- Unpleasant experiences.
- Fear.
- Laziness.
- Lack of self – control

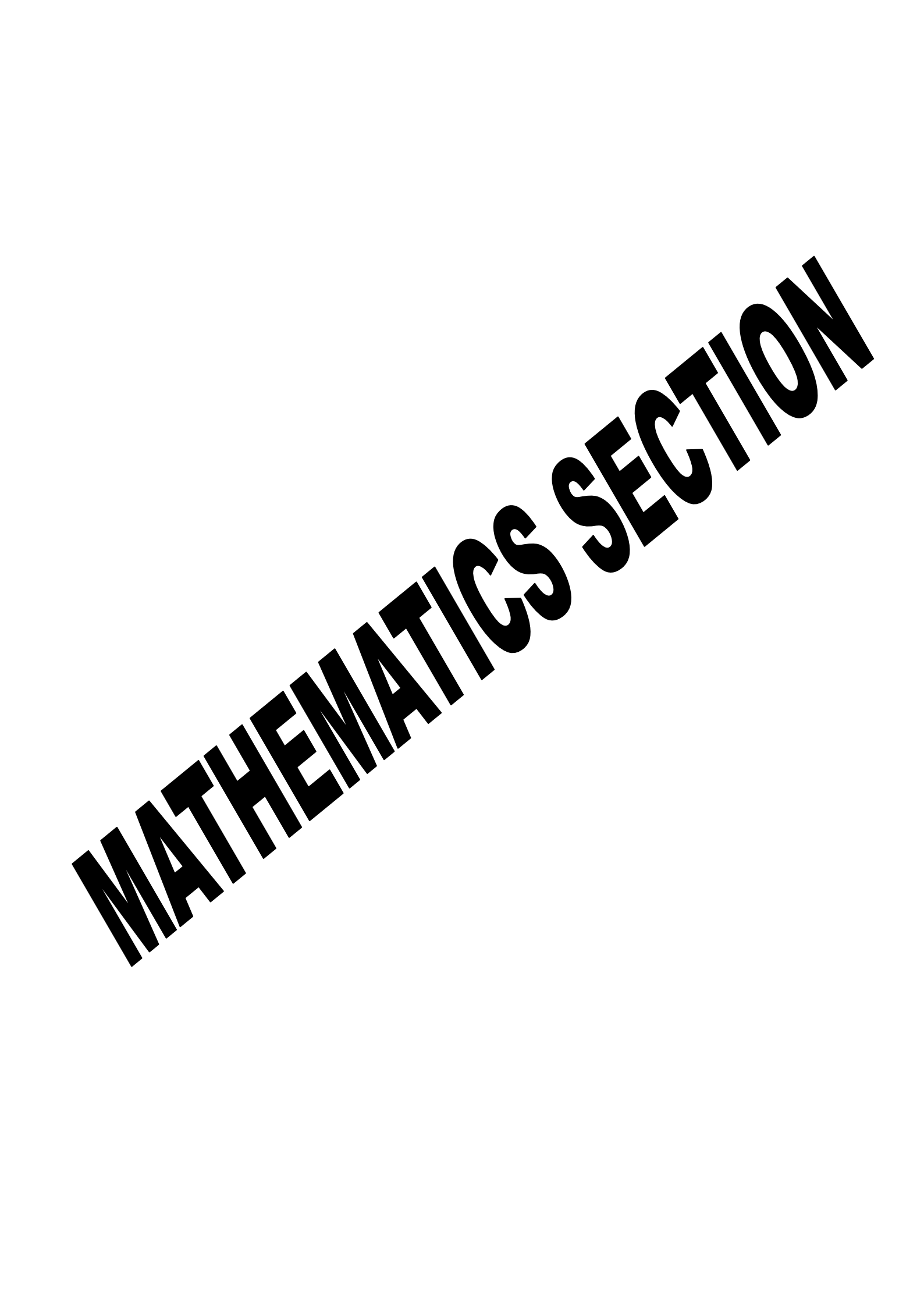
Question 9

Relate Peter's teaching on submission to authority.

*State **seven** ways a Christian can be a good citizen.*

This question was attempted by 240 candidates. It was popular and many candidates had a fair idea of the topic though the presentation was poor and their scores were average. Candidates' performance was better in the "b" part. Ways to be a good citizen included

- reporting criminal cases.
- self discipline.
- standing for the truth.
- paying of taxes.



MATHEMATICS SECTION

WASSCE FOR SCHOOL CANDIDATES 2016
RÉSUMÉ OF CHIEF EXAMINERS' REPORTS
MATHEMATICS

1. STANDARD OF THE PAPERS

According to the Chief Examiners reports of both Mathematics (core) and Further Mathematics, the standard of the paper was comparable to those of the previous years. The questions were drawn within the scope of the syllabus and covered a wide range of topics.

2. CANDIDATES' PERFORMANCE

Generally, the performance of the candidates according to both Chief Examiner for Mathematics (core) and that of Further Mathematics was below average.

3. CANDIDATES' STRENGTHS

In Mathematics (core), the candidates were able to draw lines of a given length, construct angles and bisect them, the plotting of points on a graph, as well as to calculate the common difference in arithmetic progression.

In further Mathematics, some candidates showed some understanding of statistics, probabilities, mechanics and calculating gradients.

4. CANDIDATES' WEAKNESSES

In Mathematics (core) candidates showed inability to work out equations/expression from given information.

Most of the candidates had poor knowledge on binary operation, polynomials, standard deviation.

5. SUGGESTED REMEDIES

- Teacher must exercise patience in teaching concepts to the candidates and should encourage them to study them.
- Teacher must ensure that candidates have sufficient time for revision after covering the syllabus.
- Candidates must effectively use their Mathematical instruments, calculator, etc.
- Emphasis should be put on the need for the candidates to read the rubrics of each question before attempting it.
- Teachers should endeavour to give more assignments to candidates and take time to mark their work.

WASSCE FOR SCHOOL CANDIDATES 2016
CHIEF EXAMINER'S REPORT
MATHEMATICS 2

1. GENERAL COMMENTS

The questions set were within the standard expected from the candidates. They were all within the scope of the examination syllabus and also compared favourably with those of the previous years. The stems of the questions were very clear.

2. CANDIDATES' STRENGTHS

The following strengths have been observed:

- Use of the integral powers of 10 to remove the decimal point.
- Calculation of rate % at simple interest.
- Expansion of factorized expressions.
- Calculating the common difference in an arithmetic progression.
- Construction of frequency distribution table and calculation of the mean from it.
- Drawing lines of given length.
- Construction of angles of 60° and 90° and the bisection of these to get 30° and 45° respectively.
- Construction of locus of points equidistant from two given points.
- Recalling of the concepts of perimeter and area of regular shapes like triangle, rectangle, circle and semi circle.
- Completion of table of values of a given equation.
- Plotting of points on a graph from a given table.
- Identifying the gradient of a line.

3. CANDIDATES' WEAKNESSES

The following weaknesses observed were as follows:

- Inability to form equations/expression from given information.
- Inability to express number in standard form.
- Little or no concept of compound interest.
- Poor knowledge of circle geometry and angle properties.
- Inability to extract information from a Venn diagram of three intersecting sets.
- Inability to input information in a Venn diagram of three intersecting sets.
- Inability to use properties of angle of triangles and cyclic quadrilateral to find unknown angles.
- Lack of understanding the completion of the square method of solving quadratic equations.
- Inability to calculate the standard deviation of a given data.
- Inability to use graph to find solution to equation.
- Inability to determine the equation of a straight line.
- Poor concept of modular arithmetic.
- Inability to construct parallel lines.

4. **SUGGESTED REMEDIES**

The following remedies should be noted for action by both teachers and candidates:

- Emphasis should be put on the need for the candidates to read the rubrics of each question before any attempt.
- Answers to questions involving money must be expressed in two decimal places.
- Candidates should be acquainted with basic mathematical concepts.
- The examination syllabus should be seen as a part of the main teaching syllabus hence, teacher should endeavour to go beyond the examination syllabus.
- Candidates should be exposed to various relevant reading materials, such as WAEC past papers, Chief Examiners' report, etc.
- Candidates should be encouraged to solve problems through research methods.
- Teachers should endeavour to give more assignments to candidates and take time to mark their work.
- Candidates must be encouraged to like 'Mathematics'

5. **DETAILED COMMENTS ON INDIVIDUAL QUESTIONS**

Question 1

(a) Without using Mathematical tables or calculators, evaluate $\frac{0.09 \times 1.21}{3.3 \times 0.00025}$, leaving the answer in standard form (Scientific Notation).

(b) A principal of GH¢5,600.00 was deposited for 3 years at compound interest. If the interest earned was GH¢ 1,200.00, find, correct to 3 significant figures, the interest rate per annum.

Most of the candidates did not go by the rubrics of the paper. They were advised not to use calculators or mathematical tables. They were expected to simplify their answers by transforming each number into standard form and to cancel the common factors to obtain the required result. Over 90% of the candidates resorted to the use of calculators. Few others could not write the final answer in standard form.

$$\text{Solutions: } \frac{9 \times 10^{-2} \times 121 \times 10^{-2}}{33 \times 10^{-1} \times 25 \times 10^{-5}} = \frac{3 \times 10^{-2} \times 11 \times 10^{-2}}{1 \times 10^{-1} \times 25 \times 10^{-5}} = \frac{33 \times 10^{-4}}{25 \times 10^{-6}} = 1.32 \times 10^2$$

Most of the candidates lacked the knowledge of the compound interest formula. However, they attempted to solve the problem by applying the simple interest formula to get the rate. Over 98% of the candidates could not solve the problem.

Solution: amount = (principal) + (interest)

$$\text{GHc } 5600.00 + \text{GHc } 1200.00 = \text{GHc } 6800.00$$

$$A = P \left(1 + \frac{r}{100} \right)^n$$

$$6800 = 5600 \left(1 + \frac{r}{100} \right)^3, \quad 17 = 14 \left(1 + \frac{r}{100} \right)^3, \quad \sqrt[3]{\frac{17}{14}} = \left(1 + \frac{r}{100} \right)$$

$$\frac{r}{100} = \left(\sqrt[3]{\frac{17}{14}} \right) - 1, \quad r = 100 \times \left(\sqrt[3]{\frac{17}{14}} - 1 \right)$$

$$100 \times \left(\sqrt[3]{1.2142857} - 1 \right) = 6.6858 = 6.69\% (3sf)$$

Question 2

- (a) Solve: $7(x + 4) - \frac{2}{3}(x - 6) \leq 2[x - 3(x + 5)]$.
- (b) A transport company has a total of 20 vehicles made up of tricycles and taxicabs. **Each** tricycle carries 2 passengers while **each** taxicab carries 4 passengers. If the 20 vehicles carry a total of 66 passengers at a time, how many tricycles does the company have?

Most of the candidates lacked the knowledge of the basic multiplication table. They could not clear fractions and could not expand by clearing the brackets. However, those who able to expand couldn't collect like-terms'. Over 85% of the candidates had difficulty in expanding and simplifying.

Solution:

$$7x + 28 - \frac{2}{3}x + 4 \leq 2(x - 3x - 15), = 21x + 84 - 2x + 12 \leq 6(x - 3x - 15) =$$

$$21x + 84 - 2x + 12 \leq 6x - 18x - 90, = 19x + 96 \leq -12x - 90$$

$$19x + 12x \leq -90 - 96, = 31x \leq -186, = x \leq -6$$

Most of the candidates had problem of translating word problem into Algebraic expressions or equations. Hence, they were unable to form a pair of simultaneous equations in two unknowns. The question was poorly answered. Less than 5% of those who attempted the question had it right.

Solution: let x represent the number of tricycles and y represent the number of taxi cabs. Hence the two equations can be formed.

$$\text{equation 1, } 2x + 4y = 66, \text{equation } x + y = 40$$

$$\text{eq. 1} = 2x + 4y = 66$$

$$(\text{eq. 2} \times 2) = \text{eq 3} = 2x + 2y = 40$$

Subtracting eq.1 from eq.3 $2y = 26, \therefore y = 13$

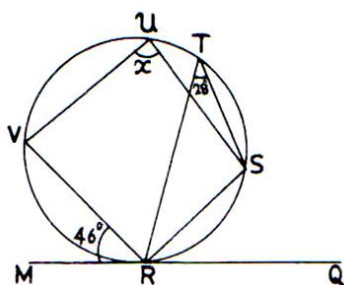
Substituting for y in eq. 2

$$x + y = 40, \quad \equiv x = 40 - 13, \quad x = 27$$

$$\therefore \text{the number of tricycles} = 27$$

Question 3

(a)



In the diagram, $\angle RTS = 28^\circ$, $\angle VRM = 46^\circ$, MQ is a tangent to the circle $VRSTU$ at the point R . Find $\angle VUS$.

- (b) A cylindrical tin, 7 cm high, is closed at one end. If its total surface area is 462 cm^2 , calculate its radius.
[Take $\pi = \frac{22}{7}$]

Most of the candidates were unable to relate properties of cyclic quadrilateral and alternate segments. They had insufficient knowledge of circle geometry and angle properties and hence unable to detect the relationships between angles in the given diagrams. Less than 81% of the candidates were able to solve this problem.

Solution: $\angle QRS = \angle STR = 28^\circ$ (angles in alternate segment)

$$\angle VRS = 180^\circ - 46^\circ - 28^\circ = 106^\circ$$

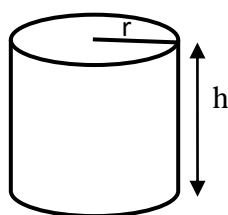
$$\angle VUS = 180^\circ - \angle VRS$$

$$\angle VUS = 180^\circ - 106^\circ$$

$$\angle VUS = 74^\circ$$

The candidates had difficulty in detecting the difference between opened and closed ended cylinders in terms of surface area. However, some of them were able to recall the total surface area (TSA) of a closed cylinder as $2\pi r(r + h)$ and equation it to 462cm^2 . Few other candidates equated wrongly the volume $\pi r^2 h$ to 462cm^2 . Less than 14% of those who attempted were able to find the radius of the base of the cylinder.

Solution:



$$\text{TSA} = 2\pi rh + \pi r^2$$

$$462 = \pi r(2h + r), 462 = \frac{22}{7}r(2 \times 7 + r), 462 = \frac{22r(14+r)}{7}$$

$$3234 = 22r(14 + r), 147 = 14r + r^2$$

$$\text{hence, } r^2 + 14r - 147 = 0, r^2 + 21r - 7r - 147 = 0, r(r + 21) - 7(r + 21) = 0$$

$$(r - 7)(r + 21) = 0, r = 7 \text{ or } -21$$

$$\therefore \text{radius (r)} = 7$$

Question 4

Scores	1	2	3	4	5	6
Frequency	25	30	x	28	40	32

The table shows the outcome when a die is thrown a number of times. If the probability of obtaining a 3 is 0.225.

- how many times was the die thrown?
- calculate the probability that a trial chosen at random gives a score of an even number **or** a prime number.

Although, the candidates were able to equate the probability $\frac{x}{155+x} = 0.225$, most of them interpreted the table poorly and could not get the numbers of even and or prime numbers right. Other candidates were unable to convert 0.225 to a proper fraction $\frac{9}{40}$ to make it easier to solve for x. less than 14% of these who attempted were able to solve the question fully.

Solution:

$$P(3) = \frac{n(3)}{\Sigma f}$$

$$0.225 = \frac{x}{25 + 30 + x + 28 + 40 + 32}, \quad 0.225 = \frac{x}{153 + x}$$

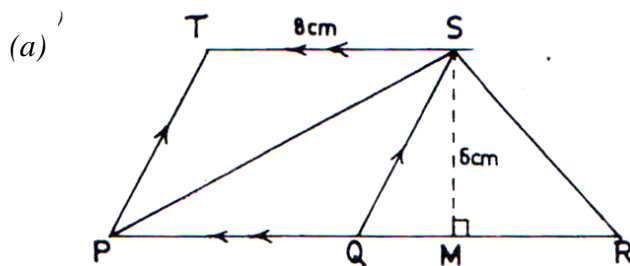
$$\frac{9}{40} = \frac{x}{153 + x}, \quad x = 45$$

(a) The number of times the die was thrown = $155 + x$, $155 + 45 = 200$

(b) $P(\text{Even} + \text{Prime}) = P(\text{Even}) + P(\text{Prime}) - (\text{Even} \cap \text{Prime})$

$$\frac{30+28+32}{200} + \frac{30+45+40}{200} - \frac{30}{200} = \frac{90+115-30}{200} = \frac{7}{8}$$

Question 5



In the diagram, $PQST$ is a parallelogram; PR is a straight line, $|TS| = 8 \text{ cm}$, $|SM| = 6 \text{ cm}$ and area of triangle $PSR = 36 \text{ cm}^2$. Find the value of $|QR|$.

(b) A tree and a flagpole are on the same horizontal ground. A bird on top of the tree observes the top and bottom of the flagpole below it at angles of 45° and 60° respectively. If the tree is 10.65 m high, calculate, correct to 3 significant figures, the height of the flagpole.

Some candidates failed to realize that the base of the triangle is $|PR| = |PQ| + |QR|$, which is $8 + |QR|$. Hence, they were unable to connect this length to the area in order to obtain $|QR|$; the candidates however, were able to recall that the area of a triangle is $\frac{1}{2}bh = \left(\frac{1}{2} \times \text{base} \times \text{height}\right)$. less than 20% of those who attempted the question were able to solve it.

Solution:

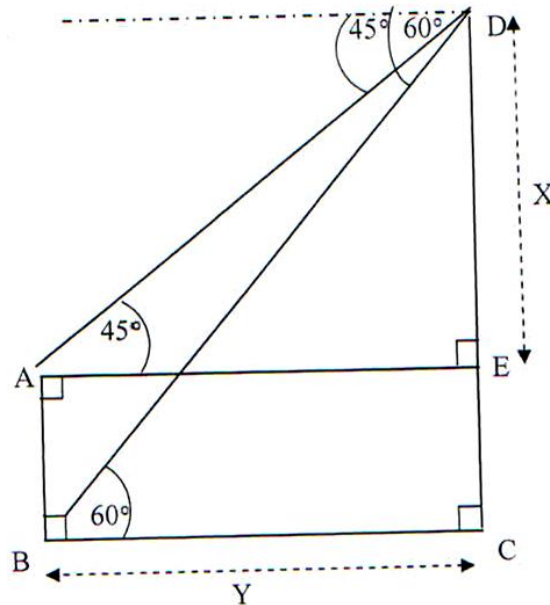
$$\text{Area of } \triangle PSR = 36 \text{ cm}^2, \frac{1}{2} \times \text{base} \times \text{height} = 36 \text{ cm}^2, \frac{1}{2} \times PR \times SM = 36$$

$$\frac{1}{2} \times PR \times 6 = 36, \quad PR = 12$$

$$|QR| = |PR| - |PQ|, = 12 - |PQ| = 12 - 8 = 4 \text{ cm}$$

- (a) Most of the candidates lacked the understanding of angles of elevation and angles of depression. They were unable to make a good sketch of the question resulting in poor diagrams and incorrect approaches. They could not determine the height $10.65m$ or the angles of 45° and 60° . Less than 5% of the candidates were able to answer the question but could not correct it to 3 significant figures as demanded.

Solution:



From $\triangle BCD$, $\tan 60^\circ = \frac{CD}{BC}$, $BC \tan 60^\circ = CD$

$$BC = \frac{CD}{\tan 60^\circ} = \frac{10.65}{1.7321} = 6.1478$$

$$Y = 6.1478$$

From the isosceles right-angled $\triangle AED$, $DE = AE = BC = 6.1478$

Hence height of flagpole = $AB = 10.65 - AE = 10.65 - 6.1478 = 4.50m$ (3 s. f)

Question 6

- (a) Find the sum of the Arithmetic Progression (AP) 1, 3, 5... 101.
- (b) Out of the 95 travellers interviewed, 7 travelled by bus and train only, 3 by train and car only and 8 travelled by all three means of transport. The number, x , of travellers who travelled by bus only was equal to the number who travelled by bus and car only. If 47 people travelled by bus and 30 by train:
- represent this information in a Venn diagram;
 - calculate the.
 - value of x ;
 - number who travelled by **at least** two means.

- (a) Most of the candidates were able to determine the common difference of an Arithmetic Progression (AP). Some candidates however could not find the common difference by using the formula, but instead had to list down all the terms from 1, 3, 5...to...101 and then added them to get 2601. Other used the formula for finding the n^{th} term of the series. Less than 8% were able to solve the question.

Solution:

Common difference, $d = T_2 - T_1$, $d = 3 - 1 = 2$

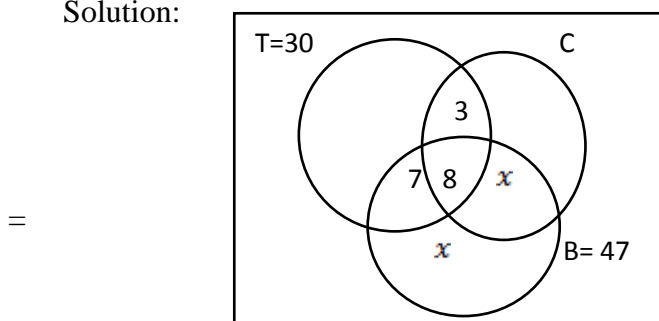
$$101 = a + (n - 1)d, \text{ where } a = 1, d = 2$$

$$1 + (n - 1)2 = 101, \quad 2n = 101 + 1, \quad 2n = 102, \quad n = 51$$

$$Sn = \frac{n}{2} (a + l) = \frac{51}{2} (1 + 101), \quad 51 \times 51 = 2601$$

- (b) Although, the candidates were able to draw a Venn diagram of three intersecting sets, most of them were unable to input information in the diagram and work out the answer correctly. Less than 15% of the candidates were able to solve the question.

Solution:



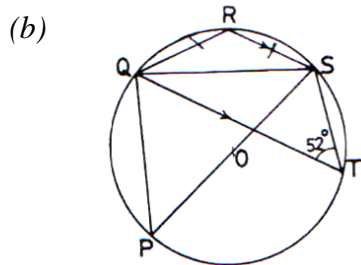
- (i) $n(B) = x + x + 7 + 8$, $47 = 2x + 15$

$$2x = 47 - 15, 2x = 32, \therefore x = 16$$

- (ii) $n(\text{at least by means}) = x + 3 + 7 + 8, x + 18, x = 16$;
 $16 + 18 = 34$

Question 7

(a) Using completing the squares method, solve, correct to 2 decimal places, $\frac{x-2}{4} = \frac{x+2}{2x}$.



In the diagram, $PQRST$ is a circle with centre O . If PS is a diameter, $RS \parallel QT$, $|QR| = |RS|$ and $\angle QTS = 52^\circ$, find:

- (i) $\angle SQT$;
- (ii) $\angle PQT$.

(a) The candidates were expected to use the 'method of completing the squares' to obtain the required result; however, less than 4% of those who attempted the question used this method. The majority of the candidates used the general formula for solving quadratic equation that is $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Solution:

$$2x(x - 2) = 4(x + 2)$$

$$2x^2 - 4x = 4x + 8, \quad 2x^2 - 8x - 8 = 0$$

$$x^2 - 4x - 4 = 0, \quad x^2 - 4x + (-2)^2 = 4 + (-2)^2$$

$$(x - 2)^2 = 8, \rightarrow x - 2 = \pm\sqrt{8}, \rightarrow x = 2 \pm \sqrt{8}, \rightarrow x = 2 \pm 2.83$$

$$x = 4.83 \text{ or } -0.83$$

(b) the candidates have not been familiar with angle properties of a circle e.g. among these properties is that a diameter subtends an angle of 90° on the circumference etc. less than 5% of those who attempted this part understood what they were doing.

$$\angle QRS + \angle QTS = 180^\circ \text{ (Opposite angles of cyclic quadrilateral)}$$

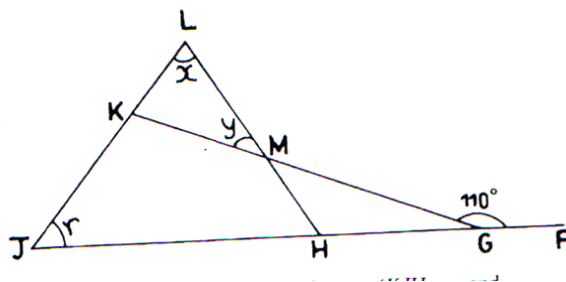
$$\angle RQS = 180^\circ - 52^\circ = 128^\circ$$

$$\angle RQS = \angle RSQ = \frac{180^\circ - \angle QRS}{2} = \frac{52^\circ}{2} = 26^\circ$$

- (i) $\angle SQT = \angle RSQ = 26^\circ$ (alternative angles)
 - (ii) $\angle PQS = 90^\circ$ (angle subtended by diameter on circumference)
- $$\angle PQT = 90^\circ - \angle SQT, \quad \rightarrow \angle PQT = 90^\circ - 26^\circ = 64^\circ$$

Question 8

(a)



In the diagram, $\angle KLM = x$, $\angle LMK = y$, $\angle KJL = r$ and $\angle KGF = 110^\circ$. If $2x = r = y$, find the value of x .

(b) Ten boys and twelve girls collected donations for a project. The total amount collected by the boys was ₦ 600.00 greater than that collected by the girls. If the average collection of the boys was ₦ 100.00 greater than the average collection of the girls, how much was collected by the two groups?

(a) Most of the candidates were unable to relate the diagram to the concept of angle properties of lines and triangles to find the value of x , given $2x = r = y$ and angle $\angle FGM = 110^\circ$. They did not understand the relationship between the given angles. Less than 13% of the candidates had a better approach to the solution.

Solution: $\angle GHL = r + x$ (extension to $\triangle JKL$), $\angle HMG = y$ (vertical opp. angles)

also, $\angle GHL + \angle HMG = \angle MGF$ (exterior to $\triangle GHM$), $r + x + y = 110^\circ$

if $2x = r = y$, then $2x + x + 2x = 110^\circ$;

$$5x = 110^\circ, x = \frac{110^\circ}{5} = 22^\circ$$

(b) Because of the difficulty in understanding word problems and the formation of equations from such, most of the candidates could not calculate the collection made by any one sex (either boys or girls) less than 15% of those who attempted this part were on the right track. Some candidates also failed to recall that amount of money in any currency when written in figures should be corrected to two decimal places. E.g. forty eight dalasis = D48.00.

Solution:

Let the total collection by girls be x . then, total collection by boys is $(x + 600)$

The average collection by girls is $\frac{x}{12}$, the average collection by boys is $\frac{x + 600}{10}$.

$$\begin{aligned} \text{From the question: } \frac{x+600}{10} - \frac{x}{12} &= 100 \Leftrightarrow \frac{6x+3600-5x}{60} = \frac{100}{1} \\ x - 3600 &= 6000, \quad x = 6000 + 3600 \\ \therefore x &= 2400 \end{aligned}$$

Total collection by girls is ₦ 2400.00

Total collection by boys is ₦2400 + ₦600 = ₦3000.00

Total collection by the two groups is ₦ 2400.00 + ₦3000.00 = ₦5400.00

Question 9

The weight (in kg) of 50 contestants at a competition is as follows:

65 66 67 66 64 66 65 63 65 68
 64 62 66 64 67 65 64 66 65 67
 65 67 66 64 65 64 66 65 64 65
 66 65 64 65 63 63 67 65 63 64
 66 64 68 65 63 65 64 67 66 64

- (a) Construct a frequency table for the discrete data.
- (b) Calculate, correct to 2 decimal places, the:
- mean;
 - standard deviation;
 - of the data.
- (a) Most of the candidates who attempted this part were able to construct a frequency table correctly showing correct totals in all columns. They were able to calculate the ‘mean’. However, few understood ‘standard deviation’ while the majority had a wrong method. Less than 9% of the candidates were able to use the correct formula, but unable to get the required square root.

Solution:

Weight (x)	Tally	Frequency (f)	f(x)	f(x ²)
62		1	62	3844
63		5	315	19845
64		12	768	49152
65		14	910	59150
66		10	660	43560
67		6	402	26934
68		2	136	9248
		$\Sigma f=50$	$\Sigma f(x)=3253$	$\Sigma f(x^2)=211733$

Solution:

- (i) Mean = $\Sigma \frac{f(x)}{50} = \frac{3253}{50} = 65.06$
- (ii) Standard deviation = $\sqrt{\frac{211733}{50} - \left(\frac{3253}{50}\right)^2} = \sqrt{1.8564} = 1.36249 = 1.36 \text{ (2d.p.)}$

Or $\sqrt{\frac{\Sigma f(x-\bar{x})^2}{\Sigma f}}$

Question 10

Using ruler and a pair of compasses only.

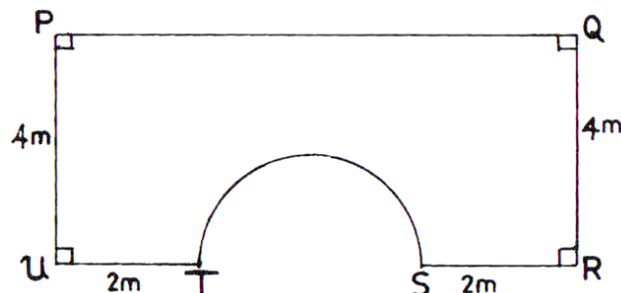
- (a) Construct:
- (i) $\triangle XYZ$ such that $|XY| = 10 \text{ cm}$, $\angle XYZ = 30^\circ$ and $\angle YXZ = 45^\circ$;
 - (ii) Locus, l_1 , of points equidistant from Y and Z;
 - (iii) Locus, l_2 , of points parallel to XY through Z.
- (b) Locate point M, the point of intersection of l_1 and l_2
- (c) Measure $\angle ZMY$

Most of the candidates were able to:

- Draw a line of given length.
- Construct angles of 60° and bisecting it to get angles of 30° .
- Construct angle of 90° and bisecting it to get angle.
- Measure given angles.
- Some of candidates did not understand the word 'loci'.
- They could not draw locus of points equidistant from two given points.
- The candidates could not also draw locus of point parallel to a given line through a given point.
- Some candidates also used the protractor to measure the given angles instead of constructing by using pair of compasses – thus showing their ignorance.

Question 11

- (a) If $\frac{3p+4q}{3p-4q} = 2$, find p: q.



The diagram shows the cross section of a bridge with a semi circular hollow in the middle. If the perimeter of the cross section is 34 m, calculate the:

- (a) length PQ;
- (b) area of the cross section.

[Take $\pi = \frac{22}{7}$]

- (a) Most of the candidates were able to cross-multiply and get P equivalent to $4q$. they were unable to interpret p as $4q$ to get the required ratio (p:q) = (4p:1q) = 4 : 1
Less than 15% of the candidates had the correct approach as $4q:1q$ to 4:1

$$\begin{aligned}\text{Solution: if } \frac{3p+4q}{3p-4q} &= \frac{2}{1}, 2(3p-4q) = 3p+4q \\ &\rightarrow 6p-8q = 3p+4q, \quad 6p-3p = 4q+8q \\ &\rightarrow 3p = 12q, p = 4q, \\ &\therefore p:q = 4q:q, 4:1\end{aligned}$$

$$\text{or} \quad 3p+4q = 2,$$

$$\begin{aligned}3p-4q &= 1 \text{ By adding: } 6p = 3, \quad p = \frac{1}{2}, \quad q = \frac{1}{8} \\ p : q &\leftrightarrow \frac{1}{2} : \frac{1}{8} = \frac{4}{8} : \frac{1}{8} = 4:1\end{aligned}$$

- (b) The candidates had the inability to get the correct equations for the perimeter of the shape or the length of UTSR. They could not calculate the diameter of the semi-circular portion and hence, were unable to find its area. Therefore, they couldn't find the area of the cross-section. Less than 5% of those who attempted the question got the answer right.

Solution:

$$\text{Perimeter} = 34 = |PQ| + |QR| + |RS| + \text{arc } ST + |TU| + |UP|$$

$$\rightarrow (4+2r) + 4 + 2 + \pi r + 2 + 4 \rightarrow 16 + 2r + \pi r;$$

$$16 + r(\pi + 2) = 34 \Rightarrow 16 + r\left(\frac{22}{7} + 2\right) = 34 \Rightarrow 16 + \frac{36r}{7} = 34$$

$$\frac{36r}{7} = 34 - 16, \frac{36r}{7} = 18, \quad 36r = 18 \times 7, r = \frac{18 \times 7}{36} = 3\frac{1}{2}$$

- (i) Hence $PQ = 4+2r = 4+7 = 11\text{m}$
(ii) Area of the cross section = (Area of Rectangle) – (Area of semi-circle)

$$\begin{aligned}&= (11 \times 4) - \frac{1}{2} \times \pi r^2 = 44 - \frac{1}{2} \times \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \leftrightarrow \\ &44 - \frac{77}{4} = 44 - 19\frac{1}{4} = 24\frac{3}{4} = 24.75\text{m}^2\end{aligned}$$

Question 12

- (a) Copy and complete the table of values, correct to one decimal place, for the relation $y = 3 \sin x + 2 \cos x$ for $0^\circ \leq x \leq 360^\circ$

x	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	360°
y	2.0			3.0	1.6		-2.0		-3.6	-3.0			2.0

- (b) Using scales of 2 cm to 30° on the x-axis and 2 cm to 1 unit on the y-axis, draw the graph of the relation $y = 3 \sin x + 2 \cos x$ for $0^\circ \leq x \leq 360^\circ$

- (c) Use the graph to solve:

(i) $3 \sin x + 2 \cos x = 0$;

(ii) $2 + 2 \cos x + 3 \sin x = 0$.

- (a) The candidates were able to copy and complete the given table of values. They were able to plot on the graph and hence draw smooth curves. Few of them had used wrong scales for the axes, while few others reversed the positive and negative sides of the x-axis. Most of the candidates had difficulty in reading from their own graphs.

Solution:

x	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	360°
y	2.0	3.2	3.6	3.0	1.6	-0.2	-2.0	-3.2	-3.6	-3.0	-1.6	0.2	2.0

From the graph: $x = 147^\circ \pm 3^\circ, 327^\circ \pm 3^\circ$.

From the graph : $x = 180^\circ, 294^\circ$.

Question 13

- (a) Find the equation of a straight line which passes through the point (2, -3) and is parallel to the line $2x + y = 6$

- (b) The operation Δ is defined on the set $T = \{2, 3, 5, 7\}$ by $x \Delta y = (x + y + xy) \bmod 8$.

- (i) Construct modulo 8 table for the operation Δ on the set T .

- (ii) Use the table to find:

I. $2 \Delta (5 \Delta 7)$;

II. $2 \Delta n = 5 \Delta 7$.

- (a) Most candidates lacked the concept that parallel lines have equal gradients. They were unable to deduce the gradient of the line $2x + y = 6$, and also unable to obtain the equation of the line through $(2, -3)$.

Solution: $y = 6 - 2x$, the gradient $= -2$.

\therefore the gradient of the line through $(2, -3)$ is $m = -2$.

$$y - y_1 = m(x - x_1); \quad y - (-3) = -2(x - 2);$$

$$y + 3 = -2x + 4, \quad y + 2x = 4 - 3,$$

$$y + 2x = 1$$

Equation of the line is $2x + y = 0$

- (b) The candidates were unable to express numbers in modulo 8. They had little or no idea about modulo arithmetic. They were expected to use the set $T = \{2, 3, 5, 7\}$ and the operation $x \Delta y = (x + y + xy) \bmod 8$. They misinterpreted the binary operation $x \Delta y$ to be $(x + y)$ which led them astray. Only very few 4% of the candidates were able to perform to expectation.

Solution:

(i)

Δ	2	3	5	7
2	0	3	1	7
3	3	7	7	7
5	1	7	3	7
7	7	7	7	7

- (ii) From the table; $2 \Delta (5 \Delta 7) = 2 \Delta 7 = 7$

- (iii) From the table; $2 \Delta n = 5 \Delta 7$,
 $2 \Delta n = 7, 2 \Delta 7 = 7$
 $\therefore n = 7$

WASSCE FOR SCHOOL CANDIDATES 2016
CHIEF EXAMINER'S REPORT
FURTHER MATHEMATICS/MATHEMATICS

1. **GENERAL COMMENTS**

The paper is straightforward than the previous years. The rubrics were very clear. However, the general performance of the candidates is below average. About 45% of the candidates scored below 40 marks. However, there were few candidates with a zero score. Some candidates even scored very high marks like 98 out of 100 marks.

2. **CANDIDATES' STRENGTHS**

Some of the candidates showed some understanding in conjugate surds, Gradients, Statistics, Probability and Mechanics.

3. **CANDIDATES' WEAKNESSES**

Most candidates failed to answer questions on Binary Operations, Polynomials, Standard deviation, Permutations and combinations, Logarithm and Remainder Theorem.

4. **SUGGESTED REMEDIES**

The following remedies should be noted for action:

- Teachers must exercise patience in explaining concepts to the candidates.
- Candidates must be encouraged to study concepts very well.
- Teachers must ensure that there is sufficient time for revision after covering the syllabus.
- Candidates must effectively use their Mathematical instruments, calculators and graph books before examination time.

5. **DETAILED COMMENTS ON INDIVIDUAL QUESTIONS**

Question 1

A binary operation $$ is defined on the set, \mathbf{R} , of real numbers by $m * n = m + n + 2$. Find the:*

- (a) *Identity element under the operation $*$;*
- (b) *Inverse of n under the operation $*$.*

About 25% of the candidates who attempted this question scored zero. Only 20% of the candidates scored full mark. However, some candidates managed to score some marks in question 1(i) by finding the correct identity element.

Question 2

Given that $(5, 2)$, $(-4, k)$ and $(2, 1)$ lie on a straight line, find the value of k .

More than 50% of those candidates who attempted this question scored full mark, but some candidates scored zero.

Question 3

(a) If $f(x + 2) = 6x^2 + 5x - 8$, find $f(5)$.

(b) Express $\frac{7\sqrt{2}+3\sqrt{3}}{4\sqrt{2}-2\sqrt{3}}$ in the form $p + q\sqrt{r}$,
where p, q and r are rational numbers.

About 80% of the candidates who attempted this question could not do part (a) correctly. They could not find the correct value of $x = 3$. However, a good number of candidates were able to attempt part (b) correctly.

Question 4

When $f(x) = 2x^3 + mx^2 + nx + 11$ is divided by $x^2 + 5x + 1$, the quotient is $2x - 5$ and the remainder is $30x + 16$. Find the values of m and n .

More than 50% of the candidates who attempted this question scored zero and only 10% of the candidate scored full mark.

Question 5

The probabilities that Ago, Sulley and Musa will gain admission to a certain university are $\frac{4}{5}$, $\frac{3}{4}$ and $\frac{2}{3}$ respectively.

Find the probability that:

- (a) none of them will gain admission;
- (b) only Ago and Sulley will gain admission.

More than 50% of the candidates who attempted this question scored full mark. However, only few of those who attempted this question scored zero mark.

Question 6

The mean of the numbers 1, 4, k , $(k + 4)$ and 11 is $(k + 21)$.

Calculate the:

- (a) value of k ;
- (b) standard deviation.

About 60% of the candidates who attempted this question were able to find the value of k using the mean. But more than 80% of those candidates could not find the standard deviation.

Question 7

- (a) A body of mass 3 kg moves with a velocity of 8ms^{-1} . It collides with a second body moving in the same direction with a velocity of 5ms^{-1} . After collision the bodies move together with a velocity of 6ms^{-1} . Find the mass of the second body.
- (b) If the second body in 7(a) moves with a velocity of 5ms^{-1} in the opposite direction as that of the 3 kg body with a velocity of 8ms^{-1} , find correct to **two** decimal places, the common velocity of the **two** bodies if they move together after collision.

About 80% of the candidates who attempted this question were able to solve part (a). But the majority of the candidates could not find the two bodies moving in the opposite direction in part (b).

Question 8

Given that $p = \begin{pmatrix} 5 \\ 3 \end{pmatrix}$, $q = \begin{pmatrix} -1 \\ 2 \end{pmatrix}$, $r = \begin{pmatrix} 17 \\ 5 \end{pmatrix}$ and $r = \alpha p + \beta q$, where α and β are scalars, express q in terms of r and p .

Most of the candidates who attempted this question were able to find the scalars but fail to express q in terms of r and p .

Question 9

Without using mathematical tables or calculator,

evaluate: $\frac{\frac{3}{2} \log 27 - 3 \log 5\sqrt{5}}{\log 0.6}$

Two linear transformations A and B in the Oxy plane, are defined by

$A: (x, y) \longrightarrow (x + 2y, -x + y)$

$B: (x, y) \longrightarrow (2x + 3y, x + 2y)$

- (i) Write down the matrices A and B .
- (ii) Find the image of the point $P(-2, 2)$ under the linear transformation A followed by B .

About 90% of the candidates who attempted this question were unable to solve the question correctly. In part (b), more than 90% of the candidates were able to attempt part b (i) correctly but were not able to attempt the part b (ii) correctly by finding the image.

Question 10

- (a) (i) Write down the expansion of $(1 + x)^7$ in ascending powers of x .
- (ii) If the coefficients of the fifth, sixth and seventh terms in the expansion in 10(a)(i) form a linear sequence (**A.P.**), find the common difference of the **A.P.**
- (b) Using the trapezium rule with ordinates at 1, 2, 3, 4 and 5, calculate, correct to **two** decimal places $\int_1^5 \sqrt{(2x + 8x^{-2})} dx$.

About 75% of the candidates who attempted part a(i) were able to expand the binomial theorem in ascending powers of x correctly. But more than 60% of them were not able to find the common difference of a linear sequence (AP) in part a(ii).

In part (b), about 50% were not able to use the correct formula of the trapezium rule.

Question 11

- (a) If ${}^kP_2 = 72$, find the value of k .
(b) Solve the equation $2\cos^2\theta - 5\cos\theta = 3$, for $0^\circ \leq \theta \leq 360^\circ$.

About 50% of the candidates were unable to find the correct value of k . In part (b), most of the candidates were unable to solve the equation correctly.

Question 12

The table shows the distribution of marks scored by some students in a test.

Marks	1-10	11-20	21-30	31-40	40-50	51-60	61-70	71-80	81-90	91-100
Number of Students	3	17	41	85	97	115	101	64	21	6

- (a) (i) Construct a cumulative frequency table for the distribution.
(ii) Draw a cumulative frequency curve for the distribution
- (b) Use the curve to estimate the:
- (i) Number of students who scored marks between 32 and 74;
(ii) Pass mark, if 18% of the students failed;
(iii) Lowest marks for distinction, if 8% of the students passed with distinction.

This question was attempted by more than 95% of the candidates. 97% of those candidates were able to answer part (a) correctly but 90% among them could not use the graph to estimate correctly in part (b).

Question 13

- (a) Two different Mathematics books, 5 different Physics books and 3 different Chemistry books are to be arranged on a shelf. How many arrangements are possible.
- (i) books on the same subject must stand together?
(ii) only the Physics books must stand together?
- (b) In a certain community, 13 out of every 20 persons speak English.

If 8 persons are selected at random from the community, find, correct to **three** significant figures, the probability that **at least** 3 of them speak English.

This question was poorly attempted less than 10% of the candidates attempted it and scored zero.

Question 14

Four vectors $\mathbf{r} = \alpha\mathbf{i} + \beta\mathbf{j}$ where α and β are positive constants.

$\mathbf{s} = 2\mathbf{i} - \mathbf{j}$, $\mathbf{m} = 3\mathbf{i} + 2\mathbf{j}$ and $\mathbf{n} = \mathbf{i} + \mathbf{j}$ are such that the magnitude of \mathbf{r} is three times as \mathbf{s} and is parallel to the vector $(\mathbf{m} - \mathbf{n})$.

- (a) Find the values of α and β .
- (b) Calculate the magnitude and direction of $(\mathbf{r} - \mathbf{s})$.

This question is seldom attempted by the candidates. About 90% of the few who attempted the question scored zero.

Question 15

A particle is projected vertically upwards from the ground with speed 30ms^{-1} . Calculate the:

- (a) maximum height reached by the particle;
- (b) time taken by the particle to return to the ground;
- (c) time(s) taken for the particle to attain a height of 40 m above the ground.

[Take $g = 10\text{ms}^{-2}$]

This was one of the questions attempted by majority of the candidates. Most of them were able solve the part (a) correctly and a good number were able to attempt the part (b) correctly. But only a few of them attempted the part (c) and solved it correctly.

SCIENCE SECTION

WASSCE FOR SCHOOL CANDIDATES 2016
RÉSUMÉ OF CHIEF EXAMINERS' REPORTS
THE SCIENCES

1. STANDARD OF THE PAPERS

The science subjects for WASSCE include General Science, Physics, Chemistry, Biology, Health Science, Agricultural Science and Physical Education. The Chief Examiners unanimously reported that all the questions were drawn from their respective syllabuses. The rubrics were clear and the marking schemes were flexible to accommodate responses from the candidates. The standard of the papers compared favourably with those of the previous years.

2. CANDIDATES' PERFORMANCE

As reported by the Chief Examiners, the performance of candidates in General Science and Biology was poor and showing a downward trend. Although the performance of candidates slightly improved in Chemistry 3, their general performance in Physics and Chemistry 2 was not impressive and does not vary much with that of previous years. Candidates' performance was satisfactory in Agricultural Science and Health Science. Physical Education 3 was modified to a performance test instead of the Test of Practicals with effect from this exam. This new approach significantly improved the performance of candidates in Physical Education.

3. CANDIDATES' STRENGTHS

The Chief examiners for the Sciences reported candidates' strengths as follows:

- Legible and clear presentation of work.
- Ability to follow instructions.
- Tabulation of readings and drawing of graphs in practical papers.
- Giving required details to questions requiring descriptive answers.
- Drawing correct diagrams.

4. CANDIDATES' WEAKNESSES

The Chief examiners for the Sciences reported candidates' weaknesses as follows:

- Difficulty in answering questions involving calculations.
- Wrong scaling of axes for graphs.
- Wrong spellings of scientific terminologies.
- Re-copying of questions on the answer booklet.
- Expressing themselves in simple English.

5. SUGGESTED REMEDIES

The Chiefs Examiners suggested the following as remedies:

- Candidates should be introduced to practical work in grade 10.
- Candidates should be encouraged to develop the reading culture.
- Qualified teachers should be employed to teach the subjects.
- Teachers should endeavour to cover the syllabus before the examination.
- Candidates should be given a lot of exercise that demand calculation.

WASSCE FOR SCHOOL CANDIDATES 2016
CHIEF EXAMINER'S REPORT
AGRICULTURAL SCIENCE 2

1. GENERAL COMMENTS

This year's Agricultural Science paper is standard. The questions were drawn from across the syllabus and the rubrics were very clear. There was no ambiguous question at all in the question paper. This way of setting questions is accepted by all standards because it eliminates the chance of passing by gambling. The instructions on the question paper were clear and simple for candidates to understand. This method of assessment should be maintained.

However, candidate's performance this year is good as compared to last year. About 47% of the candidates' scores were above the pass mark (40%).

2. CANDIDATES' STRENGTHS

The Chief Examiner reported candidates' strengths as follows:

- Teachers covering an extensive part of the syllabus.
- Candidates reading extensively to cover the syllabus.
- Schools embarking on excursion or farm visits.
- The usage of standard teaching and learning materials (teaching Aids).

3. CANDIDATES' WEAKNESSES

The Chief Examiner reported candidates' weaknesses as follows:

- Inability to read the new topics.
- Inability to read and understand the English language.
- Teachers not covering the syllabus extensively.
- The use of few substandard pamphlets in schools.

4. SUGGESTED REMEDIES

The following points are suggested as remedies:

- Teachers should endeavour to cover the prescribed syllabus.
- Candidates should avoid gambling.
- The right textbooks should be used to enable candidates use the right terms in Agriculture.
- Practical lessons in Agriculture should be made compulsory to all students.
- The new setting of questions should be maintained.
- The School Administration should get the revised syllabus from WAEC.
- Trained and qualified teachers in Agriculture should be employed to teach the subject.
- The School Administration should ensure that Agricultural Science stands as its own department and not under Science and Mathematics department.
- School gardens should be revived to expose candidates on practical aspects of Agricultural Science to enable candidates know the farming tools even the method(s) used in the farming process.
- Schools Administration should ensure that students embark on farm visit or excursion at least once every academic year.

5. DETAILED COMMENTS ON INDIVIDUAL QUESTIONS

Question 1

- (a) *In a tabular form, state **five** differences between subsistence and commercial agriculture.*
- (b) *Suggest **two** possible solutions to **each** of the following problems of agricultural development in West Africa:*
 - (i) *inadequate land;*
 - (ii) *inadequate finance;*
 - (iii) *incidence of diseases.*
- (c) *What is agricultural ecology?*
- (d) *State **five** sources of pollution of agricultural lands and fish ponds.*

- (a) This part of the question is well attempted by about 96% of the candidates who succeeded to score the full mark allocated to the question.
- (b) The possible solution to the problems of agricultural development in West Africa is also fairly answered. A good number of the candidates were able to spell out credit facilities and subsidies as part of the solutions to the problems of agricultural development in West Africa.
- (c) The definition of agricultural ecology was averagely answered. About 48% of the candidates got it right. Most of the candidates gave a general definition but failed to relate their definition to agriculture. This only enabled them get half the marks allocated to this question.
- (d) The question on the sources of pollution of agricultural land and fish ponds was poorly understood by the candidates. This might be attributed to the fact that some teachers did not treat that area with their candidates or the candidates failed to do their own research on it. Most of the Candidates gave answers like erosion, dead animals, human faeces, etc. this question is expected to be answered thus;
 - Oil spillage
 - Improper sewage
 - Excessive application of pesticides, fertilizers, herbicides etc

Question 2

- (a) *What is farm surveying?*
- (b) *State **four** disadvantages of electrical power.*
- (c) *Give **four** reasons why farm machines should be maintained.*
- (d) *Define the term land as used in agriculture.*
- (e) *Explain **briefly** how **each** of the following factors affects land availability for agriculture:*
 - (i) *population pressure;*
 - (ii) *minin;*
 - (iii) *topography.*

Question (2a) was well answered, candidates seems to exhibit a fair understanding of farm survey. However, the advantages of farm machines and electrical power were not fairly answered. Most of the candidates avoided this question. About 29% of the candidates who have attempted these questions got them right.

The definition of land was well spelt out. I belief that candidates have read this area extensively. Teachers have to be commended to continue working hard.

The factors that affect land availability for agriculture were a popular question that candidates generally attempted. This question was not strange and most of the candidates managed to get the whole mark allocated to it. I belief that Candidates were over confident in this particular sub-question.

Question 3

- (a) *Explain the term staking in yam cultivation.*
- (b) *Describe the nursery practices in yam cultivation.*
- (c) *State five reason for parboiling paddy rice.*
- (d) *State three advantages and two disadvantages of taungya farming.*

The most outstanding question that was well answered was question (3a). Candidates explained fully the term staking as the provision of artificial support for the yam plant (vine) to climb on, about 72% of the candidates were able to get this answer right. The question on the cultivation of cocoa was not well attempted by the candidates. This may be attributed to the fact that cocoa is not grown by the Gambian farmers. The School Administration should try and have at least one plant of cocoa in the school garden for learning purpose.

The question on the reasons of parboiling paddy rice was fairly attempted by candidates as compared to (3a). Candidates gave answers such as ‘to prevent pest, to prevent the grains from breaking during pounding, etc. The merits and the demerits of taungya farming were not well understood by the candidates.

Question 4

- (a) *Explain **briefly three** systems of mating in livestock management.*
- (b) *Draw and label the digestive tract of a hen*
- (c) *Give **five** reasons why ornamental plants are important.*

Question number 4 and 5 were among the questions where candidate’s performance was worst. Most of the given answers were inappropriate. The only sub-question where performed better was (4c) i.e. ‘the reasons why ornamental plants are important’. About 86% got this sub-question right with all the marks allocated to it.

Question 5

- (a) *What is agricultural insurance?*
- (b) *Explain **briefly** the following types of insurance policies for agricultural production:*
 - (i) *Specific enterprise insurance;*
 - (ii) *Fire disaster insurance;*
 - (iii) *Life assurance.*
- (c) *Discuss the process of egg formation in a hen.*

Question number (5) was strange for the candidates. Agricultural insurance is a new topic in the prescribed syllabus. Most of the teachers did not treat that topic with the students. School Administration should try and get the revised syllabus from WAEC to be guided accordingly. Most of the candidates and about 80% of those who attempted it got it wrong.

Question 6

- (a) *Mention **three** point and **three** electronic media used in disseminating agricultural extension messages.*
- (b) *State four advantages of group method of agricultural extension.*
- (c) *Explain the term assembling as a marketing function.*
- (d) *State **one** symptom and **two** control measures of each of the following crop diseases:*
- (e) *Maize streak;*
- (f) *Groundnut rosette.*

Question (6) was one of the questions that candidates' performance was remarkable. They were able to write out clearly the three print media and the electronic media that are used in the dissemination of agricultural extension messages candidates gave.

- News papers.
- Magazines.
- posters.
- Leaflets, etc.

These types of answers were expected from the candidates. The question on the advantages of the group method of agricultural extension was also fairly answered. About 49% of the candidates got this sub-question right.

However, question (6c) and (d) that were assembling as a marketing function the symptoms of maize streak disease and groundnut rosette respectively were not well attempted by candidates. The School Administration has to ensure that the right materials (teaching materials) are used by the students. Close monitoring of what the teachers are teaching is also important.

WASSCE FOR SCHOOL CANDIDATES 2016
CHIEF EXAMINER'S REPORT
AGRICULTURAL SCIENCE 3

1. GENERAL COMMENTS

The Agricultural Science paper 3 (practical) was in four sections of four different questions. Question number one was a soil science question concerning experiment on soil physical property (water holding capacity or porosity). Question number two was an Agricultural Engineering question concerning tools and survey equipment. Question number three was a crop science question concerning crop pests. Question number four was an animal science question concerning livestock products and parasites. The questions were of good standard but the candidates' performance generally was not good enough.

2. CANDIDATES' STRENGTHS

The candidates' strengths were noticed in questions 2 and 3 which dealt with tools and pest respectively. Majority of the candidates were able to answer most parts of these questions very well. Most of them were able to state the maintenance practices of the supplied tools and were also able to indicate ways of controlling the supplied pests.

3. CANDIDATES' WEAKNESSES

The weaknesses of the candidates were many. Majority of the candidates seemed not to understand some of the questions very well. Poor hand-writing, terrible spelling errors and ignorance of important agricultural terms were observed in many candidates' work. Wrong interpretation of questions was also noticed in the majority of the Candidates' work.

4. SUGGESTED REMEDIES

Below are some of the ways that candidates can be assisted before they write the Senior Secondary School Examination:

- Exposure to comprehensive practical activities. Candidates should constantly be engaged in practical activities.
- Schools should employ adequate and well qualified agricultural science teachers.
- Schools should maintain well equipped agricultural science laboratories.
- Schools should make sure that candidates have access to correct, up-to-date and regularly standardised text books.
- Schools should make sure that the correct specimens are supplied during the practical examination.
- Candidates should be exposed to the new methods of question setting by WAEC.
- Candidates should be encouraged to go on field trips and excursions before they attempt the final examination.
- Candidates should be encouraged to study comprehensively and follow the recommended syllabus.

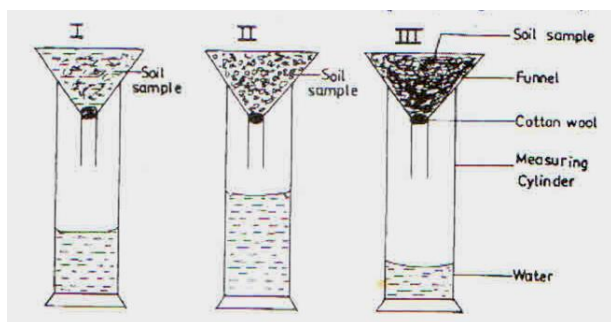
- Candidates should be encouraged to improve their spelling abilities especially for those important agricultural terms.
- Teachers should be encouraged to cover the prescribed syllabus before the end of the year.
- Item writers (individuals concern with question setting) should avoid presenting ambiguous questions to the candidates.

5. DETAILED COMMENTS ON INDIVIDUAL QUESTIONS

Question 1

The diagrams below illustrate an experimental set up to determine a soil property. Study them carefully and answer the questions that follow

To determine the water hold capacity of the different types of soil.



- Suggest suitable title for the experiment.*
- Outline the procedure for carrying out the experiment.*
- Identify the soil samples in diagrams I, II and III.*
- State **two** precautions to be taken when carrying out the experiment.*
- Which of the soil samples is prone to water logging?*
 - Give **one** reason for your answer in*

The following are detailed comments on the four questions of the paper:

- About 30% of the candidates were able to answer this question correctly.
- About 50% of the candidates answered this question correctly.
- Many of the candidates did not state the steps of the procedure in an orderly manner and were consequently penalised.
- About 50% of the candidates scored above average in this question.
- About 90% of the candidates answered this question correctly.
- About 95% of the candidates gave the correct answer to this question.
- About 85% of the candidates gave the correct answer to this question.

Question 2

Study specimens **A**, **B** and **C** carefully and answer the following questions.

- (a) Describe specimen **A**.
- (b) State **two** ways of maintaining **each** of specimens **A**, **B** and **C**.
- (c) State two uses **each** of specimens **A**, **B**, and **C**

About 90% of the candidates supplied the correct answer to this question.

About 65% of the candidates supplied the correct answer to this question.

About 75% of the candidates supplied the correct answer to this question.

Question 3

Study specimens **G**, **H**, **I** and **J** carefully and answer the following questions.

- (a)
 - (i) Classify specimens **G** and **H** according to their feeding habits
 - (ii) Name **one** part of crops damaged by **each** of specimens **G** and **H**.
 - (iii) State **three** ways in which specimen **H** is economically important.
- (b) State **four** ways of controlling **each** of specimens **I** and **J**.

About 40% of the candidates gave the correct answer to this question.

About 60% of the candidates gave the correct answer to this question.

About 65% of the candidates gave the correct answer to this question.

About 90% of the candidates gave the correct answer to this question.

Question 4

Study specimens **N**, **O**, **P** and **Q** carefully and answer the following questions.

- (a) Name **three** industries that use each of specimens **N** and **O**.
- (b) State **five** effects of specimen **P** on its host.
- (c) State **four** ways of controlling specimen **Q** on the farm.

About 20% of the candidates gave the correct answer to this question.

About 85% of the candidates gave the correct answer to this question.

About 60% of the candidates gave the correct answer to this question.

WASSCE FOR SCHOOL CANDIDATES 2016
CHIEF EXAMINER'S REPORT
BIOLOGY 2

1. GENERAL COMMENTS

The questions for Biology paper 2 were excellent and of international standard. The questions were within the scope of the syllabus designed for the West African Senior Secondary Certificate Examination (WASSCE). The general performance of the candidates showed that there is much to be done by both teachers and candidates at school level. The marking scheme made enough provision for candidates who had prepared properly for the examination to gain very good marks. However, About 5% of the candidates scored very good marks, 10% with average scores and the rest with very poor marks. The performance of candidates was really poor compared to the previous years.

2. CANDIDATES' STRENGTHS

The Chief Examiner reported candidates' strengths as follows:

- Legible presentation of work by most of the candidates.
- Ability of most of them to follow instructions.

3. CANDIDATES' WEAKNESSES

The Chief Examiner reported candidates' weaknesses as follows:

- Re-copying the exams questions on the answer booklet.
- Misinterpretation of questions.
- Failure to answer the required number of question from all the parts.
- Poor English Language.
- Lack of logical presentation of ideas by most of the candidates.
- Wrong spellings of biological/scientific terms.
- Answering more questions than necessary and even question 5 which they were not supposed to answer.

4. SUGGESTED REMEDIES

The Chief Examiner suggested the following points as remedies:

- Candidates should have a broad knowledge of all areas of the syllabus in order to perform well.
- Teachers must endeavour to cover the Biology Syllabus and embark on revision with their students.
- Candidates should endeavour to master the English Language, work hard and dedicate themselves to the subject.
- Teachers should encourage their students to learn biological/scientific terminologies.
- Candidates must therefore learn to read each and every question carefully and try to understand what it requires before attempting to answer it.
- Candidates should be conversant with scientific/biological terminologies.

5. DETAILED COMMENTS ON INDIVIDUAL QUESTIONS

Question 1

- (a) (i) List **three** forms in which living cells exist.
- (ii) Give **one** example **each** the forms listed in 1 (a) (i)
- (b) Make a diagram, 6 cm - 10 cm long, of a typical plant cell and label fully.
- (c) (i) In a tabular form, state **three** differences between a plant cell and an animal cell.
- (ii) State **three** similarities between a plant cell and an animal cell.

About 80% of the candidates attempted this question. However, a good number of them performed poorly because they failed to spell correctly the forms in which cells exist and to give the examples of each form. Some even did not know the forms in which living cells exist let alone gave an example. For example, some of them stated that living cells exist in the form of bone marrow, morsel and mouth. About 50% of the candidates failed to draw correctly the diagram of a typical plant cell not to talk of labelling the parts. About 70% of the candidates gave the correct differences and similarities between a plant and an animal cell. However, there were some who did not tabulate the differences, thus losing marks. The performance of the candidates who attempted this question was not encouraging. About 20% of the candidates got at least 10 out of 20 marks. About 5% of them scored zero.

Question 2

- (a) In sequence, name the organs that constitute the alimentary canal of humans.
- (b) State:
 - (i) **three** structural differences;
 - (ii) **three** Structural similarities;between the alimentary canal of a bird and human.
- (c) Explain **briefly** how the dentition of herbivores is adapted for feeding.
- (d) State **two** roles of the pancreas in digestion.

About 20% of the candidates attempted this question and only about 4% of them scored good marks. This was due to the fact that they failed to follow the instructions, especially in 2(a), which required candidates to name in sequence the organs that constitute the alimentary canal of humans. They failed to name the organs in the correct sequence, starting with the mouth. About 70% of the candidates were able to state correctly the differences and similarities between the alimentary canal of a bird and human. Furthermore, about 90% of them woefully failed to explain how the dentition of herbivores is adapted for feeding. In most cases, the functions did not match the structures. The candidates failed to understand the roles of the pancreas in digestion. Most of them stated that the pancreas secretes pancreatic juice for digestion but that was not enough to earn full marks. They were expected to state the functions of the enzymes in pancreatic juice.

Question 3

- (a) (i) What is a habitat?
(ii) Explain **briefly three** roles of a decomposer in an ecosystem.
- (b) Explain **briefly** energy flow in a freshwater habitat.
- (c) (i) State **three** harmful effects of microorganisms to plants.
(ii) State **six** beneficial effects of microorganisms to humans.

This question was also attempted by about 80% of the candidates but only about 10% of them scored good marks. Majority of them defined habitat correctly but could not explain correctly the roles of decomposers in an ecosystem. Decomposers bring about the decay of dead plants and animals to produce manure to enrich the soil with nutrients which could be used for plant growth. Majority of the candidates stated that decomposers decay both plants and animals, thus losing marks. More than 80% of the candidates could not express themselves in simple English to explain energy flow in a fresh water habitat. They failed to explain that energy flow in freshwater habitat starts from the sun whereby producers use it to manufacture food for the primary consumers.

Most of the candidates who attempted question 3(c) stated correctly the harmful effects of microorganisms to plants but failed to state the beneficial effects of microorganisms to humans. They were instead stating the harmful effects of microorganisms to humans. This shows that this part of the question was either misunderstood by the majority of them or they did not know the beneficial effects of microorganisms to human.

Question 4

- (a) (i) Explain the term agglutination as used in blood transfusion.
- (ii) The table below represents blood transfusion between blood donors and recipients. Copy and complete the table using the keys (+) to represent compatibility and (-) to represent incompatibility.

		Recipient			
Donor		A	B	AB	O
	A				
	B				
	AB				-
	O	+			

- (b) Explain how each of the following organisms are adapted for obtaining food:
- (i) Mosquito larva;
(ii) Dodder plant;
(iii) Grasshopper.

About 20% of the candidates attempted this question and about half of that percentage scored at least half of the mark allocated to 4(a). The whole of 4(b) was poorly answered by almost all the candidates. They could not explain how the mosquito larva, dodder plant and grasshopper are adapted for obtaining food.

Question 6

- (a) State **two** differences between tactic and nastic movements in plants.
- (b) Give **two** examples **each** of organisms that show:
 - (i) tactic movement;
 - (ii) nastic movement.
- (c) (i) State **three** ways of caring for the mammalian skin.
 - (ii) List **three** stimuli to which the mammalian skin is sensitive.
- (d) State **five** effects of high temperature on a terrestrial habitat.
- (e) (i) What is courtship behavior in animals?
 - (ii) List **three** courtship behaviours in animals.
- (f) Name **three** organisms that carry out holozoic mode of nutrition.
- (g) Explain **briefly** how fingerprinting can be used to detect crime.

The general performance of candidates in this question was below expectations. About 95% of the candidates attempted this question though it was a compulsory question. 5% of them did not attempt this question at all. About 70% of the candidates could not differentiate between tactic and nastic movements in plants let alone gave examples of organisms that show these movements. A good number of the candidates stated the correct ways of caring for the mammalian skin but some lost marks because of poor expression. For example, taking regular “birth” instead of “bath”.

For the stimuli to which the mammalian skin is sensitive, some of the candidates stated cool instead of cold, touching instead of touch, pressuring instead of pressure etc. Candidates also encountered problems in stating correctly the effects of high temperature on a terrestrial habitat. For example, most of them stated that high temperature leads to high rainfall; it causes diseases to both plants and animals, etc. This shows clearly that candidates did not understand the question. Candidates also failed to explain correctly what courtship behavior is in animals yet they gave correct example of courtship behavior in animals.

Almost 90% of the candidates who attempted question 4(f) named correctly organisms that carry out holozoic mode of nutrition. About 80% of them showed from the way they answered the question 4(g) that they had little or no idea on how fingerprinting can be used to detect crime. They were recopying the question as an answer. For example, fingerprinting can be used to detect crime instead of explaining how fingerprinting can be used to detect crime.

WASSCE FOR SCHOOL CANDIDATES 2016
CHIEF EXAMINER'S REPORT
BIOLOGY 3

1. GENERAL COMMENTS

The biology 3 (practical) paper for WASSCE for School Candidates -2016 is of a reasonable standard. All the questions were set with no ambiguity. The questions were to carry out a simple test for food substances, state the mode of feeding of fungi, draw diagrams name the location of certain internal organs of the body, give the differences and similarities between organisms and simple ecological questions involving naming natural habitat of certain organisms and their differences as well as drawing a simple feeding relationship in the form of food chain. All these questions were set from the biology syllabus.

The general performance of the candidates was below average because, out of the 80 marks allocated to this paper, just about 10% of the candidates managed to score 50 marks and above. About 20% scored between 40 and 50 marks of the allocated marks. The average score is between 30 and 40 marks.

2. CANDIDATES' STRENGTHS

About 30% of the candidates did very well and wrote very commendable answers. Candidates' strengths were as follows.

- Spelling common words correctly.
- Following instructions like giving the exact number of function required in a question.
- Naming the precise location of specimen H-liver, K- lung M - kidney in the body;
- Drawing clear diagram and a correct food chain.

3. CANDIDATES' WEAKNESSES

Weaknesses of candidates were as follows:

- Misunderstanding of questions.
- Poor spellings of biological terms.
- Poor English Language which limits them from stating the correct statements required by the questions.
- Illegible hand writing.
- Improper answering of questions.
- Inability to state specific habitats and adaptive features of organisms.
- Inability to draw a correct food chain starting with a producer and wrong directions of arrows to show the flow of direction of energy from producer to consumers.

4. SUGGESTED REMEDIES

The Chief Examiner suggested the following points as remedies:

- Teachers must put emphasis on correct spellings of biological terms.
- Biology should not be made a compulsory subject for all candidates the way it is done in some schools.
- Candidates without science background must not be forced to do biology as their only science subject.
- Teachers teaching biology must be trained and qualified in biology to be able to offer the best for candidates.

- It should be ensured that school offering Biology must have the necessary equipments to carry out biology practical works.
- The Chief Examiner's report should be made available to the schools to enable the teachers know how the candidates perform. This can also keep teachers abreast of the new and improved techniques on how to answer biology practical questions.

5. DETAILED COMMENTS ON INDIVIDUAL QUESTIONS

Question 1

- (a) (i) *Cut a piece of specimen A, place it on the white tile. Add a few drops of iodine solution. Record the observation and result in a tabular form.*

<i>Observation</i>	<i>Result</i>

- (ii) *Squeeze a few drops of specimen E on another clean white tile provided, add a few drop of iodine solution. Record the observation and result in a tabular form.*

<i>Observation</i>	<i>Result</i>

- (b) (i) *State **two** observable differences between specimens A and B.*
(ii) *Suggest **two** factors that are likely to be responsible for the state of specimen B.*
(iii) *With the aid of a hand lens/magnifying lens, observe specimen B and name an organism likely to be growing on it.*
(iv) *State the mode of feeding of the organism growing on specimen B.*
- (c) (i) *Make a drawing, 6cm - 8cm long, of specimen C and label fully.*
(ii) *State **one** function **each** of any **three** parts labeled.*

Question 1a (i and ii) were the most popular questions which candidates answered correctly.
Specimen A turns blue-black → starch present.
Specimen E turns yellowish → starch absent.

70% of the candidates scored marks in the question.

Question 1(c i and ii) were the most unpopular sub-questions of question 1. Almost all candidates drew poor diagrams with wrong length, no magnification, wrong or no title for the diagram, wrong labeling of parts and no cut surface shown in a double line.

Wrong parts

Abdomen
Air sacs
Cell
Yolk

Correct parts

Albumen
Air space
Shell
Yolk

Candidates also gave wrong answers for functions of the parts labelled.

Wrong Answers

Yolk fold embryo
Shell give colour
Albumen is food for man
Air space for respiration

Correct Answers

Yolk provide food for embryo growth
Shell for protection
Albumen supplies protein
Air space is for gaseous exchange.

Question 2

Study specimens **H**, **K**, **L** and **M** and answer question 2(a) to 2(e).

- (a) Name the location of **each** of specimens **H**, **K**, and **M** in the body of mammal.
- (b)
 - (i) Name the fluid in specimen **L**.
 - (ii) State **two** functions of the fluid named in 2(b) (i)
 - (iii) Which of the other specimens is specimen **L** associated with?
- (c)
 - (i) State **two** observable differences between specimens **H** and **K**.
 - (ii) State **two** observable features of specimen **K** that adapt it to its function.
- (d) State **one** biological importance **each** of the specimens **K** and **M**.
- (e) Make a drawing, 8cm to 10cm long of specimen **M** and label fully.

80% of the candidates gave wrong answers to question (2a). The correct answers are below the diaphragm for **H**, thoracic cavity or chest for **K** and dorsal wall of the abdominal cavity for **M**. Instead, candidate gave answers such as stomach for specimen **H**, abdomen for **M** and waist region for specimen **L**.

Question 2(bi) gave a serious problem to the candidates.

Correct Answers

Bile

Wrong Answers

Bile duct, Bale

- (b) (iii) State two functions of the fluid named in (2) (bi)

Correct Answers

- It emulsifies fats and oil into fat droplets.
- The inorganic salts in it neutralize the acid in the chyme/bile neutralize chyme.
- It provides alkaline medium for pancreatic juice to act.
- It prevents the decay of food in small intestine.

Wrong Answers

- Storage of urine
- Production of gastric juice
- For digestion of food.
- It kills bacteria in the gut etc.

(b)(iii) Other specimen that specimen L is associated with.

About 55% of the candidates were able to name the correct answer as the liver and spelt it correctly. Other candidates went as far as giving many wrong answers such as specimen **M**, **K**, stomach etc.

(c)(i) State two observable difference between specimens **H** and **K**.

Most of the candidates could not give observable difference required in this question.

Correct Answers

- Specimen is more solid/thick/turgid while specimen **K** is soft/softer/fluffy/spongy.
- Specimen **H** is darker/dark red in colour while specimen **K** is brighter/red/pink in colour.
- Specimen **H** is smothering while specimen **K** is folded/convoluted.

Wrong Answers

- Specimen **H** is found in the stomach while specimen **K** is found in the chest.
- Specimen **H** is for digestion of food while specimen **K** is respiration
- Specimen **H** secrete bile while specimen **K** do not secrete bile.

(c)(iii) State two observable features of specimen **K** that adapt it to its function.

- This question was poorly attempted by the candidates. Less than 10% of the candidates were able to score marks allocated to this question by stating the correct structure with the corresponding functions.

Correct Answers

- Moist/wet surface for dissolving gasses/oxygen/carbon dioxide.
- Thin surface membrane for easy diffusion of gasses.
- Many blood vessel/highly vascularised for transportation of gasses/dissolved food substances.

Wrong Answers

- Large surface area for digestion of gasses.
- It is spongy for respiration.
- It is moist

(d) State one biological importance each of specimens **K** and **M**.

This question required the candidates to give one importance of each specimen **K** and **M**. Almost 75% of the candidates got this wrong by using the word “help”. When giving functions of things, the word “help” should not be included. For example, the biological importance of specimen **K** (lungs) includes: for gaseous exchange, for respiration and not it helps in gaseous exchange or it helps in respiration.

Question 2(e) required the candidates to make a drawing 8 to 10 cm long of specimen **M** and label fully. 50% of the candidates failed to follow the drawing rules in Biology. The clarity of lines was poor, labeling was not with ruler, no magnification was indicated and the bean shaped structure of the kidney was not seen in most diagrams.

Question 4

Study specimens **S, T, U, V** and **W** and answer questions 4(a) to 4(e)

- (a) (i) Name the habitats of **each** specimens **S, U** and **W**.
(ii) Name the class to which **each** of specimens **S, U**, and **W** belong.
- (b) State
(i) **Four** observable similarities between specimens **S** and **U**
(ii) **Five** observable differences between specimen **S** and **U**
- (c) (i) Identify the sex of specimen **U**.
(ii) State **two** reason for the answer in 4(c) (i).
- (d) State **four** observable features that adopt specimens **S** to its habitat.
(e) Construct a food chain using **at least three** of given specimens.

This was the most popular question. It was well attempted and candidates gave very good answers to most of the question. About 60% of the candidates did well in this question by naming the correct habitat of each specimens **S, U**, and **W**.

(a) (i) Habitat of specimen **S, U**, and **W**.

Correct Answer

S - Wet/moist/damp land, under stone, damp grass/ vegetation

U - House/walls/cracks/mountain slope

W - Vegetation/grassland/farm/tree

(ii) Class to which specimen **S, U** and **W** belong.

Correct Answer

S - Amphibia

U - Reptilia

W - Insecta

Wrong Answers

S - Amphibia , Buffo

U - Reptile, reptilia

W - Insect, insectar

(b) (i) Observable similarities in specimens **S** and **U**

Correct Answer

Both have eyes, head, and wide mouth

Both have 2 pairs of 4 limbs/fore limb /hind limb

Both have tympanic membrane/eardrum

Both have nostrils, trunk

Wrong Answers

Both laid egg

Both are animals

Posses moist skin

Both camouflage.

- (b) About 60% of the candidates were able to give very good observable answers differences between specimens S and U.

Correct Answers

Specimen S (Toad)	Specimen U (Lizard)
Poisonous gland present	Poisonous gland absent
Gular fold absent	Gular fold present
Nuchal crest absent	Nuchal crest present
Neck absent	Neck present
Eye bugled	Eye not bugled

Wrong Answers

Specimen S Toad	Specimen U Lizard
Body is short	Body is long
Can camouflage	Cannot camouflage
Lives in water	Lives on land
It lay eggs in water	Laid eggs on land

- (c) More than 75% of the candidates were able to state the correct sexual identity of specimen U as a male lizard.
- (d) This question required the candidates to state the observable features that adapts specimen S to its habitat. The correct answers for this question include:
- Bulgy eyes for wide vision.
 - Muscular forelimb for absorbing shock.
 - Muscular hind limbs for hopping.
 - Poisonous gland for protection against predators.

About 70% of the candidates were giving wrong answers like

- limbs for movement
- webbed limbs for swimming.
- long sticky tongue to catches prey.

- (e) This question is also very popular among the candidates and over 60% were able to give correct answer constructing the right and correct food chain with the grass as the starting specimen and producer followed by locust as the primary consumer and toad/lizard as the secondary consumer. About 35% of the candidates did not score the maximum four marks allocated to this question by writing the correct order of food chain but wrong sequence and wrong arrow direction.

Correct food chain is as follows

Specimen T → Specimen W → Specimen S

OR

Specimen T → Specimen W → Specimen U

Wrong food chain

Specimen U → Specimen T → Specimen W.

Grass ← locust ← toad.

WASSCE FOR SCHOOL CANDIDATES 2016
CHIEF EXAMINER'S REPORT
CHEMISTRY 2

1. GENERAL COMMENTS

The standard of the paper was quite appropriate for the level of the candidates. The questions selected covered a wide range of topics across the syllabus. The rubrics were clear and without ambiguities. The marking scheme was detailed and flexible in its interpretation to accommodate the various answers provided by candidates. The performance of candidates generally was not impressive and do not vary much in comparison to the previous examination. However, very few candidates scored zero mark. But equally so, few candidates scored above 50 marks. Majority of marks were below 50 out of a total of 100 marks.

2. CANDIDATES' STRENGTHS

Candidates' strengths were remarkable in the following areas:-

- Understanding the questions set.
- Using a logical approach to answering questions
- Giving the required details to questions requiring descriptive answers
- Recalling
- Definitions of terminologies
- Almost all of the Candidates answered questions according to the instruction given, i.e. they did not attempt the questions set for candidates in Ghana only.

3. CANDIDATES' WEAKNESSES

Candidates' weaknesses were expressed in the following areas:

- Ignoring the use of key words and expressions in defining terminologies.
- Recalling appropriate words in answering certain questions.
- Understanding and applying the steps in writing chemical symbols of atoms and ions and formulae of compounds correctly.
- Writing balanced chemical equations correctly.
- Doing calculations using the required formulae, or first principle.
- Some candidates answered more than the four questions required and this could have affected their performance, as time needed to answer relevant questions was reduced.

4. SUGGESTED REMEDIES

Improvement in candidates' performance in subsequent examinations can be enhanced by considering the following suggestions:

- Familiarising with the syllabus and its contents
- Adequately revising all the topics in the different sections of the syllabus, rather than few selected topics.
- Interpreting the questions correctly prior to answering.
- Be aware of the marks allocated to each question and be guided by the marks to provide the required answer(s).
- Revise past examination papers thoroughly while preparing for this paper.
- Understanding the principles related to mathematical concepts and how each is applied in doing calculations.

5. DETAILED COMMENTS ON INDIVIDUAL QUESTIONS

Question 1

- (a) What are nucleons?
- (b) State Graham's law of diffusion
- (c) Explain **briefly** why aluminum does **not** corrode easily.
- (d) State **three** examples of periodic properties.
- (e) State **two** reasons why real gases deviate from ideal gas behaviour.
- (f) List **three** uses of fractional distillation in industry.
- (g) What factors determine the selective discharge of ions at the electrodes during electrolysis?
- (h) State the type of reaction represented by **each** of the following equations:
 - (i) $C_2H_6 + Br_2 \rightarrow C_2H_5Br + HBr$;
 - (ii) $C_2H_4 + Br_2 \rightarrow C_2H_4Br_2$.
- (i) Name the products formed when butane burns in limited supply of air.
- (j) List **three** methods of separating a solid from a liquid.

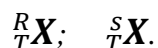
There were many good answers to this question which tested candidates' understanding of some fundamental concepts related to the subject at WASSCE level.

- (a) This question was not well answered by majority of candidates. It was evident that most of the candidates misinterpreted the question.
- (b) Most of the candidates stated Graham's law of diffusion correctly. Some candidates could not state the conditions of temperature and pressure and hence lost the mark.
- (c) Most candidates demonstrated lack of understanding of this question and this resulted in incorrect answers.
- (d) Almost all of the candidates answered this question correctly.
- (e) Most candidates could not state the reasons why real gases deviate from ideal behaviour.
- (f) Most candidates could not give the correct applications of fractional distillation.
- (g) Most candidates were able to mention at least one correct factor which determines the preferential discharge of ions at the electrodes during electrolysis.
- (h) (i), (ii) Few candidates gave the correct names of the reactions represented by the equations.
- (i) Most candidates gave at least two of the products of the incomplete combustion of the hydrocarbon.
- (j) Most of the candidates gave at least two of the correct methods of separation of a solid from a liquid.

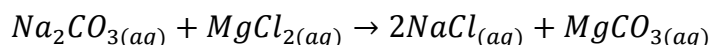
SECTION B

Question 2

(a) Consider the following atoms:



- (i) State the phenomenon exhibited by the **two** atoms.
 - (ii) What is the difference between the atoms?
 - (iii) Give **two** examples of elements that exhibit the phenomenon stated in 2(a)(i)
 - (iv) If **T** is 17, write the electron configuration of the element.
- (b) (i) State **two** differences between metals and non-metals with respect to their:
- I. physical properties;
 - II. chemical properties.
- (ii) Give **one** example of each for the following compounds.
- I. an amphoteric oxide;
 - II. a hydride which evolves hydrogen when **reacted** with water;
 - III. a trioxocarbonate (IV) salt which is readily decomposed on heating;
 - IV. a chloride salt which is **readily** hydrolyzed in water.
- (c) (i) State **three** characteristic properties of transition metals.
- (ii) Write the electron configuration of ${}_{30}\text{Zn}$.
- (iii) Explain **briefly** why zinc is **not** considered as a typical transition element.
- (d) Consider the reaction represented by the following equation:



Calculate the mass of sodium trioxocarbonate (IV) needed to produce 3.36 g of magnesium trioxocarbonate (IV).

$$[\text{C} = 12.0, \text{O} = 16.0, \text{Na} = 23.0, \text{Mg} = 24.0]$$

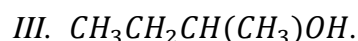
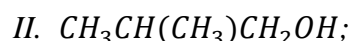
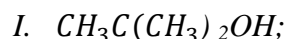
This question tested candidates' knowledge and understanding of elements and periodic properties. While there were many good answers, there were also many responses that showed that candidates did not understand the question at all.

- (a) In part (i), most candidates gave the correct name, *isotropy*. Part (ii) was generally well done by almost all the candidates. Part (iii) was almost invariably correct. Fewer candidates used the symbols of the elements rather than names. In part (iv), most candidates wrote the electronic configuration of Chlorine, however a common error was the use of commas to separate the energy levels.
- (b) Most candidates gave the correct differences in physical properties between metals and non-metals. There were difficulties in stating the correct difference in chemical properties. Part (ii) was poorly answered by most of the candidates. It was evident that the answers provided were merely guessed.

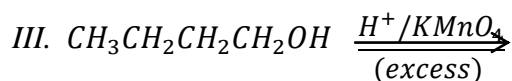
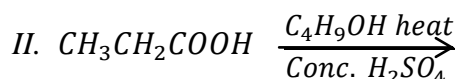
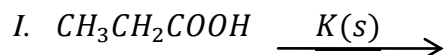
- (c) In part (i), most candidates mentioned at least two correct properties of transition metals. There was a general attempt by candidates to write the correct electron configuration of zinc, but the common error was the use of commas to separate energy levels. Part (iii) was not well answered as candidates failed to relate properties of transition metals to the d-orbital.
- (d) Majority of the candidates did the calculation correctly. There was no consistent error.

Question 3

- (a) (i) Define structural isomerism.
 (ii) State the class of alkanols to which **each** of the following compounds belongs:



- (b) (i) Write the formulae of the products formed in the following reactions:



- (ii) Name the **major** products(s) of **each** of the reactions in 3(b)(i)
- (c) A gaseous hydrocarbon **R** of mass 7.0 g occupies a volume of 2.24 dm^3 at s.t.p. If the percentage composition by mass of hydrogen is 14.3, determine its:
- (i) empirical formula;
 (ii) molecular formula.

$$[\text{H} = 1.00, \text{C} = 12.0, \text{Molar volume of gas at s.t.p.} = 22.4 \text{ dm}^3]$$

- (d) Draw the structures of the isomers of the alkene with molecular formula C_4H_8 .

Much of the organic Chemistry at this level has to be learned by candidates and it was clear to Examiners that a significant number of candidates who took this paper did not have good knowledge of key concepts related to organic compounds and the reactions involved. There were also many candidates who did not understand the IUPAC rules of nomenclature.

- (i) Few candidates answered this question correctly.
 (ii) Most candidates could not classify alcohols correctly.
 (iii) Only few candidates answered parts of this question correctly. It was evident that most candidates do not understand organic reactions. Part (i) was generally well answered by most of the candidates. Most of the candidates could answer part (ii) correctly. This part of the question was not well answered by most of the candidates.

Question 4

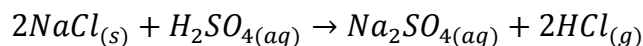
- (a) (i) Name a suitable drying agent for the preparation of carbon (IV) oxide in the laboratory.
(ii) Using one chemical test, distinguish between carbon (II) oxide and carbon (IV) oxide.
- (b) (i) Describe **briefly** how oxygen and nitrogen could be obtained separately from air on an industrial scale.
(ii) State how a lighted splint can be used to distinguish between samples of oxygen and nitrogen.
- (c) (i) Give **one** reason why bauxite is usually preferred as the ore for the extraction of aluminium.
(ii) List **two main** impurities usually present in bauxite.
(iii) State the function of sodium hydroxide solution in the extraction of aluminium from its ore
(iv) Explain **briefly** why it is difficult to extract aluminium by chemical reduction of aluminium oxide.
(v) Write an equation for the reaction of aluminium oxide with aqueous sodium hydroxide.
- (d) (i) The melting and boiling points of sodium chloride are 810°C and 1413°C respectively. Explain **briefly** why sodium chloride does not conduct electricity at 25°C but does so between 801°C and 1413°C .
(ii) State the reason why sodium metal is stored under paraffin oil in the laboratory.
- (e) (i) State what would be observed when aqueous sodium trioxocarbonate (IV) is added to a solution containing iron (III) ions.
(ii) Write a balanced equation for the reaction in 4(e)(i).

This question required candidates to apply their knowledge and understanding of the properties of elements and principles related to the extraction of metals as well as, properties of metals. Many candidates struggled with parts of this question. A significant number of candidates gave ambiguous answers in most part of the question. Writing balanced chemical equations also proved to be quite challenging to most of the candidates.

- (a) (i) Most candidates could not give the correct drying agent required.
(ii) Most candidates mentioned that lime water is used to distinguish between carbon monoxide and carbon dioxide and stated the correct observations in each case.
- (b) In part (i), most candidates could not describe the processes involved in obtaining the main components of air. Part (ii), was poorly answered by most candidates.
- (c) (i),(ii),(iii),(iv) This part of the question was poorly answered entirely by almost all the candidates.
- (d) In part (i), most candidates failed to use the key words mobile ions in explaining the electrical conductivity of sodium chloride. In part (ii), most candidates mentioned prevention of corrosion as the reason for storing sodium metal under paraffin oil.
- (e) (i),(i) This part of the question was poorly answered entirely by almost all the candidates.

Question 5

- (a) (i) Determine the oxidation number of sulphur in $\text{Na}_2\text{S}_2\text{O}_3$
(ii) Name the allotropes of sulphur.
(iii) State **two** ways in which the structure of graphite and diamond are similar.
- (b) (i) Name **two** green-house gases.
(ii) State **one** effect of an increased level of green-house gases on the environment.
(iii) State **one** source from which nitrogen (I) oxide is released into the environment.
(iv) Write a chemical equation to show the effect of heat on **each** of the following compounds:
I. $\text{KNO}_{3(s)}$;
II. AgNO
- (c) (i) Describe **briefly** how pure dry crystals of calcium chloride could be obtained from a solution of calcium chloride.
(ii) Explain **briefly each** of the following observations:
I. ammonia gas is highly soluble in water;
II. boiling point of chlorine is lower than that of iodine.
- (d) Consider the reaction represented by the following equation:



Calculate the volume of HCl gas that can be obtained at s.t.p. from 5.85 g of sodium chloride.

[$\text{Na} = 23.0$, $\text{Cl} = 35.5$, Molar volume of gas at s.t.p. = 22.4 dm^3]

This question tested candidates' knowledge and understanding of environmental Chemistry, properties related to some non-metals, principle of chemical bondings and stoichiometry. There were very few good answers to parts of the question. The calculation proved to be much of a challenge to most of the candidates, as well as, writing balanced chemical equations.

- (a) (i) Most candidates used the correct steps in determining the oxidation state of sulphur. The common error was omitting the (+) sign.
(ii) Most candidates mentioned at least one correct allotrope of sulphur.
(iii) Most candidates could not answer this part of the question correctly.
- (b) In part (i), most candidates could not name gases responsible for the Green house effect. There was a common error in mentioning gases responsible for acid rain such as sulphur dioxide and nitrogen dioxide respectively. In part (ii), candidates failed to state the effect of acid rain. Part (iii) was poorly answered by almost all the candidates. In part (iv), few candidates wrote the correct formulae of reactants and products, but could not balance the equation.
- (c) In part (i), most candidates could not explain the process of crystallization correctly. In part (ii), candidates failed to relate the solubility of ammonia in water to hydrogen bonding. Most candidates also failed to relate the difference in boiling point between chlorine and iodine to the nature of intermolecular force arising from the size of each atom.
- (d) Most candidates did not answer this question correctly. It was evident that candidates did not interpret the question correctly, or did not apply the required steps in the calculation of the volume of HCl gas produced in the reaction represented by the equation.

WASSCE FOR SCHOOL CANDIDATES 2016
CHIEF EXAMINER'S REPORT
CHEMISTRY 3

Practical
Alternative A

1. GENERAL COMMENTS

The paper was of appropriate standard with enough time allocated. The general performance was a bit satisfactory. Only about 40% of the candidates were able to score 50% and more of the total 50 marks allocated.

Compared with previous years, this year's general performance was a bit better. The questions were simple, straight forward and easy to understand and this, to a great extent has helped to improve candidates' performance. It seems as if the interest in the practical aspect of the subject is finally taking its rightful sit in the syllabus.

The overall impression created by this performance points to the fact that candidates have had considerable practical experiences. Students are no more taking practical lessons for granted. They now have at the back of their minds that practical papers are as equally important as their Essay and Objective papers (i.e. Chemistry 2&1).

2. CANDIDATES' STRENGTHS

Candidates showed commendable improvements in the following areas:

- Writing in INK.
- Clarity and legibility of work.
- Attempting all the questions.
- Using correct units to numerical answers.
- Presenting work in correct tabular forms.
- Recording burette readings to two decimal places.
- Averaging consistent/concordant titre values.
- Calculating through logical steps.

3. CANDIDATES' WEAKNESSES

The low performance level by candidates could be attributed to:

- Stating wrong inferences.
- Misinterpretation of questions.
- Making incomplete or wrong observations.
- Lack of effort and adequate preparation for the examination.
- Failing to give numerical answers in 2 or 3 significant figures.
- Recording burette readings to an impossible degree of accuracy e.g. 16.77 cm^3
 23.01 cm^3 , etc.
- Lack of knowledge of important practical concepts or terminologies e.g. precipitate instead of residue.

4. SUGGESTED REMEDIES

The Chief Examiner suggested the following points as remedies:

- Candidates should endeavour to prepare adequately for the examination.
- Candidates should ensure a wider and in-depth coverage of the syllabus.
- Additional emphasis should be placed on problem solving exercises.
- Early and continuous work be done on practical.

- Candidates must have obtained very good grades in mathematics and science in their junior schools before offering chemistry at higher levels.
- Candidates should properly study the questions and carefully take note of the rubrics before attempting them.
- Workshops and/or seminars should be organized by WAEC for Chief Examiners to educate teachers and students alike as to what is required of them in Chemistry practical examinations.

5. DETAILED COMMENTS ON INDIVIDUAL QUESTIONS

Question 1

A is a solution of $0.050 \text{ mol dm}^{-3} \text{ H}_2\text{C}_2\text{O}_4$ (ethanedioic acid).

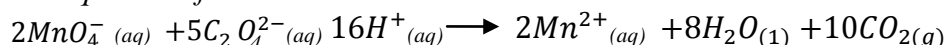
B is a solution of KMnO_4 (potassium tetraoxomanganate (VII), of unknown concentration.

- (a) *Put B into the burette. Pipette 20.0 cm^3 or 25.0 cm^3 of A into a conical flask and add about 10.0 cm^3 of dilute H_2SO_4 . Heat the mixture to about $40^\circ\text{C} - 50^\circ\text{C}$ and titrate it while still hot with B.*

Repeat the titration to obtain consistent titre values.

Tabulate your results and calculate the average volume of B used.

The equation of reaction is:



- (b) *From your results and the information provided, calculate the:*

- concentration of MnO_4^- in B in mol dm^{-3} ;*
- concentration of KMnO_4 in B in g dm^{-3} ;*
- volume of CO_2 evolved at s.t.p when 25.0 cm^3 of $\text{H}_2\text{C}_2\text{O}_4$ reacted completely.*

[$0 = 16.0$, $K = 39.0$, $\text{Mn} = 55.0$, molar volume of gas at s.t.p = $22.4 \text{ dm}^3 \text{ mol}^{-1}$]

Candidates' attempt to this question was a bit encouraging. Over 80% of the candidates demonstrated a high degree of accuracy in tabulating and recording results obtained from volumetric analysis. This earned them vital marks.

However, vital marks were lost by a few candidates because:

1(a)

- They fail to supply consistent burette readings.
- They fail to supply the correct units to the table of burette readings.
- They cancelled their tables of burette readings.
- They deliberately altered their burette readings.
- They used pencils in tabulating their burette readings

1(b) they failed to:

- Use the correct mole ratio, substitute correctly and change subject correctly in calculating the concentration of the MnO_4^- in B in mol dm^{-3} .
- Calculate the correct molar mass of KMnO_4 when calculating its concentration in g dm^{-3} .
- Supply the correct unit of the molar mass of KMnO_4 .
- Calculate the volume of CO_2 evolved at s.t.p. using the equation.
- Supply the correct unit for the volume of CO_2 produced.
- Supply their final numerical answers to *three significant figures*.

Question 2

C is a mixture of **two** salts, containing **one** cation and **two** anions.

Carry out the following exercises on **C**. Record your observations and identify any gas(es) evolved. State the conclusion you draw from the result of **each** test.

- (a) Put all of **C** in a beaker and add about 10 cm^3 of distilled water. Stir well and filter. Keep the filtrate and the residue.
- (b) To about 2 cm^3 of the filtrate, add few drops of $\text{AgNO}_{3(aq)}$ followed by $\text{HNO}_{3(aq)}$. Add **excess** $\text{NH}_{3(aq)}$ to the resulting mixture.
- (c)
 - (i) Put all of the residue into a clean test tube and add about 5 cm^3 of $\text{HNO}_{3(aq)}$.
 - (ii) To about 2 cm^3 of the solution from 2(c)(i), add $\text{NaOH}_{(aq)}$ in **drops** and then in **excess**.
 - (iii) To another 2 cm^3 of the solution from 2(c)(i), add $\text{NH}_{3(aq)}$ in **drops** and then in **excess**.

This question was simple and straight forward. Over 70% of the candidates seemed to know what they were doing and therefore followed the instructions accordingly.

It's worth noting that in the future, teachers should endeavor to tell candidates:

- to record their observations and state the corresponding inferences as soon as the tests are made.
- to state more than one possible/correct ion as inference for some observations.
- that any wrong ion stated under the inference column leads to a penalty of minus 1.
- that the confirmatory test for CO_2 is not with litmus paper but with lime water where the lime water is turned milky.

Expected answers are presented in the table below.

	Test	Observation	Inference
(a)	$\text{C}_{(s)} + \text{distilled water} + \text{filter}$	Partially dissolved/soluble. Colourless filtrate and white residue obtained	C contains soluble and insoluble salts
(b)	Filtrate of C + $\text{AgNO}_{3(aq)}$ + $\text{HNO}_{3(aq)}$ + $\text{NH}_{3(aq)}$	White precipitate Precipitate insoluble Precipitate insoluble / dissolved	$\text{Cl}^-/\text{CO}_3^{2-}/\text{SO}_3^{2-}$ Cl^- Cl^- present
(c) (i)	Residue + $\text{HNO}_{3(aq)}$	Colourless and odourless gas which turned limewater milky was evolved	CO_2 gas evolved $\text{CO}_3^{2-}/\text{HCO}_3^-$ present
(ii)	Solution from (c) (i) + $\text{NaOH}_{(aq)}$ In drops In excess	White gelatinous precipitate Precipitate dissolved/soluble	$\text{Zn}^{2+} / \text{Al}^{3+}$ present $\text{Zn}^{2+} / \text{Al}^{3+}$ present (the two ions must be mentioned)
(iii)	Solution from (c) (i) + $\text{NH}_{3(aq)}$ In drops In excess	White gelatinous precipitate Precipitate dissolved/soluble	$\text{Zn}^{2+} / \text{Al}^{3+}$ present (the two ions must be mentioned) Zn^{2+} present

Question 3

- (a) What difference in physical properties enables the separation of mixtures by.
- (i) simple distillation;
 - (ii) paper chromatography;
 - (iii) fractional distillation.
- (b) Give a reason for **each** of the following practices during titration in the laboratory.
- (i) White tile is placed under the conical flask;
 - (ii) Burette readings are always recorded to **two** decimal places.
- (c) Calculate the volume of 2.5 mol dm^{-3} stock HCl required to prepare 500 cm^3 of 0.20 mol dm^{-3} HCl.

This was the worst attempted question. The following were clearly visible from this question.

- Inadequate laboratory practice.
- Incomplete coverage of the syllabus.
- Lack of knowledge of subject matter.
- Low level of preparedness for the examination.
- Lack of knowledge in the basic principles governing Chemistry Practical.

Expected answers to this question were as follows:

- (a) (i) Wide difference in boiling of components (*for miscible liquids*)/difference in physical states (*for liquid-solid solutions*)
- (ii) Difference in absorption/retention rate of components /solubility of solute in the mobile phase
- (iii) (Close) difference in boiling points of components
- (b) (i) To make the end-point colour change more visible /in order not to overshoot the end-point
- (ii) To ensure (high) accuracy of the titre value
- (c) Using the dilution formula
- $$C_1 V_1 = C_2 V_2$$
- $$\therefore V_1 = \frac{C_2 V_2}{C_1} = \frac{0.200 \times 500}{2.5} = 40.0 \text{ cm}^3$$

CHEMISTRY 3

Practical Alternative B

1. GENERAL COMMENTS

The standard of the paper was appropriate for the level of intended candidates. It was of a parallel standard to those of previous years. The general performance was not satisfactory and it was quite obvious that majority of the candidates could not put much effort due to lack of knowledge in the subject area.

Apart from a few candidates (less than 10% of the candidates) who displayed a very good sense of understanding in some questions, most of them could not show much evidence of diligent in their approach towards the subject. There was abundant evidence that the poor performance was due to:

- Incomplete coverage of the syllabus.
- Low level of preparedness for the examination.
- Inadequate knowledge in the subject content.
- Lack of understanding of fundamental concepts and principles.

2. CANDIDATES' STRENGTHS

There is a remarkable improvement in the following areas as years go by:

- Writing in INK.
- Attempting all the questions.
- Presenting work in tabular forms.
- Clarity and legibility of work done.
- Presenting precise answers to questions.

3. CANDIDATES' WEAKNESSES

The poor performance of candidates could be attributed to:

- Insufficient practice/use of laboratory apparatus or chemicals.
- Poor understanding of important practical concepts or terminologies e.g. precipitates instead of residue.
- Lack of effort and adequate preparation for the examination.
- Misinterpretation of questions.
- Inability to express themselves clearly in simple language.
- Lack of facts and reasons in answers provided.
- Common spelling mistakes.

4. SUGGESTED REMEDIES

The Chief Examiner suggested the following points as remedies:

- Candidates should endeavour to prepare adequately for the examination.
- Candidates should ensure a wider and in-depth coverage of the syllabus.
- Additional emphasis should be placed on problem solving exercises.
- Early and continuous work should be done on practicals.
- Candidates must have obtained very good grades in mathematics and science in their junior schools before offering chemistry at higher levels.
- Candidates should properly study the questions and carefully take note of the rubrics before attempting them.
- Workshops and/or seminars should be organized by WAEC so that Chief Examiners could educate teachers and students alike as to what is required of them in a chemistry practical examination.

5. DETAILED COMMENTS ON INDIVIDUAL QUESTIONS

Question 1

D is $0.050 \text{ mol dm}^{-3}$ solution of an unknown mineral acid H_xY . *E* is a solution of *KOH* containing $0.025 \text{ mole in } 250 \text{ cm}^3$ of solution.

- (a) Put *D* into the burette and titrate it against 20.0 cm^3 or 25.0 cm^3 portions of *E* using phenolphthalein as indicator.
Repeat the titration to obtain consistent titre values.
Tabulate your results and calculate the average volume of *D* use.
- (b) From your results and the information provided, calculate the:
- number of moles of acid in the average titre;
 - number of moles of base in the volume pipetted;
 - mole ratio of acid to base.

- (c) Write a balanced equation for the reaction between the acid H_xY and base KOH .
- (d) (i) State the basicity of the acid H_xY .
(ii) Suggest what H_xY could be.

Less than 10% of the candidates scored up to 50% of the total marks allocated. Vital marks were, however, lost because:

In (a),

they failed to:

- supply consistent burette readings.
- supply the correct units to the table of burette readings.

they:

- cancelled their tables of burette readings;
- deliberately altered their burette readings;
- used pencils in tabulating their burette readings;

In (b), most candidates lost vital marks because they failed to:

- change the concentration of KOH from $mol\ cm^{-3}$ to $mol\ dm^{-3}$;
- supply their final numerical answers to *two or three significant figures*;
- supply the correct units to the final numerical answers;
- realize that the calculated mole ratio of acid to base represents the number of moles of acid and base respectively and are to be used in balancing the equation;
- understand that the basicity of the acid depends on the number of moles of the base or simply the mole ratio. For example;
- a 1:1 mole ratio means that the acid is monobasic; hence the acid could be HCl/HNO_3 ;
- a 1:2 mole ratio means that the acid is dibasic; hence the acid could be H_2SO_4 ;
- a 1:3 mole ratio means that the acid is tribasic; hence the acid could be H_3PO_4 ;

They used the neutralization formula of $\frac{C_A V_A}{C_B V_B} = \frac{n_A}{n_B}$ which is not applicable in this case.

Question 2

F is a mixture of **two** salts.

Carry out the following exercises on **F**. Record your observation and indentify any gas(es) evolved. State the conclusion you draw from the results of **each** test.

- (a) Put all of **F** in a beaker and add about $10\ cm^3$ of distilled water. Stir well and filter, if necessary.
- (b) (i) To about $2\ cm^3$ portion of the solution, add few drops of $Ba(NO_3)_{2(aq)}$ followed by excess $HNO_{3(aq)}$
(ii) To another $2\ cm^3$ portion of the solution, add $NaOH_{(aq)}$ in drops and then in excess
(iii) Warm the resulting mixture from 2(b)(ii).
(iv) To another $2\ cm^3$ portion of the solution, add $NH_{3(aq)}$ in drops and then in excess.
(v) To another $2\ cm^3$ portion of the solution, add few drops of potassium thiocyanate solution ($KSCN_{(aq)}$).

Candidates' attempt to this question was average. Vital marks were lost by most candidates because they:

- failed to adhere to instructions;
- recorded wrong or incomplete observations;
- stated wrong or incomplete inferences.

Correct and expected answers are stated in the tables below:

	Test	Observation	Inference
(a)	F + distilled water + stir	Dissolve to give yellow/ yellow brown solution	F contains soluble salts (Fe ³⁺ may be present)
(b)	F _(aq) + Ba(NO ₃) _{2(aq)} + HNO _{3(aq)}	White (chalky) precipitate Precipitate insoluble	SO ₄ ²⁻ , SO ₃ ²⁻ , CO ₃ ²⁻ , S ²⁻ SO ₄ ²⁻ present
(i)	F _(aq) + NaOH _(aq) In drops	Reddish-brown gelatinous precipitate	Fe ³⁺ present
(ii)	In excess	Precipitate insoluble	
(iii)	Mixture in b (ii) warmed	Colourless pungent/ choking/irritating gas evolved, turns moist red litmus to blue/forms dense white fumes with conc HCl	Gas is NH ₃ NH ₄ ⁺ ions present
(iv)	F _(aq) + NH _{3(aq)} In drops	Reddish-brown gelatinous precipitate	Fe ³⁺ present
	In excess	Precipitate insoluble	
(v)	E _(aq) + KSCN _(aq)	Deep red / blood red solution or coloration	Fe ³⁺ present / confirmed

Question 3

(a) Name **one** gas which:

(i) **Cannot** be collected over water;

(ii) Can be dried with concentrated H₂SO₄;

(iii) Changes the orange/yellow colour of K₂Cr₂O₇/H⁺_(aq)

Give **a** reason for your answer in **each** case.

(b) State the chemical process involved in the following conversions:

(i) Palm wine to ethanol;

(ii) Pb(NO₃)_{2(aq)} to PbCO_{3(s)} using K₂CO_{3(aq)}

(iii) NH₄Cl_(s) to NH_{3(g)} and HCl_(g);

(iv) Starch to glucose using hot HCl_(aq).

This was the worst attempted question. The following were evidently clear from this question:

- Inadequate laboratory practice.
- Incomplete coverage of the syllabus.
- Lack of knowledge of subject matter.
- Low level of preparedness for the examination.
- Lack of strict adherence to simple instructions e.g. giving formulae instead of writing the names of substances.

Correct answers to this question were:

(a) (i) Ammonia /hydrogen chloride/sulphur (IV) oxide;

Reason: Very soluble in water

(ii) Oxygen /hydrogen/sulphur (IV) oxide /carbon (IV) oxide / chlorine/hydrogen chloride;

Reason: They do not react with H₂SO₄

(iii) Hydrogen sulphide /sulphur (IV) oxide / ethene / ethyne/propene /propyne/ butene /butyne;

Reason: They are reducing agents or K₂Cr₂O₇ is an oxidizing agent.

(b) (i) Fermentation

(ii) Double decomposition/precipitation

(iii) Sublimation/thermal decomposition/thermal dissociation

(iv) (Acid) hydrolysis.

WASSCE FOR SCHOOL CANDIDATES' 2016
CHIEF EXAMINER'S REPORT
HEALTH SCIENCE 2

1. GENERAL COMMENTS

The questions were standard and within the scope of the syllabus. The general performance of the candidates was satisfactory. The performance of some candidates was good; showing their coverage of the whole syllabus. However, some candidates were unable to answer some of the questions and thus perform badly.

Looking at the answers given to the questions, it appeared that some of the candidates did not understand the questions. The candidates therefore needed to understand the questions in order to give the required answers.

About 50% of the candidates scored good marks, 30% with average scores and the rest with very poor marks.

About 30% of the candidates have problems in expressing themselves in simple English and this contributed greatly to their poor performance. The correct spelling and usage of scientific/biological terminologies was also a problem.

2. CANDIDATES' STRENGTHS

Most candidates showed improvement in their ability to:

- legibly present their work;
- adhere to the instructions;
- give concise and straight forward answers;
- state the functions of saliva;
- explain what an enzyme is;
- explain the term pollution;
- name the major layers of the skin;
- state the factors for maintenance of health;
- explain the terms *personal hygiene* and *physical health*;
- state the functions of fluorine in human body;
- mention two insects associated with disease in humans;
- state four methods of controlling insects in homes.

3. CANDIDATES' WEAKNESSES

The candidates' weakness includes their inability to:

- express them self using good English Language;
- correctly interpret the questions;
- answer the required number of questions;
- correctly use biological/scientific terminologies.

4. SUGGESTED REMEDIES

The Chief Examiner suggested the following points as remedies:

- Candidates should read widely to understand scientific terminologies.
- Candidates should carefully read instructions and follow them accordingly.
- Candidates should comprehend what the question requires before answering them.

- The syllabus needs to be thoroughly covered by the teachers before the examination.
- The students need to be taught on how to correctly draw biological diagrams.
- Teachers should be strict in marking students work to improve their spelling and writing skills.

5. DETAILED COMMENTS ON INDIVIDUAL QUESTIONS.

SECTION A

Question 1

- (a) State **three** functions of saliva.
- (b) State **three** functions of the large intestine.
- (d) State **four** ways in which the working of the alimentary canal can be enhanced.

This was attempted by all candidates and their performance was satisfactory. Almost 70% of the candidates who attempted this question got it correct.

Questions (a) and (b) were well answered by the candidates. The problem was with question 1(c), in which most of the candidates were confused with the word “enhanced” and were writing about the problems of alimentary canal.

Question 2

- (a) What are enzymes?
- (b) Name **one** food item acted upon by each of the following digestive enzymes:
 - (i) trypsin;
 - (ii) renin;
 - (iii) lipase;
 - (iv) amylase.

The definition of the word enzymes posed big problem to the students. More than 50% of the candidates were unable to spell key words like “catalyst” in the definition and others gave incomplete definition of enzymes.

In question 2(b), most candidates could not correctly state the food items acted upon by the listed digestive enzymes. Almost 90% of the candidates could not answer the nutrients acted upon by the enzyme *rennin*.

Question 3

Describe the process of protein absorption in the small intestine.

This was one of the most poorly attempted questions. Almost half of the candidates did not attempt this question. About 10 % of the candidates who attempted the question scored some marks. Some candidates were explaining the process of protein digestion in the alimentary canal instead of protein absorption in the small intestine.

Question 4

Explain the term pollution in relation to Health Science.

This question was well answered by almost 60% of the candidates. About 10% of the candidates deviated by explaining noise, vehicle smoke in cities or industrial pollution.

Question 5

- (a) Mention **three** substances found in the urine of humans.
- (b) State **two** reasons why humans take a lot of water when the weather is hot.

About 50% of the candidates were unable to correctly spell the substances in human urine in question 5(a) as a result loses marks. The spelling of urea/uric acid, ammonia and ammonium compounds posed a lot of problems.

Only about 30% of the candidates were able to score marks for 5 (b). Most candidates got the idea but could not express themselves. A good number of candidates spelled “sweat” as “sweet”.

Question 6

Name the **two** major layers of the skin.

This question was attempted by many candidates and their performances were above average. About 65% of the candidates that attempted the question could not correctly name the layers of the skin. About 25% of the students could not spell *epidermis* and *dermis* correctly.

Question 7

- (a) State **five** factors for the maintenance of health
- (b) State **five** features of endomorphs
- (c) Explain the following terms:
 - (i) personal hygiene;
 - (ii) physical health;
 - (iii) blood pressure.
- (d) List **four** injuries that could occur in the muscles of humans.

This question was attempted by about 90% of the candidates and their performance was fairly good as 60% of the candidates were able to give correct answers.

In part 7(a) candidates correctly mention at least three factors necessary for the maintenance of health. A few candidates fail to score marks because of clumsy sentences that were difficult to understand.

Question 7(b) was the worst answered question on this paper. Only about 10% of the candidates were able to state two features of endomorphs. A good number of the candidates were listing the activities rather than the features of endomorphs. They gave wrong answers like “to watch activities” rather than “take part”, “they are short” etc.

7(c) most candidates could not correctly explain the terms personal hygiene, physical health and blood pressure. Others explanations were incomplete.

Question 7(d) was as well poorly attempted. Only about 40% of the candidates gave two injuries that occur in muscles. Most candidates listed the injuries to the bone rather than muscles.

Question 8

- (a) (i) *What is meant by the term homeostasis?*
(ii) *Explain how the human body maintains a constant body temperature in a cold environment.*
- (b) *State:*
 - (i) **three** *sources of iodine;*
 - (ii) **two** *deficiencies of iodine;*
 - (iii) **one** *function of fluorine in the human body.*
- (c) *Draw and label an elbow joint.*

This was the least attempted question. The candidates who have answered this question performed poorly.

The meaning of the term *homeostasis* was wrongly explain by most candidates .The way the body maintains a constants body temperature in a cold environment was also wrongly explained. Candidates were writing wrong answer as sitting next to the fire, put on sweaters or heavy clothes and joggings to warm oneself. Most candidates that attempted question 7(b) got it correct. In part b(i), most candidates state at least two correct sources of iodine and a correct deficiency of iodine . In b (ii), almost 90% of the candidates who attempted this question stated the correct function of fluorine in human body. The diagram of the elbow joint was attempted by only about 10% of the candidates. The size of their diagrams was small and in some instances did not resemble the elbow at all. The line qualities were also poor, as they were broken. Most of the candidates were unable to label more than two parts of the diagram drawn.

Question 9

- (a) *State **two** similarities **each** between the symptoms of the following pairs of diseases:*
 - (i) *dysentery and cholera;*
 - (ii) *malaria and yellow fever;*
 - (iii) *tuberculosis and whooping cough.*
- (b) (i) *mention **two** insects associated with diseases in humans*
(ii) *state **four** methods of controlling insects in homes.*
- (c) *State **two** advantages each of the following methods of food preservation:*
 - (i) *baking;*
 - (ii) *frying;*
 - (iii) *roasting;*
 - (iv) *boiling.*

The questions were up to standard and within the syllabus requirement. The marking scheme has adequately catered for all irrespective of the individual's locality.

**WASSCE FOR SCHOOL CANDIDATES' 2016
CHIEF EXAMINER'S REPORT
HEALTH SCIENCE 3**

PRACTICAL

1. GENERAL COMMENTS

The Health Science paper 3, test of practical, comprised of two sections A and B. Candidates were expected to answer all questions from both sections. The questions were standard for the examination

2. CANDIDATES STRENGTHS

Most candidates show improvement in their ability to:

- adhere to stated instructions by answering all questions ;
- answer each question on a fresh page ;
- correctly name the parts of the diagrams , mentioning the broken bones ;
- state the first aid treatment on broken bone ;
- name the types of pasture;
- state the functions of the parts of the alimentary canal ;
- identify the thoracic vertebra;
- explaining the term artificial insemination ;
- name the stimuli detected by human skin and its functions .

3. CANDIDATES WEAKNESS

The candidate's weakness includes their inability to:

- correctly spell words;
- write legibly for examiners to read ;
- express themselves well in English Language ;
- identify simple diagrams ;
- name the type of injuries on the bones;
- identify parts of the thoracic vertebra and alimentary canal;
- suggest two measures to correct the posture shown as diagrams;
- to mention four instrument used in auditory screening;
- explain the terms *test tube baby* , *metabolism* and *absorption* .

4. SUGGESTED REMEDIES

The Chief Examiner suggested the following points as remedies:

- Teachers should put emphasis on the students' written work to improve their English.
- Wrong spellings by students should not be marked in order to improve the students' spellings tests.
- Teachers should endeavour to cover the syllabus before the examination.
- Students should do enough practice on drawing biological diagrams.
- Students should be given enough work on identifying parts of diagrams.
- Students should have up to date health science laboratory.

5. DETAILED COMMENTS ON INDIVIDUAL QUESTIONS

Question 1

The diagram below illustrates a broken bone in the lower limb. Study the diagram carefully and answer questions 1(a), (b), (c) and (d).



- (a) (i) What type of injury is shown in the diagram?
(ii) Mention the bone broken as shown in the diagram.

About 70% of the candidates identified the injury in 1(a)(i) as complex fracture/compound fracture whilst the correct answer in complicated fracture .

The bone broken in (a)(ii) is femur bone .

Some candidates gave other wrong answer as humerus,ulna, tibia etc.

- (b) State three observable features of the injured part.

The word observable was not understood by most candidates as almost 50% of them wrote non observable things like painful and the part will be swollen.

- (c) List two materials needed to support the injured part.

Most students were able to name the need materials to support the injured part in (1) but the spelling of splint was very difficult for most of them. Other gave wrong answers as rope, string, crutches etc.

- (d) State three First Aid treatments that should be applied to the affected part.

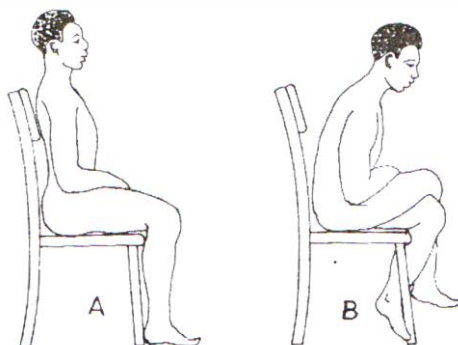
The First Aid treatment in 1(d) was as well answer except in few cases.

The candidates wrote answer like the use of ink, methyalted spirits, gentian violet, iodine, Paracetamol , etc.

Question 2

The diagram below illustrates posture in humans.

Study the diagram carefully and answer 2(a), 2(b) and 2(c).



- (a) Name the type of posture in the diagrams labelled **A** and **B**.

This question was well answered by almost all candidates.

- (b) State **three** observable features each of the postures in the diagrams **A** and **B**.

This question was also well answered by almost 90% of the candidates. But a few stated observable feature of **A** having one leg and hand, and **B** having one hand and two legs. Other given wrong answers were kyphosis, lordosis and scoliosis as observable features.

- (c) Suggest **two** measures to correct the posture in diagram **B**.

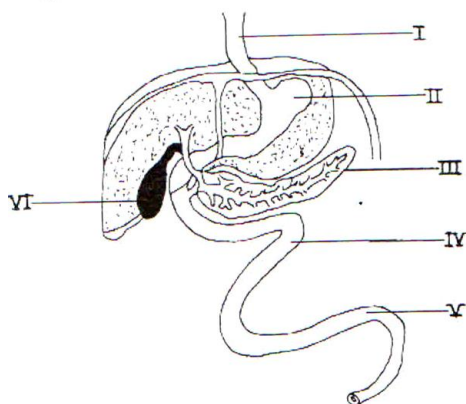
Almost 70% of the candidates wrote wrong answer to this as eating balanced diet and doing regular exercise.

Question 2(a) was well answered by almost all candidates. Question 2(b) was also well answered by almost 90% of the candidates but a few stated observable feature of **A** having one leg and hand, and **B** having one hand and two legs. Other given wrong answers were kyphosis, lordosis and scoliosis as observable features.

Almost 70% of the candidates wrote wrong answer for question 3(c) like eating balanced diet and doing regular exercise.

Question 3

The diagram below illustrates the alimentary canal and its associated organs in humans. Study it carefully and answer questions 3(a), 3(b) and 3(c).



- (a) (i) *Name the parts labelled **I,II, III,IV, V** and **VI**.*

"PARTS	CORRECT ANSWER	WRONG ANSWER
I	esophagus /gullet	trachea
II	stomach	abdomen/belly
III	pancreas	liver/stomach
IV	duodenum	small intestine
V	ileum /small intestine	large intestine
VI	gall bladder	liver.

- (ii) State **two** functions **each** of the parts labelled **III** and **IV**.

PARTS	CORRECT ANSWER	WRONG ANSWER
III	secretes pancreatic juice secretes hormones	secretes renin secretes bile
VI	store bile, drains bile into duodenum	secretes bile, produce pancreatic juice.

- (b) Describe the shape of the parts labelled:

- (i) IV;
(ii) V.

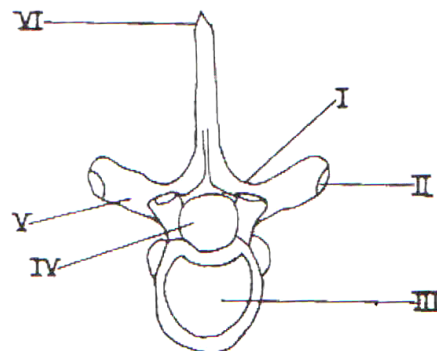
PARTS	CORRECT ANSWER	WRONG ANSWER
IV	u-shape/ curved/loop	s-shape/tube shape
V	coiled/long shape	like earth worm/round worm,

- (c) State the significance of the shape described in 2(b)(ii).

More than half of the candidates did not attempt this question. Others wrote answer as produce enzymes, etc.

Question 4

The diagram below is an illustration of a vertebra in the human skeleton. Study it and answer questions 4(a), 4(b) and 4(c).



- (a) (i) identify the vertebra illustrated in the diagram.

CORRECT ANSWER	WRONG ANSWER
thoracic vertebra	cervical / lumber vertebra

- (ii) Name the parts labelled **I, II, III, V** and **IV**.

PARTS	CORRECT ANSWER	WRONG ANSWER
I	Neural arch	neural bone
II	tuberculum/tubercular facet	
III	centrum	middle / central part
IV	vertebral foramen / neural canal	neural bone
V	transverse process	spinal process
VI	neural spine	transverse process

(iii) *In which part of the human body is the bone located?*

CORRECT ANSWER

vertebral column/
thoracic region

WRONG ANSWER

abdominal region/ neck/ waist region

(b) *State **one** function **each** of the parts labeled **III, IV and V**.*

PARTS CORRECT ANSWER

III provide support for the vertebra
I provide protect for the vertebra
II provides attachment to the next vertebra
IV passage of spinal cord
V for muscle attachment

WRONG ANSWER

for muscle attachment

(c) *Name **two** bones to which the vertebra illustrated is attached.*

CORRECT ANSWER

cervical vertebra
lumber
ribs

WRONG ANSWER

Axis/ Atlas
Sternum/ breastbone
ulna, radius, caudal

Question 5

(a) *Mention **four** instruments used in auditory screening.*

This question was the worst attempted questions on this paper. Almost 90% of the candidates did not score any marks in this question.

(b) *Explain the following health terms:*

- (i) *artificial insemination;*
- (ii) *test tube baby.*

About 90% of the students were able to explain the term artificial insemination. Almost half of the candidates were unable to explain the term test tube baby in b(ii). Most of the candidates explained test tube baby as fetus delivered before nine months and the put in an incubator to complete development

(c) *State **two** ways of preventing atherosclerosis.*

This question was not answered by almost half of the candidates. Some of the wrong answers given were to avoid drinking alcohol, to properly clean the environment, avoid pollution

Question 6

- (a) (i) Name **two** diseases of the alimentary canal in humans.
(ii) State **two** health effects of over-eating.

The disease of the alimentary canal

CORRECT ANSWER

cholera

typhoid fever

dysentery/amoebic dysentery

diarrhoea/gastroenteritis

WRONG ANSWER

ulcer

cancer

high blood

stomach pain

The candidates were mainly stating the disorders of stomach rather than alimentary canal . The health effects of overeating were not well answer by most candidates. They wrote answer as leading to obesity, laziness, restlessness. Almost 30% of the candidates' did not write correct answers for this question.

- (b) Explain the following terms in digestion:

(i) metabolism;

(ii) absorption.

CORRECT ANSWER

(i) is a chemical process involving the breakdown and building up substance in the cells .

(ii) is the transportation / movement of soluble digested food substance through the capillaries/ villi into the living cells

WRONG ANSWER

The removal of waste materials from the Cells of the body.

The taking of materials from the stomach to the body.

Question 7

- (a) State **four** roles of an orthopaedic unit.

The word orthopedic unit was not understood by the candidates. Only about 10% of the candidates were able to give two roles of orthopedic unit.

The answer of the candidates were diverse and far from the answer.

- (b) Explain the following terms as determinants of correct posture:

(i) nutrition;

(ii) exercise.

CORRECT ANSWER

(i) is the act of eating balance diet / food containing all classes in moderate amounts/ quality to assist in maintenance of good posture in humans

(ii) is the participation of individuals in regular physical activities moderated to suit individual for the maintenance of good posture in humans

WRONG ANSWER

this is the type of food eaten by people to correct posture

this the running , jogging or other activities that makes an individual posture to be correct

Question 8

(a) Mention **three** stimuli to which the human skin is sensitive.

CORRECT ANSWER

- (i) heat/hot
- (ii) cold
- (ii) touch
- (iv) pressure
- (v) pain

WRONG ANSWER

- injury
- wound
- sweat
- smell
- wind

(b) Name **three** parts of the human body where a thermometer may be placed for reading temperature.

CORRECT ANSWER

- anus
- armpit
- elbow fold
- palm/hand
- under the tongue
- mouth

WRONG ANSWER

- stomach
- chest
- face
- neck
- leg
- head

(c) State **four** functions of the human skin.

CORRECT ANSWER

- protection of the body
- regulation of the body temperature
- excretion of waste
- formation of vitamin D
- absorption
- sensitivity
- colour pigmentation with melanin

WRONG ANSWER

- formation of hair
- storage of food nutrients
- conservation of water
- metabolism

WASSCE FOR SCHOOL CANDIDATE 2016
CHIEF EXAMINERS REPORT
PHYSICAL EDUCATION 2

1. **GENERAL COMMENTS**

The Physical Education paper 2 for the WASSCE for School Candidates 2016 was not difficult and the marks allocated commensurate with the questions. Although the paper seemed simple and straight forward, majority of candidates misinterpreted certain questions and therefore could not score high marks. In the same vein, answers submitted by candidates from quite a good number of centres exhibited a significant decrease in the overall quality of work of candidates this year. Generally speaking, the overall candidates' performance for this paper this year was only satisfactory. It is therefore obvious that candidates performed better in physical education paper 3 than paper 2.

2. **CANDIDATES' STRENGTHS**

The majorities of candidates exhibited high degree of legibility and clarity of work and hardly did they beat about the bush when attempting to answer each question even when their answers were not correct.

3. **CANDIDATES' WEKINESSES**

Unsatisfactory performance of candidates could be attributed to the following:

- Obvious lack of seriousness in the approach and output of several candidates;
- Poor preparation for the examination;
- Inadequate coverage of the syllabus on time;
- Poor understanding of basic definitions, principles and concepts;
- Inability to apply correct operational terms.

4. **SUGGESTED REMEDIES**

Candidate's performance shall improve if:

- they are encouraged to develop the reading culture;
- trained and qualified teachers in physical education are employed to teach the subject at all levels.

Recommend text: standard physical and Health Education for Senior Secondary Schools:

5. **DETAILED COMMENTS ON INDIVIDUAL QUESTIONS**

Question 1

(a) *What are sprint races?*

(b) *State:*

(i) ***three** duties of a referee in an athletics event;*

(ii) ***four** duties of a start's assistant in an athletics event.*

This was a popular question for the candidates. The majority of candidates that opted for this question scored reasonable marks.

Question 2

- (a) State **six** duties of a basketball referee.
(b) State **four** instances in which a player is not off-side in a football game.

This was another popular question with satisfactory responses from the majority of those who opted for it.

Question 3

- (a) Mention:
(i) **three** instances in which the ball is **dead** in tennis game;
(ii) **two** instances in which players change court in a tennis game;
(b) State **five** differences between tennis game and table tennis game.

Questions 3(a) (i) and 3(b) were reasonably answered by over 78% of the candidates that attempted them. On the contrary, 3(a) (ii) attracted large amount of irrelevant answers from the majority of candidates in the hope of gaining some credit.

SECTION B

Question 4

- (a) State **five** objectives of the ancient Olympic Games.
(b) Mention **five** factors that can affect an individual's choice of recreational activity.

This was not a popular question among the candidates. The majority of candidates that attempted this question could not score reasonable marks in relation to (a) part of the question. The (b) part of the question was comfortably answered by a bulk of those that opted for it.

Question 5

- (a) (i) What is outdoor recreation?
(ii) Give **four** examples of outdoor recreation activities.
(b) State **four** objectives of an intramural sporting activity in schools.

The candidates' overall performance in terms of question 5 (a) and (b) was credible.

SECTION C

Question 6

- (a) Name the **four** chambers of the human heart.
(b) State **two** functions **each** of the following parts of the human brain.
(i) cerebrum;
(ii) cerebellum;
(iii) medulla oblongata.

Question 6 was poorly attempted by the candidates over 78% of the candidates that opted for it. Some presented their work in an untidy and careless manner. Ridiculously, some just copied ad verbatim the questions on their answer booklets with the hope of earning some marks.

Question 7

- (a) *What is muscle tone?*
- (b) *State **four** effects of exercise on each of the following:*
 - (i) *muscle;*
 - (ii) *the heart.*

This was not a popular question and candidates could not do justice to it.

Question 8

- (a) (i) *What is bye in a tournament?*
- (ii) *State **four** disadvantages of a knockout competition.*
- (b) *Give **four** examples of extramural competition.*

Question 8 (a) (i) attracted unwarranted responses from the entire candidates that attempted it. Question 8 (b) was well attempted by the candidates that opted for it and their marks were good.

Question 9

- (a) (i) *Name **two** agents used for crowd control during sporting activities in schools.*
- (ii) *Give **four** reasons why crowds should be controlled during sports competitions.*
- (b) *State **four** ways of controlling crowds in sports.*

Another popular question with positive responses from the majority of those that opted for it. Indeed, few marks were lost due to inadequate submission from few candidates that opted for Question 9 (a) (i)

Comments on difficulty of the questions

The questions were well structured and reflected the length and breadth of the syllabus. Several sub-questions were difficult for the majority of the candidates to tackle due to the fact that most candidates were not well informed or not informed at all before the examination.

Comments on incorrect or ambiguous questions or questions outside the requirements of the syllabus

The questions were framed in such a manner that **they** were all correct and met the requirements of the syllabus. In fact, they were free from ambiguity.

Comments On The Suitability For The Level Being Examined Vis-a-Vis The Level For The Syllabus

The questions were suitable for the level being examined. Candidates' inability to perform very well centered on the following reasons:

- Poor understanding of basic concepts and principles in relation to physical education;
- Inability to apply correct terminologies;
- Obvious lack of seriousness in the approach and output of several candidates due to negative attitude towards the subject;
- Lack of professionally trained personnel to handle the subject at all levels;
- Lack of adequate instructional materials.

WASSCE FOR SCHOOL CANDIDATE 2016
CHIEF EXAMINERS REPORT
PHYSICAL EDUCATION 3

1. GENERAL COMMENTS

Physical education 3 has been in existence but the performance Test Examination has replaced the Theory of Practice. Candidates were required to showcase their basic skills in Physical Education. Basically, the format of the paper followed established pattern. The questions were all within the scope of the syllabus and were direct and simple. In fact, a large number of candidates were conversant with the desired skills; with many addressing positively the specific issues raised in the questions.

Indeed, there were some noticeable variations in the standard of practical demonstrations exhibited by candidates in various centres. In most of the centres, candidates displayed quality evidence of absolute familiarity of the repertoire of the requirements of the syllabus; hence, their standard of practical demonstration was grossly commendable.

Comparatively, there was sufficient evidence of general improvement in candidates' performance in the present Performance Test Examination compared to the previous Test of Practice Examination. Obviously, no candidate seemed unable to complete the practical test and there was no confusion over the rubrics of the paper: except in a situation where, perhaps the administrative failed to provide the required materials or got the materials late. There was an outstanding increase in the number of candidates this year than the previous year.

2. CANDIDATES' STRENGTHS

The majority of candidates exhibited an outstanding degree of positive performance due to the following reasons:

- The desire to do well was highly noticed from even the weak candidates.
- Following appropriate sequence in skills demonstration.

3. CANDIDATES' WEAKNESSES

Common areas of weaknesses among candidates include:

- The trend of performing certain skills by most candidates in certain centres revealed poor quality tuition and lack of adequate preparedness for the examination.
- Negative attitude of the majority of candidates towards athletics and games.
- In ability to read and interpret the requirements of some of the questions due to poor understanding of English language

4. SUGGESTED REMEDIES

For candidates' future performance improvement, the following have been suggested:

- The candidates should be introduced to intensive practical work early enough to enable them acquire required foundation;
- Schools offering Physical Education should have the required facilities of Physical Education;
- Teachers should cover the syllabus before the examination.

5. **DETAILED COMMENTS ON INDIVIDUAL QUESTIONS**

Question 1

Demonstrate skillfully a good height in high jump event, paying attention to the approach, take-off, clearance and landing.

This question was compulsory and it was attempted by about 98% of the candidates that sat to the examination. Appropriate skills were applied by over 80% of the candidates and their scores were highly commendable.

Question 2

Skillfully execute the 100 metres race through the phases of the start, take-off, running form and finish as fast as possible.

Candidates were allowed to choose either questions 2 or 3. Most of the candidates opted to do question 2. Indeed, the performance of candidates on this question was generally good with bulk scoring very high marks.

Question 3

In the 800 metres race, demonstrate the start, take-off, running form and finish to return a good time.

This was not a popular question; only few candidates ventured into it and their performance was on the average.

SECTION B BALL GAMES

Question 4

*Assume a position behind a restraining line and use the chest pass to propel the ball in a game of basketball at a target marked on a wall. **Three** trials are allowed.*

This was not very popular among the candidates but the few who opted for it obtained valuable marks.

Question 5

On a marked football field, kick a stationary ball placed on the goal line as far as possible into the field with the dominant foot.

This question was highly popular among the candidates and the responses were excellent. In fact, majority of candidates exhibited very high outstanding skills in this question and their scores were highly appreciated.

SECTION C RACKET GAMES

Question 6

Using the forehand drive, hit a table tennis ball continuously against an upright surface for 30 seconds.

This question was not very popular among the candidates. The majority of candidates that opted for it lacked concentration and coordination and their scores were disappointing.

Question 7

Execute the forehand clear, by hitting the shuttle from the badminton back court, high and deep into the opposite half of the court.

This is another popular question that attracted highly coordinated skills from the majority of candidates and their marks were good.

SECTION D GYMNASTICS

Question 8

Skillfully demonstrate body position, hand position, hand placement, head position, roll over and recovery while performing forward roll.

This question was not very popular among the candidates and only very few of them could demonstrate the required skills accurately.

Question 9

Skillfully demonstrate approach, hand placement, take-off, leg position and landing in the performance of astride vault.

This question was popular and attracted beautiful approaches from the majority of the candidates. Hence, their scores were highly appreciated

WASSCE FOR SCHOOL CANDIDATES 2016
CHIEF EXAMINER'S REPORT
PHYSICS 2

1. GENERAL COMMENTS

The standard of this paper was quite appropriate for well prepared candidates. The questions covered a wide range of topics across the syllabus. Furthermore, all questions were straight forward, testing candidates' knowledge of the syllabus. Nevertheless, last year's performance was better than this year's, and as a result, the marks were not impressive. Few candidates scored zero mark, but equally, few scored above 30 marks. However, the majority of the candidates scored marks below 30 out of a total of 60 marks.

2. CANDIDATES' STRENGTHS

About 70% of the candidates could state materials that can be used to demonstrate Brownian motion and could list some uses of rockets.

3. CANDIDATES' WEAKNESSES

About 80% of the candidates scored below 15 marks out of a total of 60 marks. Most of them were unable to explain, define or state the following:

- Doping.
- Net Force.
- Thermal Equilibrium.
- Fundamental Interval.
- Critical Angle.
- Dielectric Strength.
- Mass Defect.
- Binding Energy.

4. SUGGESTED REMEDIES

Candidates' performance in subsequent examinations can be improved by considering the following suggestions:

- Familiarising with the syllabus and its contents.
- Adequately revising all the topics in the different sections of the entire syllabus.
- Attention should be given to practical applications of basic physics concepts.
- Understanding the principles related to mathematical concepts and how each is applied in doing calculation.

5. DETAILED COMMENT ON INDIVIDUAL QUESTIONS

Question 1

State the dimensions of:

- (a) *impulse;*
- (b) *acceleration;*
- (c) *work.*

It was a very popular question and was attempted by 90% of the candidates, but about 2% of those who attempted it scored full marks (total of 3). There were many zeros.

Many candidates could not state the dimension of impulse, acceleration and work; instead they gave the S.I units of these quantities. It seems that most teachers did not treat this topic well.

The expected answer was as follows:

QUANTITY	DIMENSION
Impulse	MLT^{-1}
Acceleration	LT^{-2}
Work	ML^2T^{-2}

Question 2

A projectile is fired with a velocity of 20 ms^{-1} at an angle of 40° to the horizontal. Determine the components of the velocity of the projectile at its maximum height.

About 80% of the candidates attempted this question. Most of these candidates scored zero. Only few scored 2 or full 3 marks. This was actually an easy question if candidates could resolve velocity into vertical and horizontal components.

A candidate who prepared well should be able to know that at the highest point, $U_y = 0$ and that U_x the horizontal component that will remain. i.e. $U_x = 15.32 \text{ m/s}$

$$U_x = u \cos \theta$$

$$U_y = u \sin \theta$$

$$U_x = 20 \cos 40$$

$$= 15.32 \text{ m/s}$$

$$U_y = 0$$

Question 3

*State **three** different materials that can be used to demonstrate Brownian motion.*

This was quite an easy question and was attempted by 90% of the candidates. About 20% of those candidates who attempted this question scored at least 1 mark and the rest scored zero. This suggests that many candidates did not understand the concept properly. The three marks could be earned by just listing three of the following:

- Smoke particles.
- Carbon particles.
- Dust particles.
- Pollen particles.
- Chalk particles.
- Potassium permanganate crystals.

Question 4

An electron enters perpendicularly into a uniform magnetic field which has a flux density of 0.12 T . This results in a magnetic force of $9.6 \times 10^{-12} \text{ N}$ on the electron. Calculate the speed of the electron as it enters the magnetic field. ($e = 1.6 \times 10^{-19} \text{ C}$).

This question was not popular. About 20% of the candidates attempted this question and 0.5% scored the full 3 marks while most of the candidates scored zero.

The expected answer was:

$$F = evB \sin \theta$$

Where F is the force, V is the speed, B is the flux density, θ = angle and e is the charge of the electron.

$$9.6 \times 10^{-12} = 1.6 \times 10^{-19} \times V \times 0.12 \times \sin 90^\circ$$

By making V the subject,

$$V = 5.0 \times 10^8 \text{ ms}^{-1}$$

Question 5

List **three** uses of rockets.

This was actually an easy question. About 90% of the candidates attempted it. For which majority of the candidates who attempted this question scored 1 mark, most of them gave a similar uses not a different used e.g. rocket are used for carrying people to space and also rocket are used to carrying scientists to space.

Some uses are:

- Space Exploration.
- Space Travel.
- Warfare.
- Fireworks / Entertainment.
- Launching Of (Artificial) Satellites (Into Orbits).

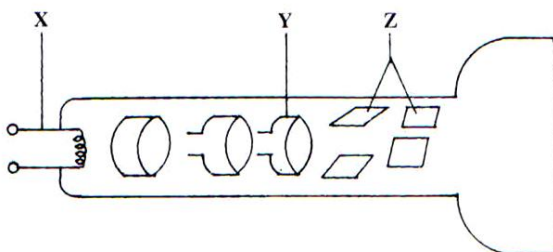
Question 6

- (a) What is doping
(b) Explain how doping improve the conductivity of a semiconductor.

This question was attempted by 40% of the candidates. It is obvious that many teachers did not teach this topic in schools. Only few candidates gave the meaning of doping and got it correct, but cannot explain how doping improves the conductivity of a semiconductor.

- Doping is the introduction of impurity atoms into a semiconductor.
- Doping reduces the energy gap between the conduction band and the valence band so that charges of minimum energy can move into the conduction band.

Question 7



The diagram above illustrates a cathode ray tube.
Identify the components X, Y, and Z.

This question was popular. About 80% of the candidates attempted it. However, only about 2% of the candidates scored the full 3 marks. It seems that many teachers did not cover this topic with the candidates.

- X - Filament/heater/cathode
Y - Anode
Z - Plate/deflectors

Question 8

Explain the term net force.

*Define the principle of conservation of linear momentum and state **one** example of it.*

A ball of mass 200g released from a height of 2.0 m hits a horizontal floor and rebounds to a height of 1.8m. Calculate the impulse received by the floor.

($g = 10\text{ms}^{-2}$)

A body of mass 20g performs a simple harmonic motion at a frequency of 5Hz. At a distance of 10 cm from the mean position, its velocity is 200cms^{-1} .

Calculate its:

(i) maximum displacement from the mean position;

(ii) maximum velocity;

(iii) maximum potential energy.

($g = 10\text{ms}^{-2}$; $\pi = 3.14$)

About 50% of the candidates attempted this question of which 95% of them scored zero. They cannot explain the term 'net force'. Most of them were defining force. About 2% of those who attempted this question can define the principle of conservation of linear momentum correctly.

- The net force is the effective force resulting from the actions of a system of force on a body.

OR

Net force is an unbalance force that produces acceleration of a body.

In an isolated system of colliding bodies, the total momentum in a fixed direction remains unchanged / constant.

e.g. - rocket propulsion

- Recoil of gun
- Colliding trolleys

For question 8c and 8d, about 99% of the candidates who attempted this question scored zero.

For 8C,

$$\begin{aligned}V_1^2 &= u_1^2 + 2gh_1 \\ &= 0 + 2 \times 10 \times 2\end{aligned}$$

$$V_1 = 6.32\text{ms}^{-1}$$

$$V_2^2 = u_2^2 - 2gh_2$$

$$0 = u_2^2 - 2 \times 10 \times 1.8$$

$$U_2 = 6\text{ms}^{-1}$$

Impulse = change in momentum

$$= mv_1 - (-mu_2) = m(v_1 + u_2)$$

$$= 0.2(6.325 + 6)$$

$$= 2.46\text{N}$$

For 8d,

$$(i) \quad V = w\sqrt{r^2 - y^2} = 2\pi f\sqrt{r^2 - y^2}$$

$$2 = 2 \times 3.14 \times 5 \times \sqrt{r^2 - 0.1^2}$$

$$r = 0.12\text{m}$$

$$\begin{aligned}
 \text{(ii)} \quad V_{\max} &= \omega r = 2\pi f r \\
 &= 2 \times 3.14 \times 5 \times 0.12 \\
 &= 3.77 \text{ ms}^{-1}
 \end{aligned}$$

$$\begin{aligned}
 \text{P.E} &= \frac{1}{2} m \omega^2 r^2 = \frac{1}{2} m (2\pi f)^2 r^2 \\
 &= 0.5 \times 0.02 \times (2 \times 3.14 \times 5)^2 \times (0.12)^2 \\
 &= 1.42 \times 10^{-1} \text{ J}
 \end{aligned}$$

Question 9

(a) Explain the terms:

- (i) thermal equilibrium;
- (ii) fundamental interval.

(b) List **two** uses of the hydraulic press.

(c) Name the material used to reset the steel index in the Six's maximum and minimum thermometer.

(d) (i) A nursing mother prepared her baby's milk mixture at 85°C , in a feeding bottle. In order to cool it to 40°C , she immersed the bottle in an aluminum bowl of heat capacity of 90 JK^{-1} Containing 500 g of water at 26°C . if the mass of the mixture is 300 g , calculate the specific heat capacity of the mixture.

[Neglect heat losses and heat capacity of the bottle; specific heat capacity of water = $4200 \text{ J kg}^{-1} \text{ K}^{-1}$]

- (ii) (α) Name **two** ways through which the bottle losses heat.
- (β) Name **two** industrial processes in which heat exchanger is used.

This question was popular. About 70% of the candidates attempted it. But few candidates were able to explain the terms thermal equilibrium and fundamental interval. However, most of them had the idea of 'heat is being equal' but cannot link it to two bodies in contact when they have no net flow of heat between them.

About 0.5% of the candidates had explained, the fundamental interval and about 90% of them cannot list the uses of the hydraulic press. This group cannot also give the name of the material used to reset the steel index in the Six's maximum and minimum thermometer. The material is a magnet.

Fundamental interval is the difference in between the lower fixed point and the upper fixed point. Hydraulic press can be used for

- Lifting objects
- Compressing metal sheets
- Compressing soft material into blades
- Compressing paper in printing industries.

For 9d, about 0.3% of those who attempted it scored full 4 marks. 20% of the candidates who attempted this question can at least name a method of heat lost. i.e. conduction and convection. Most of the candidates who attempted this question cannot name two industrial processes in which heat exchanger is used. They just gave random processes from industries. The expected answer is heat lost by mixture = heat gained by water + heat gained by aluminum.

$$0.3 \times (85 - 40) = 0.5 \times 4200 \times (40 - 26) + 90 (40 - 26) \text{ Cm} = 2271.1 \text{ JKg}^{-1} \text{ K}^{-1}$$

And heat exchanger can be used in:

- Incubation
- Cooling by radiation
- Generation of electricity
- Refrigerator
- Air- conditioning
- Sewage treatment.

Question 10

- (a) Define critical angle.
- (b) How are anti-node created in a stationary wave?
- (c) The angle of minimum deviation of an equilateral triangular glass prism is 46.2° . Calculate the refractive index of the glass.
- (d) An illuminated object is placed in front of a concave mirror and the position of a screen is adjusted in front of the mirror but no image is obtained on the screen. Give **two** possible reasons for this observation.
- (e) An illuminated object is placed at a distance of 75 cm from a converging lens of focal length 30 cm.
 - (i) Determine the image distance.
 - (ii) If the lens is replaced by another converging lens, the object has to be moved 25 cm further away to have its sharp image on the screen. Determine the focal length of the second lens.

This was a popular question, attempted by more than 80% of the all the candidates. It was a fair question but most candidates did not prepare well although there were evidences from their answers that the topic were taught in schools.

Only few candidates define critical angle correctly. Some are having the idea of light travelling from one medium to another but nothing was said about the angle of incident in the denser medium for which the angle of refraction in the less dense medium being 90° .

Most of the candidates who attempted the question on how anti-nodes are created in a stationary wave answered it wrongly. Some drew diagrams labelling the nodes and the anti-nodes of a stationary but cannot explain how they are created.

Few candidates stated that anti-nodes are created when an incident and its reflected wave are superposed and 180° out of phase. About 1% of those who attempted this question can state the formula for the refractive index of a glass using minimum deviation.

The correct answer is i.e. $n = \sin\left(\frac{A + DM}{2}\right) / \sin\left(\frac{A}{2}\right)$

$$n = \sin\left(\frac{60 + 46.2}{2}\right) / \sin\left(\frac{60}{2}\right)$$
$$n = 1.6$$

However, most of them cannot substitute correctly and as a result the value of the refractive index was wrong.

10d was not answered correctly by over 90% of the candidates who attempted it. No image is form on the screen as a result of the following.

Objective, screen and mirror are not coaxial.

The screen is located at a distance less than or greater than the actual image distance.

The object is placed at the focal point of mirror.

The object is placed between the focus and the pole of the mirror.

10e (i) was popular. Most of the candidates who attempted this question can state the lens formula. However less than 5% of those who attempted it substituted correctly and has the answered right.

$$\text{i.e. } \frac{1}{f} = \frac{1}{u} + \frac{1}{v}$$

$$\text{i.e. } \frac{1}{30} = \frac{1}{75} + \frac{1}{v}$$
$$v = 50 \text{ cm.}$$

The new object distance is $u = 75 + 25$
 $u = 100 \text{ cm.}$

As a result of this, the focal length of the second lens was not correct.

The solution:

$$\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$$
$$\frac{1}{f} = \frac{1}{100} + \frac{1}{50}$$
$$f = 33.3 \text{ cm}$$

Question 11

- (a) Explain briefly dielectric strength.
- (b) An electromagnetic wave has its wavelength shorter than those of radiowave and microwave but longer than that of visible light.
- (i) Identify the wave.
 - (ii) Name **one** suitable detector for the wave.
 - (iii) Name **one** source of the wave.
- (c) An oil drop carrying a charge of $1.0 \times 10^{-19} \text{ C}$ is found to remain at rest in a uniform electric field of intensity 1200 NC^{-1} . Calculate the weight of the oil drop.
- (d) An RLC series circuit consists of a $100 \, \Omega$ resistor, 0.05 H inductor and a $25 \mu\text{F}$ capacitor.
A 220 V , 50 Hz mains voltage is applied across the circuit. Calculate the:
- (i) impedance
 - (ii) current
- ($\pi = 3.14$)

This question was not popular about 30% of the candidates attempted it and very few of these candidates who attempted this question can explained the meaning of dielectric strength. i.e. Dielectric strength is the maximum potential gradient or electric field strength an insulator can withstand without breaking down.

For 11(b), this topics relating to the electromagnetic spectrum, seems not to be taught in most schools. The question was poorly answered by most of the candidates.

Less than 10 candidates who named infra - red wave as the wave that has its wavelength shorter than those of radio wave and microwave but longer than that of visible light. This is the correct answer.

A suitable detector can be any of the following:

- Infra - red - camera.
- Photographic film.
- Bolometer.
- Thermopile.

A source of the wave can be any hot body like the sun etc.

11(c) was poorly answered by most of the candidates who attempted it. This topic doesn't seem to be taught by most of the schools.

The expected answer is

$$\begin{aligned} \text{From } E &= \frac{F}{q} = \frac{w}{q} \\ W &= F = Eq \\ &= 1200 \times 0.1 \times 10^{-19} \\ &= 1.2 \times 10^{-16} \text{N} \end{aligned}$$

Where E is the electric field intensity; q is charge F = w (is the force)

11(d) it seems only few schools treated this topic on RLC circuits. From those who attempted this question, 10% of them can state the formula of:

- Capacitive reactance $\rightarrow X_C = \frac{1}{2\pi f c}$
- Inductive reactance $\rightarrow X_L = 2\pi f l$
- Impedance $\rightarrow Z = \sqrt{R^2 + (X_L - X_C)^2}$ $I = \frac{V}{Z}$

Substituting into these formula will give the value of $Z = 149.9 \Omega$ and $I = 1.47 \text{A}$

Question12

(a) Explain the following terms:

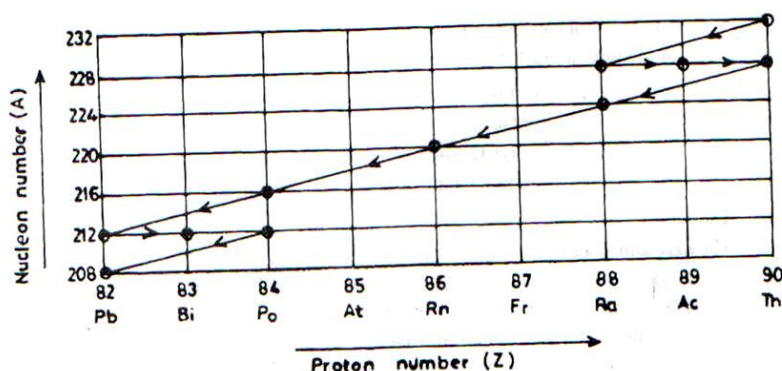
- (i) mass defect;
- (ii) binding energy of a nucleus.

(b) (i) Assuming the wave nature of an electron, what is the effect of decreasing the speed of a photoelectron on its:

- (α) wavelength?
- (β) energy?

(ii) A particle of mass $4.4 \times 10^{-23} \text{kg}$ moves with a velocity of 10^5ms^{-1} . Calculate its wavelength.

($h = 6.6 \times 10^{-34} \text{Js}$)



The diagram above shows part of a radioactive decay series. Use it to answer the following questions.

- (i) Name a pair of isotopes.
- (i) Name the isotopes with which the series starts.
- (iii) Write down a nuclear equation for **two** examples of **each** of:
 - (α) alpha decay;
 - (β) beta decay.

This was fairly popular question attempted by 60% of the candidates. Lack of proper coverage of the syllabus and poor preparation for the exams prevented the candidates from having good marks. About 60% of the candidates who attempted this question could not explain the meaning of mass defect and binding energy of a nucleus correctly.

In 12 (bi) it seems most of the candidates were guessing as the wavelength / energy increasing or decreasing when the speed of a photoelectron is decreased. As a result of guess work, most of them loose marks.

In 12 (bii) required the candidates to calculate the particle wavelength when it is moving with a velocity of 10^5ms^{-1} .

Solution

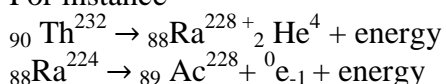
$$\lambda = \frac{h}{mv}, \text{ substituting gives}$$

$$\lambda = 1.5 \times 10^{-16} \text{m}$$

A few of the candidates solved this problem correctly. In section (d), about 20% of the candidates who attempted the question and named the pair of isotopes as well as stating the isotopes with which the series starts.

About 5% of candidates who attempted this question wrote correct nuclear equation for an alpha decay and beta decay. Another 10% of the candidates omitted the release of energy.

For instance



In both equations this set of candidates did not include the energy.

WASSCE FOR SCHOOL CANDIDATES 2016
CHIEF EXAMINER'S REPORT
PHYSICS 3

PRACTICAL
ALTERNATIVE A

1. GENERAL COMMENTS

The paper is of the same standard with those of the previous years. It actually covered about 90% of the syllabus. The apparatus involved in all questions were items used in everyday practical. This year's performance is better than last year's. However, some candidates scored zero mark but the number is in significant.

2. CANDIDATES' STRENGTHS

Candidates' exhibited some understanding in:

- Drawing of graphs
- Tabulating Reading
- Precautions
- Evaluation

3. CANDIDATES' WEAKNESSES

Candidates showed some weaknesses in:

- Accuracy
- Deduction
- Problems involving calculations
- Definitions of terms

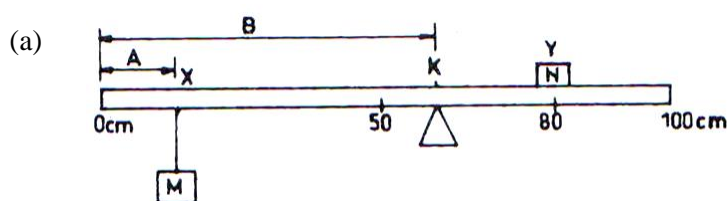
4. SUGGESTED REMEDIES

Candidates needs to:

- Prepare very well for the examination
- Possess their personal Electronics calculators and learn to use the properly.
- Access the past questions papers to be familiar with the format of questions.
- Ensure that they try to understand topics taught in class.
- Take their time to read the questions and understand them before answering
- Have their individual instruments for the subject.
- Be taught the basic mathematics symbols such as V^{-1} whose meaning is $\frac{1}{V}$, and in fact, the number of decimal places and as well as significant figures is vital to practical test.
- Candidates need to read and adhere to the instructions and improve their command of English Language, so as to deal with the questions better.
- Have group discussion so that a lesson becomes students oriented.

5. DETAILED COMMENTS ON INDIVIDUAL QUESTIONS

Question 1



You are provided with a uniform metre rule, a knife edge, some masses and other necessary materials.

- Determine and record the centre of gravity of the meter rule.
- Fix the 100g mass marked **N** at a point **Y**, the 80cm mark of the rule using sellotape.
- Suspend another 50g mass marked **M** at **X**, a distance **A** = 10cm from the 0 cm mark of the rule.
- Balance the arrangement horizontally on the knife edge as illustrated in the diagram above.
- Measure and record the distance **B** of the knife edge from the 0cm mark of the rule.
- Repeat the procedure for **four** other values of **A** = 15cm, 20cm, 25cm and 30cm.
- Tabulate your readings.
- Plot a graph with **B** on the vertical axis and **A** on the horizontal axis.
- Determine the slope, **S**, of the graph.
- Also determine the intercept, **C**, on the vertical axis.
- Evaluate:

$$(\alpha) \quad k_1 = \frac{(1-2s)}{s} 100;$$

$$(\beta) \quad k_2 = \frac{2c}{s} - 160.$$

- State **two** precautions taken to obtain accurate results.

- (i) Define moment of a force about a point.

- (ii) State **two** conditions under which a rigid body at rest remains in equilibrium when acted upon by non – paralld coplanar forces.

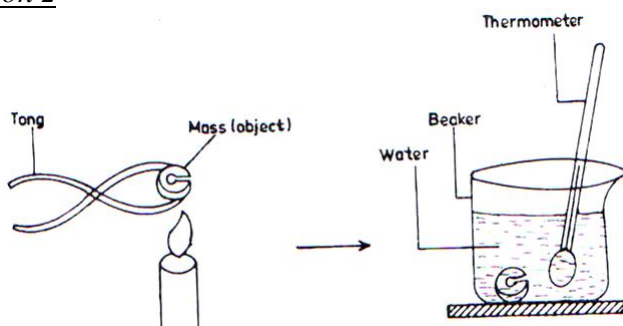
This was a very popular question most of the candidate answer it well. Any candidate who understood the moment of a force by balancing a mass hanging on a meter rule or a knife edge will be able to perform well. The impression was that some candidates knew the Centre of gravity G, of the body was obtained. Although some candidates did not interpret it correctly, they were given the raw values instead of the required number of decimals places for A and Almost 75% of the candidates were at default but got the raw values of A and B.

Some candidates measured the distance from the edge of the meter rule to the load. Actually this was a wrong procedure as the set of distance B (from the zero mark of the knife) were determine and recorded by 75% of the candidates who attempted the question. Good graphs were plotted with few points off the line but some candidates labeled the x and y-axis instead of the required labeling. The omission of the units was also observed widely.

The gradient was calculated and these were substituted in k1 and K2. About 80% of the candidates scored a mark or two for the precautions. Part b(i) was correctly answered by most of the candidates. But in part b(ii) most candidates cannot state two conditions under which a rigid body at rest remains in equilibrium when acted upon by non-parallel coplanar forces.

Question 2

2(a)

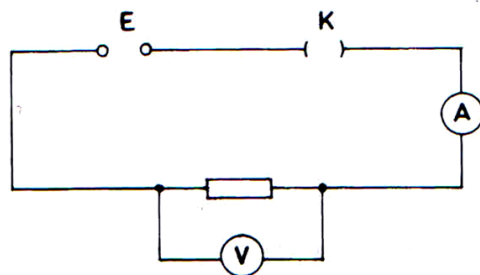


You are provided with a beaker, a thermometer, a stirrer, a measuring cylinder, a Bunsen burner, a wire gauze a 50g mass, a pair of tongs, water, tripod stand and other necessary materials.

- (i) Using the measuring cylinder, measure 150cm^3 of water into the beaker.
- (ii) Record the volume v of the water in the beaker.
- (iii) Calculate the mass m of the water, given that $m = \rho v$ and $\rho = 1\text{gcm}^{-3}$
- (iv) Measure and record the initial temperature θ_0 of the water in the beaker.
- (v) Hold the 50g mass with the pair of tongs in the flame of the **Bunsen burner** for 2 minutes.
- (vi) Quickly transfer the 50g mass to the water in the beaker.
- (vii) Stir gently and record the **highest** temperature θ_1 attained
- (viii) Evaluate $\theta = (\theta_1 - \theta_0)$
- (ix) Empty the content of the beaker and repeat the procedure above for another values of $v = 200\text{cm}^3, 250\text{cm}^3, 300\text{cm}^3$ and 350cm^3 .
- (x) Tabulate your reading
- (xi) Plot a graph with m on the vertical axis and θ on the horizontal axis.
- (xii) Determine the slope, s , of the graph.
- (xiii) Evaluate $K = \frac{50}{s}$
- (xiv) State two precautions taken to obtain accurate result.
- (b)
 - (i) define heat capacity
 - (ii) An electric kettle rated 1.2kw is used to heat 800g of water initially at a temperature of 20°C . Neglecting heat losses, calculate the time taken for the kettle to heat the water to its boiling point.
[Take boiling point of water $= 101^\circ\text{C}$, specific heat capacity of water $= 4200\text{Jkg}^{-1}\text{K}^{-1}$]

This was a popular question, but was not well answered. Most of the candidates who attempted the question were able to have $m, v, \theta, \theta_0, \theta_1$ correctly evaluated. Although choosing a reasonable scale was challenging. The b (i) and b (ii) were not answered accurately and most of the candidates fail to convert the 1.2kw to 1200w, they directly substituted the values into the formula. Most of the candidates who attempted this question did not solve the sub-questions well.

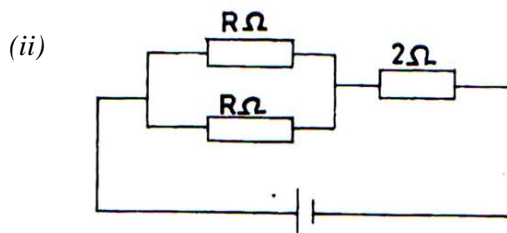
3(a)



You are provided with a variable d.c. power supply E , a $2\ \Omega$ standard resistor, a key, an ammeter, a voltmeter and other necessary materials.

- (i) Set-up a circuit as shown in the diagram above with $E = 1.5\text{ V}$.
- (ii) Close the key K
- (iii) Take and record the voltmeter reading V .
- (iv) Take and record the corresponding ammeter reading I
- (v) Evaluate V^{-1} and I
- (vi) Repeat the procedure for **four** other values of $E = 3.0\text{ V}, 4.5\text{ V}, 6.0\text{ V}$ and 7.5 V
- (vii) Tabulate your readings.
- (viii) Plot a graph with V^{-1} on the vertical axis and I^{-1} on the horizontal axis starting both axes from the origin $(0,0)$
- (ix) Determine the slope, S , of the graph.
- (x) Also determine the intercept, C , on the vertical axis
- (xi) State **two** precautions taken to obtain accurate results

- (b) (i) State **two** methods by which an electric current can be produced



Calculate the value of R in the circuit diagram show above, given that the effective resistance of the circuit is $4.0\ \Omega$ and the internal resistance of the cell is negligible.

It is still believe that schools do not have enough electrical apparatus in their laboratory and so year after year they end up forfeiting the easiest question (on electricity) in the examination.

It has been admitted that these electrical equipments are expensive but a genuine effort must be made to store some such as rheostats, ammeter, voltmeter, resistance boxes and switches. Candidates must also be taught how to connect simple circuit. Distinction must be made between series and parallel connections.

The electrical question is one of the simple circuits set; the candidates who attempted the question measured the quantities V^{-1} and I^{-1} correctly to one decimal places instead of three (3) decimal places.

The usual precautions were widely written i.e. to ensured tight connection of wires; the key they must be opened after taking reading to preserve cell power. Majority of the candidate fail to attempt b (i) ,it was widely, observed that candidates did not understood the source of electricity. Most of the candidates directly used the formula in b (ii) and fail to get the answer appropriately.

PHYSICS 3
PRACTICAL
ALTERNATIVE B

1. **GENERAL COMMENTS ON THE PAPER**

Comparatively, alternative **B** is the same standard as alternative **A**. The performance of candidates in alternative **B** was below the expected standards of the examination compared to alternative **A**. The low level performance of candidates in alternative **B** was largely attributed to negligence in presenting data and how they response to the sub-questions. Most candidates' responded were incomplete or significant points were simply left out.

2. **CANDIDATE S' STRENGHT**

Candidates exhibited some understanding in:

- Drawing of graphs
- Tabulating readings
- Precautions
- Evaluation

3. **CANDIDATES' WEAKNESSES**

Candidates showed weaknesses in:

- Accuracy
- Deduction
- Problems involving calculations
- Definition of terms

4. **SUGGESTED REMEDIES**

The suggested remedies are as follows:

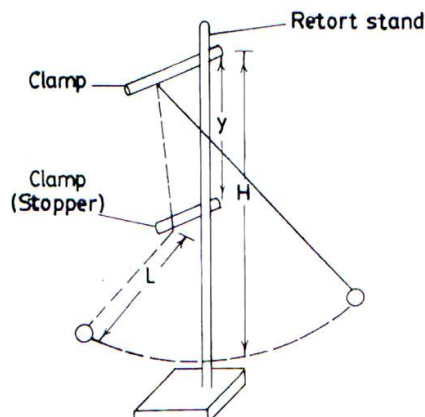
:

- Candidates need to prepare well for the examination
- Candidates should access the past questions paper to be familiar with the format of the questions drawn before the actual examination.
- Teachers need to review the chief examiner's report regularly and try to address the weakness of candidates
- Teachers should endeavor to carry out more practical work for the candidates.
- Teachers need to put more emphasis on the concept and build candidates knowledge in physics language.
- Candidates need to understand the topics under which practical question are being drawn.

5. DETAILED COMMENTS ON INDIVIDUAL QUESTIONS

Question 1

(a)



You are provided with a pendulum bob, a string, a meter rule, retort stand with two clamps, a stop watch and other necessary materials.

- (i) Set-up a simple pendulum of length, $H = 120\text{cm}$
 - (ii) Fix the second clamp on the retort stand to serve as a horizontal stopper, such that the clamp is just in contact with the pendulum string in the equilibrium position as illustrated in the diagram above.
 - (iii) Adjust and record the position of the stopper such that $y = 20\text{cm}$ and $L = 100\text{cm}$.
 - (iv) Set the pendulum in motion in a plane at right angles to the stopper such that at **each** return the string makes contact with the stopper.
 - (v) Measure and record the time t for 20 oscillations.
 - (vi) Determine the period T .
 - (vii) Evaluate \sqrt{L} , $\sqrt{L + y}$, and $X = (\sqrt{L + y} + \sqrt{L})$.
 - (viii) Keeping H constant, repeat the procedure for **four** other values of $L = 90\text{cm}$, 80cm , 70cm and 60cm .
 - (ix) Tabulate your readings.
 - (x) Plot a graph with T on the vertical axis and X on the horizontal axis.
 - (xi) Determine the slope, S , of the graph.
 - (xii) Evaluate $g = \left(\frac{\pi}{S}\right)^2$, where $\pi = 3.14$
 - (xiii) State **two** precautions taken to obtain accurate results.
- (b)
- (i) what is periodic motion?
 - (ii) In the experiment above, if $X = 18\text{cm}^{1/2}$, use your graph to deduce the time for 20 oscillations.

The commonest error here was that T , \sqrt{L} and $\sqrt{L} + y$ was not measured to three decimal places. Majority of the candidates who attempted this question rounded off the square root of the answer to 1 decimal place instead of 3 decimal places. This approach affected most of the candidates who scored zero mark for the various columns.

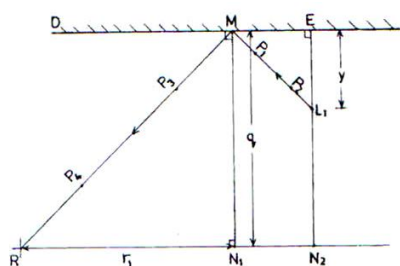
Good graphs were plotted with few points off the line. Gradients were calculated carefully, the substitution was well done, however, most of the candidates could not evaluate $(\frac{\pi}{s})^2$.

Because of the omitting of the square which entirely affect the value of g .

However, most of the candidates got the precaution correct. Handful of candidates were able to answer b(i) and b(ii). For b(ii) almost 25% of the candidates did not use the graph to find the value of T when $x = 18\text{cm}$, instead they use the formula $y = mx + c$ to calculate the value of T and most candidates who obtained it from the graph did not convert it to $t = 20T$.

Question 2

(a)



You are provided with a plane mirror, cellotex board, optical pins and other necessary materials.

(i) Place the plane mirror vertically on the sheet of paper provided and trace its outline.

Remove the mirror

(ii) Mark the middle of the mirror as **M** and a point **E** such that **ME** = 2.5cm as illustrated in the diagram.

(iii) Draw **two** normals **MN₁**=**EN₂** = 7cm

(iv) Mark a point **L₁** on **EN₂** such that **y** = **EL₁** = 2.5cm.

(v) Draw a line from point **L₁** to **M** and place **two** pins **P₁** and **P₂** on this line.
Replace the mirror on its outline.

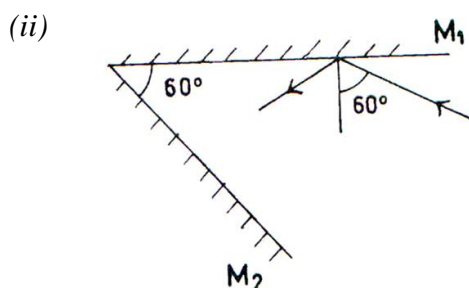
(vi) Locate the images of **P₁** and **P₂** in the mirror and fix **two** other pins **P₃** and **P₄** such that they are in a straight line with the images of **P₁** and **P₂**.

(vii) Remove the mirror and the pins.

Draw a straight line through the pin holes **P₄** and **P₃** and produce it to meet **M**.

(viii) Join points **N₂** and **N₁** and produce it to meet the reflected ray at **R**.

- (ix) Measure and record the distance $r_1 = \mathbf{RN}_1$.
- (x) Also measure and record the distance $y = \mathbf{EL}_1$, and $q = \mathbf{MN}_1$.
- (xi) Evaluate y^{-1} and $\mathbf{J} = \frac{r_1}{q}$.
- (xii) Repeat the procedure for **four** other values of $y = \mathbf{EL}_1 = 3\text{cm}, 4\text{cm}, 5\text{cm}$ and 7cm .
- (xiii) Tabulate your readings.
- (xiv) Plot a graph with \mathbf{J} on the vertical axis and y^{-1} on the horizontal axis.
- (xv) Determine the slope, \mathbf{S} , of the graph.
- (xvi) Evaluate $\mathbf{K} = 2s$.
- (xvii) State **two** precautions taken to obtain accurate results. (Attach your traces to your answer booklet)
- (b) (i) List two characteristics of the image of an object formed by a plane mirror.



A ray light is incident on a plane mirror \mathbf{M}_1 at an angle of 60° as illustrated in the diagram above.

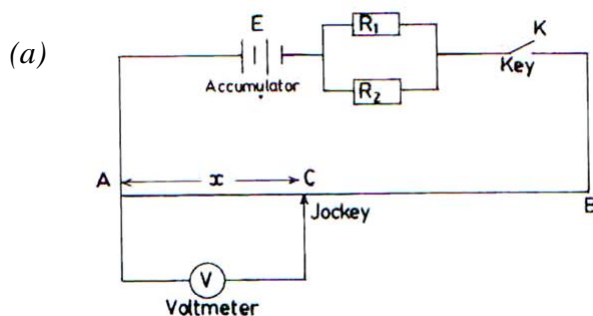
Determine the angle of reflection on plane mirror \mathbf{M}_2 .

This is very popular question; most candidates attempted this question and scored full mark. although it is a popular question and most of the candidates answer it, but about 25% of the candidates do not showed any traces of the five(5) diagrams as they failed to perform the experiment by using the pins instead went on drawing the diagrams and choosing their own values without any source.

It has been clearly shown that some candidates had no understanding between a ray and a line. Most of the candidates really draw the incident ray and the reflected ray without an arrow which makes them drop marks.

Precautions were good but in b (i) candidates were unable to list two characteristics of image of an object formed by a plane mirror. We were also left disbelief that candidates cannot determine the angle of reflection on the plane mirror \mathbf{M}_2 and b (ii) candidates could not differentiate between real images from virtual image and equally some candidates could not determine the angle of reflection on the plane mirror \mathbf{M}_2 in b (ii).

Question 3



You are provided with a voltmeter V , a battery E , two standard resistors R_1 and R_2 a potentiometer AB , a key K , a jockey and other necessary materials.

- (i) Set-up a circuit as shown in the diagram above.
 - (ii) Close the key K .
 - (iii) Make a contact with the potentiometer wire AB , using the jockey at a point C such that $AC = x = 20\text{cm}$
 - (iv) Read and record the voltmeter reading V .
 - (v) Evaluate x^{-1} and V^{-1} .
 - (vi) Repeat the procedure for other values of $x = 30\text{cm}, 40\text{cm}, 50\text{cm}, 60\text{cm}$ and 80cm .
 - (vii) Tabulate your readings.
 - (viii) Plot a graph with V^{-1} on the vertical axis and x^{-1} on the horizontal axis, starting both axes from the origin $(0,0)$
 - (ix) Determine the:
 - (α) slope, S , of the graph;
 - (β) intercept, C , on the vertical axis.
 - (x) State **two** precautions taken to obtain accurate results.
- (b)
- (i) State **two** devices in which Ohm's law does not apply.
 - (ii) A current of 1A is supplied to **two** resistors of resistances 2Ω and 3Ω connected in parallel. Calculate the current in **each** resistor.

This was another popular question attempted by 75% of the candidates. It seems to be the easiest question among three. However, it is suggested that schools need to acquire more electrical equipments so that the candidates can benefit from such easiest questions. For example, the absence of a voltmeter in a school can deprive the candidates from benefiting from such easiest question. Furthermore these equipments must be connected in simple circuit for candidates to see the way forward. Precautions were good.

WASSCE FOR SCHOOL CANDIDATES 2016
CHIEF EXAMINER'S REPORT
SCIENCE 2

1. GENERAL COMMENTS

The Standard of the questions was up to the level of the examination. Most of the questions were simple, direct, and unambiguous. The questions were within the scope of the syllabus. Examiners noted with concern that candidates' performance this year is far less than what was observed last year. The marks generally were lower and there were more zeros (0). A handful of answer booklets were left blank by the candidates.

2. CANDIDATES' STRENGTHS

Candidates' strengths were reported as follows:

- Candidates attempted the biology related questions better than the chemistry and physics related questions as observed in previous years.
- Most of the candidates were able to remember formulae; this made it easier for them to make better attempts on questions involving calculations than last year.
- Fewer spelling mistakes were noted this year. More candidates were able correctly spell difficult scientific terms like *Cirrhosis*, *Hepatitis* etc.
- Candidates' hand writings were clear and readable.
- Questions involving biological diagram was well attempted.

3. CANDIDATES' WEAKNESSES

Candidates' weaknesses were reported as follows:

- Some candidates failed to follow the instructions given in the paper.
- Some candidates could not grasp the demands of the questions and hence gave irrelevant answers.
- Some candidates could not number correctly the questions they answered.
- Some candidates either copied the questions or repeated the questions as answers.
- Some candidates lost marks in questions involving calculations for using wrong or no unit in the final answer.
- Marks were also lost to poor diagrams and labelling.
- Poor communication skills and wrong grammatical expressions were largely seen among a majority of the candidates.

4. SUGGESTED REMEDIES

Despite the fact that question five was made up of only Biology questions, most of the optional questions had a mixture of all the three aspects of the syllabus, that is the physics, biology and chemistry aspect. This is an improvement compared to the questions set in the previous years. The marking scheme, for the first time, split marks for definitions. This allowed marks to be awarded to definitions that are partly correct. However, the following points could help improving candidates' performance:

- Questions involving calculations should not be concentrated under one question as seen in question 6 which had 3 questions involving calculation whereas questions five and eight had none.
- Easier questions can be given instead allowing wrong or partly correct answers to get half mark.
- Schools should employ qualified teachers so as to ensure that all aspects of the syllabus are covered properly.
- Teachers should make extra efforts to complete the syllabus well ahead of the examination to enable candidates have enough time for revision.
- Mathematical aspects of the syllabus should not be left out; if possible, the services of mathematics teachers should be encouraged.
- Science laboratories should be provided to complement the teaching of the subject as this will enhance students' understanding.

5. DETAILED COMMENTS ON INDIVIDUAL QUESTIONS

Question 1

- (a) *What is a solvent?*
 (b) *Give **three** reasons why water is considered a universal solvent.*

A. The question was well attempted by many of the candidates. However, only about 5% of the candidates were able to score at least one (1) mark. Many of the candidates were unable to correctly define solvent.

Some of the wrong answers given are:

- A solvent dissolves in solute/water.
- Anything that can dissolve.
- Water is a liquid in motion.
- Various uses of water

B. Although about 50% of the candidates examined were able to score at least one mark for stating that water is a substance that can dissolve most substances, a handful completely ignored the question while some gave wrong answers.

Some of the wrong answers given were:

- It is in liquid form.
- It is colourless and odourless.
- It is the beginning of life.
- It is used by everybody.

Question 2

- (a) *State the difference between hydrocarbons and other organic compounds.*
 (b) *Give the IUPAC name for **each** of the following compounds:*

(i) CH_3COCH_3 ;

(ii) $\text{CH}_3\text{CH}_2\text{OH}$;

(iii) HCOOH .

- A. Only about 5% of the candidates were able to score at least 1 mark from this question. Many candidates failed to score any mark from this question because they:
- failed to add the word “only” after carbon and hydrogen.
 - only stated the correct answer on one side and missing it out on the other side of the comparison.
 - wrote out a completely wrong answer for the question.
 - gave a simple definition of hydrocarbons.

Some of the wrong answers noted were:

- organic compound do not contain hydrogen and carbon.
- organic compounds are derived from plants and animals.

- B. This sub-question was largely ignored. Although about 2% of the candidates attempted to answer the question, only a handful was able to score at least one mark from this question.

Many of the candidates who attempted this question drew the structure of these compounds instead of giving the IUPAC names.

Question 3

- (a) *What is meant by the term power as used in science?*
(b) *A machine lifts a 50.0 kg crate through a height of 20.0 m in one minute. Calculate the power output of the machine.*
[$g = 10 \text{ ms}^{-2}$]

- A. Only about 20% of all the candidates were able to score at least 1 mark from this question. Those that scored zero in this question either gave the definition of force or energy or omitted ‘with respect to time’ as part of the definition of power.
- B. About 25% of the entire candidates examined attempted this question. Less than 50% of those who attempted the question were able to score 1 mark out of the 3 marks allocated to this question. This 1 mark came from correctly stating the formula of power as:

Power = work/time OR fxd/t OR Mgh/t .

However the majority of the candidates lost marks to:

- Wrong substitution
- Wrong calculations
- Wrong or no unit

Question 4

- (a) *What is biotechnology?*
(b) *Give **three** examples of food items that are produced using biotechnology.*

- A. This question was largely ignored. Few of the candidates who attempted the question were only able to score one mark for mentioning “... for the production of food items” in their definition of biotechnology.

Those that scored zero in this question gave answers like:

- Biotechnology is the process of food in the body.
- It is a technology used in making food.
- It is a chemical used in producing food.
- It is a modern method of producing food.

B. About 25% of the candidates examined were able to score at least one mark in this question. Many erroneously stated “Garri”, “Foofoo”, “Fat and Oil”, “Amino Acid” as examples of food items that are produced using biotechnology.

Question 5

- (a) (i) *Describe the process of fat digestion in humans.*
(ii) *List **two** diseases that affect the liver.*
- (b) *State:*
(i) ***three** effects of environmental degradation;*
(ii) ***one** way **each** by which the effects stated in 5(b)(i) could be controlled.*
- (c) (i) *What is fibroid?*
(ii) *State:*
I. ***two** symptoms of fibroid;*
II. ***one** effect of fibroid.*
- (d) (i) *draw and label a typical plant cell as seen under a light microscope.*
(ii) *State **one** function each of any **two** parts labelled in 5(d)(i).*

A(i) This question focused mainly on the biology aspect of the syllabus. It was attempted by about 70% of the candidates.

Despite the fact that this question was direct and straightforward, only a handful scored at least 1 mark.

The types of answers given were an indication of a lack of understanding of the requirement of the question.

Some of the wrong answers encountered by examiners were:

- A description of digestion in general.
- Definition of digestion.
- Digestion starts with exercise.

A(ii). This question was well attempted. More than 50% of the candidates were able to score at least 1 mark from this question by listing at least one disease of the liver. However a few lost marks to wrong spellings such as cansa, kansa, jauline, jondice etc.

B(i). This question was well attempted by about 55% of the candidates. About 20% of the candidates were able to score at least 1 mark by correctly stating “pollution”, “erosion”, “deforestation” and “desertification” as the effects of environmental degradation. Some on the other hand erroneously defined environmental degradation. Others were stating the causes and control instead of effects of environmental degradation.

C(i) This sub-question was the least attempted of all the sub- questions in question 5. Less than 1% of the candidates who attempted this question scored at least 1 mark by stating that fibroid is a disease.

C(ii) Many of the candidates attributed fibroid to plants by referring to it as fibre, fibrous roots etc. Some candidates also stated the disease as linked to the stomach instead of the womb or uterus.

The effect of fibroid was largely ignored. Just a handful of candidates was able to correctly state that it can lead to death.

D(i) More than 95% of all the candidates who attempted question 5 made an attempt on this question. Out of this 95%, a little above 40% were able to score at least 1 mark from this question.

Majority of the candidates who attempted the question lost marks due to the following reasons:

- Wholly or shaded lines or shading of organelles.
- No cell wall, no nucleus or no cell membrane.
- drawing of animal cell instead of plant cell.
- Use of a ruler to draw the diagram.
- Poor labelling, wrong labels, using arrows as label guidelines, slanted label guidelines, free-hand drawing of label guidelines instead of use of rulers and label guidelines not touching the parts that were labelled.
- Use of a pen to draw and label the diagram instead of the use of pencils.

D(ii) This sub-question was well attempted as well. More than 35% of the candidates who attempted this question were able to score at least 1 mark from this question.

One of the wrong answers noted from this question was: cell wall protects the plant. The correct answer should have been, cell wall protects the plant cell.

Question 6

- (a) (i) Name the reactants in esterification reaction.
(ii) State **one** function of concentrated sulphuric acid in esterification reaction
(iii) Give **four** reasons why aluminium is used in the manufacture of cooking utensils.
- (b) (i) Name **two** products of anaerobic respiration.
(ii) Write a balanced chemical equation for anaerobic respiration of glucose.
[glucose $C_6H_{12}O_6$].
(iii) Suggest **four** factors that must be considered to ensure proper ventilation when building a house.
- (c) (i) What is meant by the term mole?
(ii) Calculate the number of moles present in 35.0 g of iron metal. [$Fe=56$].
- (d) (i) Define the term kilowatt-hour.
(ii) An immersion heater is marked 1000 W, 220 V. Calculate the resistance of the heater.

- A (i) Only about 20% of all the candidates examined attempted this question. This might be attributed to the fact that the question started with a chemistry question and also that it contained two calculation questions.

About 50% of the candidates who attempted this question correctly mentioned alkanols/alcohol/ethanol and alkanoic acid as the reactants for esterification reaction. A few wrong answers like acid and base, esters were however noted.

- A (ii) This question was attempted by about 35% of those who attempted question 6. Many ignored the question completely. More than 60% of those who attempted the question correctly mentioned that sulphuric acid acts as a catalyst in esterification reaction. However some wrongly stated that it makes the reaction acidic.

- A(iii) This question was well attempted by about 90% of those who attempted question 6. It appeared as if this question attracted them to question 6.

Some of the wrong answers given by candidates were:

- Aluminium is shiny.
- It reflects light.
- Easy to wash.
- Women like using it.
- It is very reactive.
- It conducts electricity.

- B(i) Many of the candidates, about 60% of those who attempted question 6 wrongly stated the products of anaerobic respiration as oxygen and water. Only handfuls were able to correctly mention at least one out of ethanol, lactic acid, carbon dioxide or energy.

- B(ii) More than 80% of the candidates who attempted this question scored the half mark for stating $C_6H_{12}O_6$ as the reactant. This could probably be attributed to the fact that $C_6H_{12}O_6$ was mentioned in the question.

Most of these candidates lost marks for giving the wrong reactants, not adding energy and also for not balancing the equation.

- B(iii) Although a vast majority, about 90%, of those who attempted question 6 made an attempt on this question, the type of answers given could suggest that most of these candidates did not understand the question.

Many of the candidates wrongly stated landscape, topography, amount of money, size of family, type of land etc as factors that must be considered to ensure proper ventilation when building a house.

However, it is worthy to note that about a handful correctly stated the position of the house and the number and size of windows.

- C(i) Less than 1% of all the candidates who attempted question 6 were able to correctly state the definition of Mole as the amount of substance containing the Avogadro's number of particles. About 10% of the candidates who attempted this question defined mole with reference to mass per molar mass. A basic answer which was not acceptable for this level of examination.

- C(ii) More than 50% of the candidates who attempted this question scored at least 1 mark for correctly stating that $\text{Mole} = \frac{\text{Mass}}{\text{Molar mass}}$. Many lost marks for wrong substitution, wrong calculation and wrong or no units. Some completely ignored the question.
- D(i) This question was poorly attempted. Only a handful of all the candidates who attempted this question were able to correctly state the definition. A vast majority, about 90%, ignored the question.
- D(ii) Just like the previous calculation question, many of the candidates, about 40%, scored at least one mark for correctly stating the formula of resistance. Again marks were lost to wrong or no units.

Question 7

- (a) (i) *Draw and label a diagram of hydrometer.*
- (ii) *Describe **briefly** how the density of a liquid is determined using a hydrometer.*
- (b) (i) *What is thermostat?*
- (ii) *Name **two** appliances which use thermostat.*
- (iii) *The resistance of a conductor is $5\ \Omega$. If the potential difference across its ends is 120 V, calculate the current flowing through the conductor.*
- (c) (i) *Describe the mechanism of inhalation in humans.*
- (ii) *State **three** harmful effects of smoking in humans.*
- (d) (i) *What is lymph?*
- (ii) *State **three** functions of lymph.*
- A(i) This was the least popular optional question. It was attempted by only 5% of the candidates. Just about a handful was able to make an appreciable attempt to draw the diagram of hydrometer. Some of the diagrams however were either not labelled or deviate largely from the correct diagram.
- A(ii) Again this question was badly attempted. More than 90% of the candidates who answered this question could not write anything meaningful. Many ignored the question. Less than 1% however, scored 1 mark for stating that the hydrometer should be lowered into the liquid.
- B(i) About 25% of the candidates who attempted this question were able to correctly state that it is used to regulate temperature in appliances. A few however gave the description of thermometer instead of defining a thermostat.
- B(ii) Contrary to the above, more than 60% of the candidates who attempted question 7 were able to correctly mention at least one appliance that uses thermostat. Some of such correct answers are: fridge, freezer, electric cooker and air conditioners. Some wrong answers that are worthy of note are: electric bell, traffic lights and gas cooker.

- B(iii) This question was well attempted. About 40% of the number of candidates who attempted this question was able to score at least 1 mark for correctly stating the formula for current. More than 20% scored the total three marks for this question. A handful however lost marks for wrong or no unit.
- C(i) The attempt on this sub-question was the poorest among all sub-questions in this question. A very insignificant number, far less than 1% of the number of candidates who attempted this question were able to score at least 1 mark for mentioning that the external intercostal muscle contract and the internal intercostal muscles relax. While some of the candidates ignored the question, some gave descriptions of respiration and breathing instead.
- C(ii) More than 50% of the candidates who attempted this question were able to score at least 1 mark for correctly stating at least one of the following: heart attack, stroke, heart diseases, bad breath and cancer.
- D(i) This question was poorly attempted. Majority, about 90% ignored it completely. The few candidates who made attempt to write something could not correctly state the meaning of lymph. Almost all the candidates who attempted question scored zero (0) in this question. One or two of the candidates erroneously described lymph as a stage of insect metamorphosis.
- D(ii) This question also followed the pattern of the previous as they were related. More than 95% scored zero (0) from this question.

Question 8

- (a) State **two** functions each of the following organs associated with digestion:
- (i) Liver;
 - (ii) Pancreas.
- (b) Name:
- (i) **three** different joints found in humans;
 - (ii) **one** location of each of the joints named in 8(b)(i).
- (c) (i) What is malnutrition?
- (ii) State **four** effects of malnutrition in humans.
- (d) (i) Explain how covalent bonds are formed
- (ii) Give **two** examples of covalent compound.
- (e) State **four** functions of the World Health Organisation.

This was the most popular optional question. It was attempted by about 95% of all the candidates examined.

- A(i) About 55% of the candidates who attempted this question were able to score at least 1 mark for stating at least one correct function of liver. Some of the wrong answers given were: liver is used for digestion, it produces insulin, stores food, carries blood and it repairs blood.

- A(ii) About 40% of the candidates who attempted this question were able to score at least 1 mark for stating at least one correct function of pancreas. Some correct answers worthy of note were: it produces pancreatic juice and it produces insulin. However some wrong answers are: fight diseases, pump blood and used for digestion.
- B(i) This question was well attempted. More than 50% of the candidates who attempted this question scored at least one mark for correctly stating at least one of the following as the correct types of joints: ball and socket joint, gliding joint, immovable joint and hinge joint. Many of the candidates however lost marks for wrong answers or wrong spellings. Some of the wrong answers given were: hing, boll and socket joint, pelvic joint, sliding joint, elbow, hip, waist and ankle joints.
- B(ii) The percentage of candidates who scored at least one mark dropped as against the previous question largely due to the fact that some of the candidates mixed up the location of the joints. Since this question is closely linked to the previous, all of the candidates who gave wrong answers in the previous question also scored zero (0) in this question.
- C(i) This question was well attempted but not well answered. More than 60% of the candidate who attempted this question was able to score at least one mark for adding lack of food nutrients in their definition. Only less than 5% managed to correctly and fully define malnutrition as a condition or situation where there is insufficient or lack of the required essential food nutrients in their right proportions. Most of the candidates wrongly stated malnutrition as a process instead of a condition or situation. A handful defined it as a positive and welcome condition for humans.
- C(ii) Contrary to the above, this question was well answered. More than 60% were able to score at least 1 mark for correctly stating at least one effect of malnutrition. Many mentioned at least one deficiency symptoms such as kwashiorkor, rickets, goiter, etc. A few lost marks by giving positive effects like encourage growth in children.
- D(i) A little above 20% of the candidates who attempted this question were able to explain how covalent bond is formed. Many candidates wrote sentences that made no meaning; some were stating it as the transfer of electrons while some others were drawing the electronic configuration of compounds.
- D(ii) This question was fairly attempted. Only about 15% were able to score at least one mark from this question. Most of the candidates lost marks because they stated atoms or gas and not compounds.
- E This question was well attempted and well answered. More than 75% of the candidates who attempted question 8 score at least one mark from this question. Some lost marks for stating wrong function of WHO. Some of the wrong answers given were: provision of food, provision of employment opportunities and building of hospitals.

WASSCE FOR SCHOOL CANDIDATES 2016
CHIEF EXAMINER'S REPORT
SCIENCE 3

1. GENERAL COMMENTS

The standard of this year's paper was as good as those of the previous years. Most of the questions were standard and within the scope of the syllabus. The general performance of the candidates was poor and showed no sign of improvement compared to the previous years.

2. CANDIDATES' STRENGTHS

Despite the observation made above, candidates demonstrated some strength in the following areas:

- Identification of the parts of the digestive system in question 2.
- Taking the second ammeter reading in question 3.
- Plotting and calculating the slope of the graph, as well as stating the relationship between the current and voltage.
- Calculation of the length of the internodes in question 5.
- Stating the precautions for diluting concentrated sulphuric acid in question 4.

3. CANDIDATES' WEAKNESSES

The following weaknesses were observed:

- Spelling errors which were evident in labeling the parts of the human digestive system.
- Weak practical knowledge.
- Inability to interpret the questions well.
- Inadequate preparation.
- Scaling of the axes for the graph in question 3.

4. SUGGESTED REMEDIES

The Chief Examiner suggested the following points as remedies:

- Heads of schools, teachers and parents must ensure that their candidates and children are adequately prepared before attempting the examination.
- A lot of practice in graph work should be given to candidates to enable them master the skills in handling graphical questions.
- Candidates should be helped to master this skill of correct scaling of axis.
- More practical lessons should be incorporated in the teaching and learning of science.

5. DETAILED COMMENTS ON INDIVIDUAL QUESTIONS

Question 1

*An investigation was carried out on **three** colourless solutions contained in test tubes labelled **X**, **Y** and **Z**. To portions of **each** of the solutions, few drops of phenolphthalein indicator were added. To a fresh portion of solution **Y**, few drops of phenolphthalein indicator was added. To the resulting mixture, solution **X** was added until a colour change was observed.*

The results obtained in the initial stage of the experiment are presented in the table below.

<i>Test</i>	<i>Solution X plus phenolphthalein</i>	<i>Solution Y plus phenolphthalein</i>	<i>Solution Z plus phenolphthalein</i>
<i>Colour change observed</i>	<i>Colourless</i>	<i>Pink</i>	<i>Pink</i>

Study the table carefully and answer the questions that follow:

- (a) Classify solutions **X**, **Y** and **Z** as either acidic or alkaline.
- (b) (i) Suggest the colour change that would be observed when drops of solution **X** was added to the mixture.
(ii) Name the reaction that took place between solutions **X** and **Y**.
(iii) State the effect of the resulting mixture at the point of colour change on red litmus paper
(iv) State **three** applications of the reaction named in 1(b)(i).

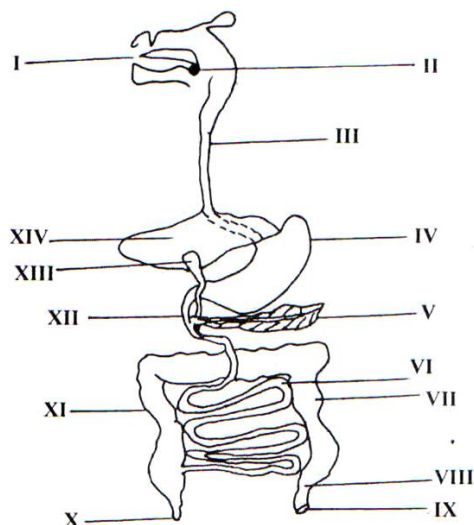
Candidates' performance in this question was generally poor. Only about 30% did well in this question. The reasons for this poor performance are as follows:

- (i). Candidates were unable to correctly classify solutions Y and Z as alkaline from observations (i.e pink) made when these solutions were mixed with phenolphthalein. . It was evident that candidates lacked the requisite practical knowledge, which lends them to mere guess work.
- (ii). The part (b)(i) of this question required candidates to state the colour change observed when drops of solution X(which is acidic) were added to the mixture of solution Y and Phenolphthalein. The expected answer was, from pink to colourless. A good number of the candidates lacked the skill to answer this question. They simply stated colourless. It must be noted that a colour change comes from one colour to another colour.
- (iii). Part (b)(iii) required candidates to state the effect of the resulting mixture of solutions X(acidic), Y(alkaline) and phenolphthalein at the point of colour change on red litmus paper. The expected answer was: no effect or it remains red or unchanged. Alarmingly, candidates had no idea about what this question was really asking for. Again this highlighted the need to strengthen the teaching of practical work during our science lessons.
- (iv). Similarly, part (b)(iv) was also poorly answered by candidates. It required them to state three applications of neutralisation. Sadly, while the question appeared simple, about 70% of the candidates could not answer it correctly. Despite the numerous shortcomings stated above, a good number of candidates, either by some Divine intervention or by mere guess work, were able to classify solution X correctly as acidic.

Question 2

The diagram below illustrates the digestive system of humans.

Study it carefully and answer the questions that follow.



- (a) Name the parts labeled **I, II, III, IV, V, VI, VII, VIII, IX, X, XI, XII, XIII and XIV**.
- (b) Name the part where the following food substances are digested:
- (i) yam;
 - (ii) beans;
 - (iii) egg;
 - (iv) butter.
- (c) Name the digestive juice produced in the parts labeled **II, V and XIV**.
- (d) Name the type of movement that occurs in the labeled **III**.

This was the most popular question in the paper. This is why about 70% of the candidates did well in this question. The reasons for the good performance were:

- Candidates were able to identify the parts of the digestive system.
- They were able to name the parts of the digestive system where the food substances yam, beans, egg and butter are digested.

Despite the overall good performance in this question, candidates could not do well in parts (c) and (d). Part (c) required candidates to name the digestive juice produced in the parts labelled **II**(salivary gland), **V**(pancreas) and **XIV**(liver).

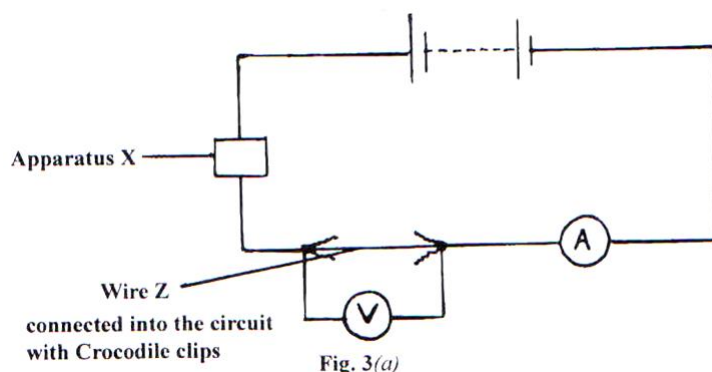
The required responses were *saliva*, *pancreatic juice* and *bile* respectively. Candidates completely misunderstood this question. They rather wrote the glands that produced the juices instead of the juices. Part (d) which required candidates to name the type of movement that occurred in the part labelled **III** (oesophagus) was equally answered poorly. The expected response is *peristalsis*, but about 60% of the candidates could not come up with this answer.

Question 3

Fig 3(a) is an illustration of an electrical circuit diagram used to investigate the relationship between the current, I flowing through a wire, Z and the corresponding voltage drop, V across the wire. When X is adjusted, the voltmeter readings, V and the corresponding ammeter readings, I were noted and recorded as in the table below.

Fig. 3(b) shows the ammeter readings I_2 , I_3 for their corresponding voltage readings 2.1 V and 4.0 V.

Study the diagrams carefully and use them to answer the questions that follow.



Voltmeter reading, V/V	1.0	2.1	4.0	5.1	7.2	9.0	10.1
Ammeter reading, I/A	0.17	I_2	I_3	0.60	0.95	1.08	1.20

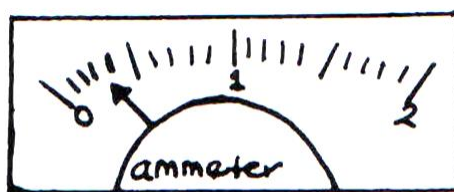
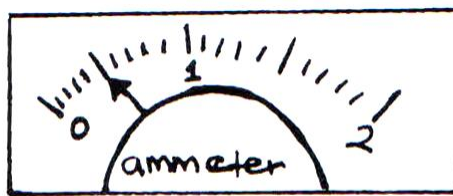


Fig. 3(b)



- (a) Identify apparatus X .
- (b) Copy the table, read and record the values of I_2 and I_3 .
- (c)
 - (i) Using the figures in the table, plot a graph of V on the vertical axis and I on the horizontal axis.
 - (ii) Determine the slope of the graph.
 - (iii) From the graph, state the relationship between I and V .

The performance of candidates in this question was also poor. Only about 40% of the candidates were able to score about half of the marks allocated to this question. The reasons for the low percentage performance are:

- (i) They could not name the apparatus labelled X (the variable resistor or rheostat). Majority called it, resistor. Clearly, these candidates did not read the question thoroughly to see the function of the apparatus. This could have given them the clue.

- (ii) A good number of candidates could not read the first ammeter correctly. This was purely due to carelessness. If they could read the second ammeter correctly, there is no excuse for not reading the first correctly. In fact, some of them rounded up the 0.35 to 4. This is a very bad practice. Data of this type should never be rounded up but written as read.
- (iii) Candidates also did poorly in scaling the axes for the graph. It should be noted that, a wrong scale nullifies every other aspect of the graph. Despite these weak areas, some areas were well answered. Candidates knew how to calculate the slope and state the relationship between voltage and current.

Question 4

- (a) Samples of sodium chloride solution, lime juice, caustic soda solution and battery acid were tested with litmus solution.

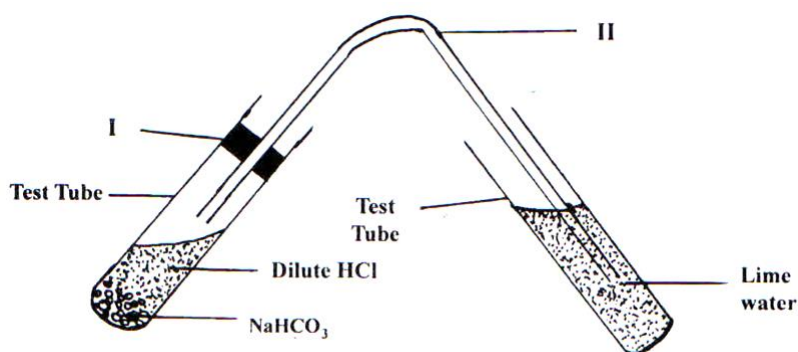
The observations made are as shown in the table below.

Activity	Observation	Name of substance
Sample + Litmus solution	No visible colour change	
Sample + Litmus solution	Colour change to pale red	
Sample + Litmus solution	Colour change to blue	
Sample + Litmus solution	Colour change to deep red	

- (i) For **each** of the observation stated on the table, write the name(s) of the sample(s) **most** likely to give the observation.
- (ii) Arrange the samples in order of increasing pH.

- (b) The diagram below is an illustration of a set-up used to test for a gas in the laboratory.

Study the diagram carefully and use it to answer the questions that follow.



- (i) Name the parts labeled **I** and **II**.
- (ii) Name the gas that is being tested for.
- (iii) Write a balanced equation for the reaction that produced the gas named in 4(b)(ii).
- (iv) State what is observed in the test tube containing the lime water.

- (c) *A gas is evolved when a mixture of calcium oxide (CaO) and some crystals of ammonium chloride (NH₄Cl) were heated in a test tube.*
- (i) *Name the gas evolved.*
 - (ii) *Name **two** physical properties of the gas named in 4(c)(i).*
 - (iii) *Write a balanced equation for the reaction that took place.*
- (d) *Suggest **three** precautions that should be taken when diluting concentrated sulphuric acid with water.*
- (e) *Describe **briefly** how the process of reading the level of a liquid in a measuring cylinder is carried out.*

The performance of candidates in this question was similar to the performance registered in question 3. About 40% of the candidates did well in this question. The reasons for this poor performance were:

- (i) Candidates completely misunderstood the question. The (a) part of this question required them to use the following samples, sodium chloride, lime juice, caustic soda and battery acid and write them against the observation made when each of the samples was tested with litmus solution. Candidates ignored the use of these substances and wrote down things like, strong acid, weak acid, neutral and strong base.
- (ii) They were also required to arrange these substances in order of increasing pH. This was also poorly answered.
- (iii) Part (b)(iii) of this question required candidates to write equation for the reaction between dilute hydrochloric acid and sodium hydrogen carbonate. The responses revealed that, majority of candidates had no idea about the products of this reaction. Even the few that did could not write the correct formula of sodium chloride. The same is also true of the equation for the reaction between calcium chloride and ammonium chloride. When asked to name the gas produced from this reaction, candidates either avoided the question or wrote ammonium gas.
- (iv) Candidates also failed in their attempt to explain the process of reading the level of a liquid in a measuring cylinder.

Despite these weaknesses, candidates were able to:

- (i) state the precautions to be taken when diluting concentrated sulphuric acid.
- (ii) ironically state the physical properties of the gas(ammonia) produced from the reaction between calcium oxide and ammonium chloride and
- (iii) state the effect of the gas(carbon dioxide) produced from the reaction between dilute hydrochloric acid and sodium hydrogen carbonate on lime water.

Question 5

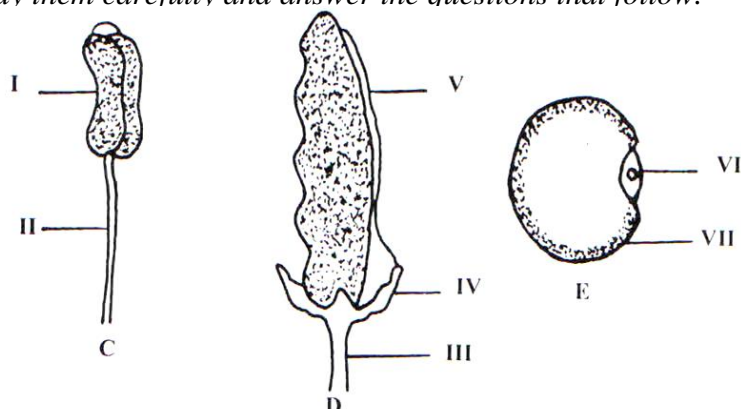
- (a) A set of **five** potted bean seedlings was grown in continuous darkness for one week. Another set of five bean seedlings was also grown in normal day and night conditions. The lengths of the internodes close to the soil level were measured for all the seedlings.

The result obtained is tabulated below as set **I** and set **II** for the **two** different conditions under which the seedlings were grown.

Seedlings	Length of Internodes (cm)	
	set I	set II
1	4.5	15.5
2	5.5	16.0
3	5.0	14.5
4	4.0	16.5
5	5.0	15.5

- Calculate the average length of the internodes for sets **I** and **II**
 - Indicate the set which was grown in continuous darkness, giving **one** reason for your answer.
 - State **two** other features of seedlings grown in continuous darkness.
- (b) The diagram below illustrates parts of the flowering plant.

Study them carefully and answer the questions that follow.



- identify **each** of the structures labelled as **C**, **D** and **e** in the diagrams above.
- name **each** of the parts labelled **i**, **ii**, **iii**, **iv**, **v** and **vi**.
- state **one** function **each** of the parts labeled **i**, **ii**, **v**, **vi** and **vii**.
- what is the relationship between the structures labelled **D** and **E**?

This question presented the biggest challenge to candidates. The average percentage can be rated as low as 10%. Examiners were of the opinion that this topic was absolutely not treated in the classroom. The question was about two sets of five seedlings. Set I was grown in continuous darkness for one week and the other set (set **II**) was grown in normal day and night conditions. The lengths of the internodes were at the end of one week measured and recorded. From these results, candidates were asked to,

- (i) calculate the average length of the internodes for each set.
- (ii) indicate the set which was grown in continuous darkness , giving one reason for their answer and.
- (iii) state two other features of seedlings grown in continuous darkness.

Sadly, candidates only did well in the calculations of the average lengths of the internodes. The second part of this question contained three diagrams illustrating parts of a flowering plant. The parts were **C** (stamen), **D** (fruit) and **E** (seed). Candidates were required to,

- (i) identify the structures labelled, **C**, **D** and **E**.
- (ii) name each of the parts labelled **I** (anther), **II** (filament), **III** (stalk), **IV**(sepal), **V**(fruit coat) and **VI** (miscopy).
- (iii) state one function each of the parts labelled **I**, **II**, **V**, **VI**, and **VII**(i.e. seed coat)
- (iv) state the relationship between the structures labelled **D** and **E**. Invariably, candidates did not show any appreciable strength in any of these questions.

COMMERCIAL SECTION

WASSCE FOR SCHOOL CANDIDATES 2016
RÉSUMÉ OF CHIEF EXAMINERS' REPORTS
THE COMMERCIAL SUBJECTS

1. STANDARD OF THE PAPERS

The Chief Examiners for Business Management, Principles of Cost Accounting and Commerce indicated that the questions set were within the scope of the syllabuses and can be compared favourably with the previous years. However, the Chief Examiner for Financial Accounting was quiet on the standard of the paper.

2. CANDIDATES' PERFORMANCE

Generally, candidates' performance varied from one subject to another. While the Chief Examiners for Business Management reported that this year, candidates' performance was better than last year's, the Chief Examiners for Commerce reported the contrary. According to him, candidates' performance this year was not as good as last year's. Also, the Chief Examiner for Principles of Cost Accounting reported that candidates' performance was average while the Chief Examiner for Financial Accounting clearly reported that this year, candidates' performance was far below average.

3. CANDIDATES' STRENGTHS

Generally, some candidates performed extremely well. Not much was mentioned on the strengths of candidates in Business Management and Commerce respectively. However, some of the areas reported on by the Chief Examiners are as follows:

- The Chief Examiner for Commerce highlighted that the candidates manifested their strength in the proper presentation of their answers.
- Some candidates in Principles of Cost Accounting were reported to have properly prepared the Process Account as well as Stock Ledger Card.
- In Financial Accounting, it was reported that candidates performed well as a result of clarity of expression and approach.
- From the report of the Chief Examiner for Business Management, the performance of candidates showed that they were fully prepared for the examination.

4. CANDIDATES' WEAKNESSES

While some subjects realized slight improvement in this year's examination, performance in other subjects is far below average. Below are some of the areas candidates performed poorly in:

- The Chief Examiners for the commercial subjects unanimously reported that most of the candidates have difficulty in spelling and proper presentation of answers.
- The Chief Examiners for Business Management, Commerce and Financial Accounting reported that some candidates merely recopied the questions as answers or provided meaningless answers and sometimes even failed to provide an answer.

- It was also observed that syllabus coverage is a cause for concern in some schools.
- In Financial Accounting, some candidates failed to write the account headings resulting in poor marks.
- In Commerce and Financial Accounting, the Chief Examiners observed that some candidates performed badly as a result of misinterpretation of questions
- The Chief Examiners reported that illegible writing had made a few candidates lose marks because their answers were totally unreadable.

5. **SUGGESTED REMEDIES**

As a way of overcoming the weaknesses highlighted above, suggestions have been proffered by the Chief Examiners to improve the performance on. Candidates/schools are advised to:

- pay much attention to the general instructions and the demands of the questions.
- make the Chief Examiner's reports available to both teachers and candidates and take note of key points highlighted therein.
- improve on the use of English Language by reading extensively.
- endeavour to cover the entire syllabus.
- ensure that teachers as well as candidates have the required/recommended text books.
- increase the number of assessments and tests to be able to overcome some of the errors highlighted in the Chief Examiners' reports.
- revise past questions and discuss the answers with them candidate

WASSCE FOR SCHOOL CANDIDATES 2016
CHIEF EXAMINER'S REPORT
BUSINESS MANAGEMENT

1. GENERAL COMMENTS

The questions set for this examinations were very standard, straight forward and in simple English. There were no vague questions and no question was set outside the syllabus.

Generally, the performance of candidates this year was better than last year's.

However, there was also clear evidence from the scripts that a good number of the candidates were not properly prepared for the examination. There were serious language deficiencies and a failure to adhere to rubrics.

2. CANDIDATES' STRENGTHS

Candidates' strengths depended on the centre. About 80% of the candidates from few centres demonstrated a high degree of knowledge as per their answers to the questions. They were able to score reasonable marks.

On the whole, candidates' performance was better in questions 1a & b, 2, 3, 4, and 6a. Over 90% passed the paper. It shows that these candidates were well prepared for the examination

3. CANDIDATES' WEAKNESSES

The individual performance of the candidates continue to be a cause for concern especially when in this year's paper, no question was drawn from the new topics in the syllabus. The marked weaknesses were in questions 1b and c, 5, 6b and question 8. The weaknesses in their answers included the following:

- Poor spellings and presentations - about 30% of the candidates failed to construct simple complete sentences.
- Illegible writing – some scripts were totally unreadable because of poor handwriting.
- It was also observed by examiners that candidates gave answers without separating them according to how they were numbered in the paper.
- About 10% of the candidates just copied the questions on the answer booklet and about 0.8% of them didn't write anything on their answer sheets except their personal details.

4. SUGGESTED REMEDIES

The Chief Examiners suggested the following as remedies:

- Candidates should pay greater attention to general instructions and the demands of the questions.
- To improve on the use of English Language, candidates should be encouraged to read novels and speak English at all times.
- School authorities should make available the Chief Examiner's reports to teachers and candidates.
- Field trips should be organised on regularly by schools.
- Schools should ensure that candidates have the recommended text books.

5. DETAILS COMMENTS ON INDIVIDUAL QUESTIONS

Question1

MUM AND SONS PARTNERSHIP

Mum and Sons partnership was formed by three partners namely Fatima Abudu, Cyril Pratt and Kasim Alhassan after signing a partnership deed. The firm produces fast moving consumer goods such as milk, sugar and beverages.

Two years ago, the partners added production and sale of household appliances to their operations. This resulted in the reduction of the firm's overall profit. The partners therefore engaged Aisha and Associate Consultancy to investigate the poor trend in performance. The consultants held separate meeting with the partners, managers and employees. Three main factors were identified as contributing to the problems such as adding new line of business without market research, lack of promotional activities limited number of distribution outlets.

After careful study of the causes of the decline, the consultants recommended the identification of consumers' wants through market research before developing a new product. The recommendation of the consultants was well implemented by Mum and Sons Partnership. In addition, the partnership firm introduced good pricing policies, aggressive advertising and other promotional activities. There resulted in increased sales and high profit-margin.

In order for mum and Sons Partnership to continue with its expansion programme, two of the partners suggested that the firm should be converted into a limited liability company. Cyril Pratt however opposed the idea.

(a) State four items contained in a partnership deed.

This question required candidates to state items in a partnership deed. It was correctly answered by 80% of the candidates.

(b) Outline the steps Mum and Sons partnership should follow in developing a new product.

This question was badly done by those candidates that attempted it. One would have expected that candidates should know or list steps in developing a new product. About 99% were not able to list steps involved in developing a new product.

*(c) Explain **two** promotional activities other than advertising which Mum and Sons Partnership used.*

This question required candidates to know the elements of promotion or the various components of promotion. Just as in question 1b, about 95% of the candidates had no idea of promotion mix or the elements of promotion.

*(d) Explain **three** benefits that would be enjoyed by members if the business was converted into a limited liability company.*

This question expected candidates to have knowledge and understanding of a limited liability company and its advantages over a partnership business. About 65% of the candidates presented good answers.

Question 2

(a) List the **three** parties to a cheque.

This was a straight forward question requiring candidates to list the parties to a cheque. About 80% of the candidates gave correct answers, 15% of them were not able to correctly spell the parties to a cheque and 5% had no idea about it.

(b) State and explain **two** accounts operated by Commercial Banks

About 75% of the candidates were able to explain the accounts operated by Commercial Banks. The distinction between current account and savings account is that cheque is used to withdraw from and bank charges commission on current account, whereas passbook is used to deposit and make withdrawals. Bank pays interest on this account.

(c) Explain three services provided by Banks to current account holders

About 80% of the candidates gave the general functions of Commercial Banks. The question was specifically on the functions to current account holders.

Question 3

(a) What is motivation?

(b) Explain in order of sequence, the first **four** levels of Maslow's hierarchy of needs

About 90% of the candidates answered this question. It required them to enumerate Maslow's hierarchy of needs. This was the most popular question where candidates scored the highest marks.

Question 4

(a) Explain the term planning.

This question was popular among the candidates. About 90% of the candidates attempted it. Their performance was not encouraging. The simple definition is: planning is the process which managers use to identify to identify and select appropriate goals and courses of action for an organization. Candidates who attempted this question gave incomplete answers.

(b) Explain **four** benefits of planning in management.

This part required candidates to explain the benefits of planning. Invariably, most of them gave answers that had no bearing on the question. Others duplicated their answers. To do very well here, the candidate should state specific benefits of planning such as;

For decision making, monitor performance, efficient use of resources etc.

Answers such as planning helps to make profit, planning is good for business, are not acceptable.

Question 5

(a) What is an Organizational structure?

This question was not popular and was poorly answered by the few who attempted it. Candidates were to define organizational structure. About 90% of those who answered it wrote on organization chart.

(b) Explain the following concepts:

(i) Job enlargement;

(ii) Job enrichment;

(iii) Matrix structure;

(iv) Functional structure.

This part of the question was an uphill task for most candidates, many of them were unfamiliar with this aspect of the syllabus and the average score was too poor.

Question 6

(a) Outline **three** circumstances in which a contract can be discharged

This question was very popular and attempted by 75% of the candidates and good scores were recorded.

(b) Explain the following law of contract concepts:

- (i) Consideration;
- (ii) Valid contract;
- (iii) Unenforceable contract.

This part required the candidates to define:

- Consideration which is a right, interest or benefit enjoyed by parties to a contract or detriment suffered. However, about 60% of the candidates were not able to give proper definition of the concept. Some of the candidates wrote, consideration means “the importance of offer”, others said it is “when you consider the other person”
- Valid contract – nearly all the candidates who attempted this area got it right.
- Unenforceable contract – was grossly misunderstood by about 70% of the candidates and therefore poor scores were recorded.

Question 7

(a) Distinguish between insurable risk and uninsurable risk.

This was a popular and repeated question. It was attempted by about 85% of the candidates. About 75% out of 85% of the candidates answered the question correctly by stating the terms of insurance and uninsurable risks that can be calculated, measured can be identified while uninsurable risk is the opposite.

(b) Explain **five** benefits of insurance to a business organization.

The candidates were to give five benefits of insurance to a business organization. Instead, most of the candidates wrote on the general importance of insurance to individuals and business making some of the points stated not certain - applicable to business organization.

Question 8

(a) Distinguish between on-the-job training and off-the-job training giving an example of each.

This question was attempted by about 65% of the candidates and nearly all of them could not differentiate between on-the-job-training and off-the-job-training with appropriate examples.

(b) Explain **five** importances of training employees in an organization.

The candidates who attempted this question were able to navigate around the answers by making statements that were close to the answers but were not strong enough to earn them any mark.

WASSCE FOR SCHHOL CANDIDATES 2016
CHIEF EXAMINER'S REPORT
COMMERCE 2

1. GENERAL COMMENTS

The paper was of the same standard as the previous years. The questions drawn matched the level of the candidates. There was a blend of questions ranging from recall of knowledge to application. 95% of the questions were drawn from familiar topics. However, candidates' performance was not as good as the previous years.

2. CANDIDATES' STRENGTHS

Candidates who prepared well before the examination made very good scores. They showed their strength in orderly presenting their answers with appropriate commercial terms. Their scripts were perfectly readable.

3. CANDIDATES' WEAKNESSES

In general, 70% of the candidates who failed to make up the pass grade lacked readiness to sit the examination. This was manifested in the poor presentation of their answers. Some candidates just wrote their answers at will with little or no reference to the demands of the questions. Others copied verbatim from the question papers. In other cases, candidates could not interpret accurately the extent to which they should provide an answer to a question. Mostly, definitions were provided in answering question that required explanation. This would certainly not attract full marks. Another contributing factor for the poor performance could be the non-completion of the syllabus on time. Consequently, candidates would have little or no time for revision.

4. SUGGESTED REMEDIES

Following the findings made in this year's marking exercise; the under-mentioned points are worth noting for improved performance in subsequent examinations:

- Teachers and school authorities should endeavour to abreast their candidates with the latest development in commerce. This will help them to widen their knowledge in the subject and put them in a better position to score good grades.
- Regular class exercises and assignments will also help to assess the candidates' level of understanding on each topic taught.
- Candidates should be acquainted with sections of the syllabus not taught by their teachers. This will help them greatly in their revision work.
- Teachers are also advised to revise past questions and discuss the answers with their candidates. This should be done alongside the normal teaching periods.
- Subject teachers are also encouraged to introduce their candidates to WASSCE standard questions since Grade-10. This will help them acquaint themselves with such standard before their final examination in Grade-12.
- The use of the internet could also help candidates in acquiring knowledge regarding the latest development in Commerce.

5. DETAILED COMMENTS ON INDIVIDUAL QUESTIONS

Question 1

*Explain **five** ways in which commerce is important in the life of a nation.*

This was most popular question amongst the candidates. 80% of those who attempted it did very well. Apart from being drawn from a familiar topic it is clear and simple to understand. Consequently, candidates were able to provide the correct answers to earn them goods scores. However, those who performed poorly were those who failed to explain the functions of commerce. Some candidates only listed the ancillaries to trade, such as banking, advertising, transportation, etc.

Question 2

- (a) *List **four** features of a self services shop.*
- (b) *State **four** disadvantages of a self service shop*
- (c) *State **four** importance of working capital to a business.*

75% of the candidates attempted this question. However, there was gross misinterpretation of its requirements by most candidates. About 90% of them highlighted the features of a sole trader in a bid to answer part (a) of the question. Correct answers were 'goods have price tag on them; trolleys and baskets are made available for shoppers, large space to aid movement', etc. candidates needed to have had a wide range of knowledge about the operations of a supermarket or department store, especially features common to both of them as they all offer self-service.

Question 3

- (a) *State **four** functions of a wholesaler to a retailer.*
- (b) *Explain **five** advantages of small scale retail business over a large scale business.*

Part (a) of this question was well answered. There were however few cases of misinterpretations in part (b), where the advantages of sole proprietorship were presented over those of large scale businesses.

Question 4

*Explain **each** of the following classes of insurance:*

- (a) *Marine insurance;*
- (b) *Accident insurance;*
- (c) *Group insurance;*
- (d) *Fidelity Guarantee insurance;*
- (e) *Consequential Loss insurance*

Most of the candidates who attempted this question did very well in explaining marine insurance clearly. The other four types of insurance were not adequately answered resulting in an overall poor performance in the entire question. Answers expected included:

Accident insurance- makes provision for compensation against injuries or mishaps which may occur to a person or group of persons which may include personal accident, employers liability, accident to property etc, Group insurance- policy taken to cover a number of people (candidates on excursion, football teams) instead of issuing each person with a

separate policy, Fidelity guarantee-a policy taken by an employer to cover losses resulting from employees' dishonesty and fraudulent practices, Consequential loss insurance- policy taken to cover loss of revenue to a firm as a result of being out of business especially after a fire incident.

Question 5

- (a) Explain **four** functions rendered by a courier firm.
- (b) Explain **six** functions rendered by a Telecommunication firm

This was not a popular question. 75% of those who attempted it could not present the necessary answers to earn good scores. This could have been due to the fact that the question was drawn from a rarely examined area over the past few years. Therefore, both teachers and candidates paid little or no attention to cover this part of the syllabus.

Question 6

- (a) List **five** media of public relations
- (b) Enumerate **five** types of after sales service
- (c) State **five** benefits of after sales service.

Listing of the media of public relations was well done as required in part (a). Few repetitions were however evidenced; such as 'journal, newspaper, and magazine all fell under Print media. They should not be treated as separate points. Also, radio, television, and cinema were all electronic media. Nonetheless, the types and benefits of after-sales services were well answered by majority of the candidates.

Question 7

- (a) Distinguish between a broker and a factor
- (b) State **three** duties of an employer to an employee
- (c) State **four** duties of an employee to an employer.

Section-(a) of this question could not be answered correctly by almost all the candidates who responded to it. They could not clearly differentiate between a broker and a factor. The main difference between the two are that; a broker operates on the stock exchange as an agent, whilst a factor is a merchant who sells goods on behalf of his principal and has legal claim of the goods of his principal. Part (b) and (c) were correctly answered by majority of the candidates. However, those who performed badly were those who could not distinguish between an employer and an employee and therefore could not match their respective duties as required by the question.

Question 8

- (a) What is turnover in commerce?
- (b) List and explain **six** factors that determine the turnover of a product.

A great percentage of the marks were allocated to part (b) of the question which required the candidates to have covered a greater percentage of the topic where the question was drawn. 85% of those who attempted it could not score half of the mark allocated to the question. Lack of adequate preparation could have contributed to the poor performance.

WASSCE FOR SCHOOL CANDIDATES 2016
CHIEF EXAMINER'S REPORT
FINANCIAL ACCOUNTING 2

1. GENERAL COMMENTS

In all, majority of the candidates attempted five questions. Some attempted less than that, but others were unable to attempt even a single question. While some copied some questions into their answer booklets, others did not write anything in their answer booklets at all.

The most popular questions were questions number (2), (4), (5), (7), and (9) respectively. The least questions which were attempted by the candidates in varying proportions were questions number (1), (3) and (8). The least attempted question was (6).

In section (A), though, many attempted questions (2) and (4), most of the candidates did well while others performed badly. One could observe that some of these candidates have a problem of reading as well as writing.

In section (B), that is, the practice questions, the larger number of candidates who did not do well and scored very low marks was as a result of their inability to attempt at least any two questions successfully from questions (5) to (9); though the questions were drawn from popular topics which should have been covered in class or from the candidates own initiatives. In some cases, other candidates found the questions very difficult to handle. This group of candidates scored between zero and less than twenty marks (20 marks) in all.

Looking at the questions, one will be prompted to say that they were within the levels of the candidates and not above their standard. The questions were all drawn from very popular topics which may have been covered before the examination.

It was also observed that most of the candidates who performed very poorly are from the smaller schools and schools from the provinces.

Statistically, (1.16%) did very well, hence, scoring between 61 and 70 of the total marks. This was followed by (3.02%) of the candidates who scored between 51 and 60 marks, followed by (12.53%) of candidates scored between 41 and 50 marks and so on. Below is a table illustrating the marks scored, the number of candidates in each group and the percentages obtained.

Marks Scored	No. of Candidates in Each Group	Percentage (%)
0 - 10	112	25.99
11 - 20	84	19.49
21 - 30	103	23.89
31 - 40	60	13.92
41 - 50	54	12.53
51 - 60	13	3.02
61 - 70	05	1.16
TOTAL	431	100

From the table above, it can be seen clearly that the performance is not very good. The performances of about 83.29% of the candidates fall far below expected standards.

2. **CANDIDATES' STRENGTHS**

Generally, some of the candidates did very good work. Those who selected their questions carefully provided answers in an orderly manner and with clear expression thus earned themselves very good marks.

Of course, there were some candidates who exhibited some skills in their approach and provided some answers that deserve some commendation. Such candidates however, were not many as noted in the table above.

3. **CANDIDATES' WEAKNESSES**

It was observed that most of candidates had problem in reading and writing; the answers provided by most of them in the theory and practice questions were out of context. For example, questions 4 and 3 which most of candidates attempted were completely meaningless so far as those questions are concern.

Also, some candidates failed to write the account headings; this, affected them in terms of marks. Some candidates chose to write different account names instead of what is required by the questions. In this regard, one may conclude that some candidates did not read the instructions after going through the question to know exactly what is required of them.

4. **SUGGESTED REMEDIES**

The Chief Examiner suggested the following points as remedies:

- The annual Chief Examiner's report sent to schools should be made available to teachers so that they would be able to go through it and take note of the key points highlighted to enhance candidates' performance.
- Teachers should also try to cover at least eighty percent of the syllabus.
- Teachers should increase the number of assessment and tests to enable candidates avoid most of the mistakes and errors highlighted in the Chief Examiners' report.
- School Administration, teachers, parents should find ways and means to create a conducive teaching and learning environment and encourage candidates to take up their studies seriously.

5. **DETAILED COMMENTS ON INDIVIDUAL QUESTIONS**

SECTION A – THEORY

Question 1

- (a) *What is a general journal?*
- (b) *State **six** used of the general journal.*

This question was not popular among the candidates. About 6% of the candidates attempted it but almost all of them scored very low marks due their inability to define the General Journal properly and lack of ideas on the uses of the journal. Most of these candidates scored zero or insignificant marks.

Question 2

- (a) List **four** items **each** that are found on the:
 - (i) credit side of the sales ledger control account;
 - (ii) debit side of the purchases ledger control account.
- (b) List **seven** types of errors a trial balance will **not** reveal.

This question appeared to be the most popular one. Almost all the candidates who attempted it performed very well. Most of the candidates scored the full marks. The content of question (2) is within the knowledge of the candidates. It was a clear indication that the topic had been covered and understood by many.

Questions 3

- (a) Outline **three** distinguishing features of public and private companies.
- (b) State **three** rights available to an ordinary shareholder.

About 30% of the candidates went in for it because they perceived it to be simple but, the answers provided showed that they had very little idea about features of Public Company and Private Companies as a result, they confused Public Cooperation to mean Public Company hence scored zero mark in Question 3 (a) and on (b) because most of them could not state the rights of the ordinary shareholder.

Question 4

- (a) What is depreciation of an asset?
- (b) List **three** causes of depreciation.
- (c) Explain the following methods of depreciation:
 - (i) straight line;
 - (ii) reducing balance;
 - (iii) revalidation.

This was not a popular question. The few candidates who attempted this question could not give the definition of Depreciation of Fixed Assets and the explanation of its types; Straight Line, Reducing Balance and Revaluation method which makes those candidates to lose most of the marks allocated for this question. However, they were able to state the causes of depreciation.

SECTION B PRACTICE

Question 5

*Momoh enterprise cashbook showed a debit balance of Le 4,500 on December 31, 2014
Further examination revealed the following:*

- (i) A direct debit of Le 350 for subscription had been paid by the bank.
- (ii) Bank charges of Le 500 had not been reflected in the cash book.
- (iii) Payment settled by standing orders were omitted from the cash book; electricity bill Le 70, insurance Le 100 and medical bill Le 120.
- (iv) A dividend of Le 320 paid directly into the bank had not been entered in the cash book.
- (v) It was discovered that the cash book balance brought down was undercast by Le 180.
- (vi) Cheques amounting to Le 4,800 issued had not been presented for payment.
- (vii) Cheques amounting to Le 1990 paid into the bank had not yet been credited.

You are required to prepare:

- (a) the revised cash book;
- (b) bank reconciliation statement as at December 31, 2014.

About 90% of the 431 candidates attempted it. It was the most popular among all the questions. Most of the candidates scored the full marks while others scored 90% of the total marks.

Most of the candidates had understood the topic though some mistakes were made. For some of them, their problem was inappropriate inscriptions assigned to transactions debited or credited in the Adjusted Cash Book and that affected their scores.

Question 6

The following is the Receipt and Payments Account of kayoed social Club for the year ended 31st December, 2014.

<i>Receipts and Payments for the year ended 31st December, 2014</i>				
	₦	₦		₦
Cash in hand 1/12/2014		500	Purchase for sports equipment	1,800
Cash at bank 1/1/2014		1,500	Repairs	1,500
Subscriptions:			Salaries	1,700
2013	1,200		Insurance	1,000
2014	4,000		Show expenses	3,200
2015	<u>2,300</u>	7,500	Transport expenses	500
Donations		2,000	Secretarial expenses	300
End of Year show		15,000	Purchase of furniture	3,000
Transfer from deposit account		3,000		
		<u>Balance</u>		<u>16,000</u>
		<u>29,000</u>		<u>29,000</u>

Additional information:

- (i) Equipment was valued at ₦3,250 and furniture ₦1,550 on 31st December, 2013.
- (ii) Depreciation to be provided as follows:
 Equipment ₦505
 Furniture ₦55
- (iii) The following expenses were outstanding:
 Salaries ₦300
 Transport ₦100
 Repairs ₦250
- (iv) Subscriptions owing by members were as follows:
 31st December, 2013 ₦1,200
 31st December, 2014 ₦2,100
- (vi) The balance in the bank deposit account at 31st December, 2013 was ₦3,000.
 You are required to prepare:
 - (a) Statement of affairs as at 31st December, 2013
 - (b) Subscriptions account for the year ended 31st December, 2014
 - (c) Income and expenditure account for the year ended 31st December, 2015.

This was the least attempted question. It required Statement of Affairs, Subscriptions Account and Income and Expenditure Account. Majority of candidates did not attempt it because they might not have been covered the topic in class before the examination. They had no idea about the topic or did not well understand the question. Again ‘incomplete records and single entry’ as a topic is largely not interesting to most students because one needed to understand the principles of double entry to a large extent in order to be comfortable with the topic.

Question 7

The following balances were extracted from the books of Ogba Enterprise on December 31, 2014

<i>Capital</i>	<i>315,200</i>
<i>Purchases</i>	<i>259,800</i>
<i>Sales</i>	<i>484,700</i>
<i>Carriage inwards</i>	<i>17,410</i>
<i>Premises at cost</i>	<i>215,000</i>
<i>Equipment at cost</i>	<i>198,000</i>
<i>Trade debtors</i>	<i>76,800</i>
<i>Bank overdraft</i>	<i>63,509</i>
<i>Trade creditors</i>	<i>64,820</i>
<i>Cash in hand</i>	<i>13,400</i>
<i>Stock (January 1, 2004)</i>	<i>27,680</i>
<i>Salaries and wages</i>	<i>56,700</i>
<i>Provision for doubtful debts</i>	<i>13,000</i>
<i>Discount allowed</i>	<i>11,450</i>
<i>Drawings</i>	<i>70,000</i>
<i>Discount received</i>	<i>22,800</i>
<i>Electricity</i>	<i>29,229</i>
<i>General expenses</i>	<i>37,060</i>
<i>Rent</i>	<i>43,000</i>
<i>9% Debentures</i>	<i>100,000</i>
<i>Return inwards</i>	<i>24,500</i>
<i>Return outwards</i>	<i>16,000</i>

Additional information:

Stock in trade at December 31, 2014 was ₦29,400;

Provision for doubtful debts to remain at 8% of debtors;

General expenses owing totaled ₦12,860;

Rent prepaid ₦19,500

Depreciation is to be provided as follows;

Premises 12½% on cost

Equipment 10% on cost

You are required to prepare:

Trading profit and loss Account for the year ended December 31, 2014;

Balance sheet as at that date.

This question attracted the attention of about 95% of the candidates. This was so because the question was drawn from a popular topic ‘Final accounts of a Sole trader’ which would have been covered. Out of the ninety five percent of the candidates who attempted this question, 64% showed that they had command over the topic from which the question was drawn. They scored almost the full marks. Some of the candidates scored low marks because they used the vertical method which they were not conversant with and then misapplied some of the items in the ledger.

Question 8

The following information relates to the books of accounts of Adom ltd

<u>TRADING AND PROFIT AND LOSS ACCOUNT FOR THE YEAR ENDED 31ST DECEMBER, 2014</u>			
	<u>GH¢</u>		<u>GH¢</u>
Opening Stock	20,000	Sales	240,000
Add Purchases	<u>160,000</u>		
	180,000		
Less closing stock	<u>36,000</u>		
Cost of goods sold	144,000		
Gross profit c/d	<u>96,000</u>		
	240,000		
	<u>240,000</u>		<u>240,000</u>
		Gross Profit b/d	96,000
Selling and distribution			
Expenses	73,200		
Administrative			
expenses	14,800		
Net Profit	<u>8,000</u>		
	<u>96,000</u>		<u>96,000</u>

<u>Balance sheet as at 31st December 2014</u>				
	<u>GH¢</u>	<u>GH¢</u>	<u>GH¢</u>	<u>GH¢</u>
Share Capital			Fixed assets at cost	125,000
Ordinary shares	100,000		Less Depreciation	<u>25,000</u>
Preference Share	10,000			100,000
General reserve	24,000		<u>Current Assets</u>	
Profit and loss Account	<u>8,000</u>	<u>32,000</u>	Stock	36,000
		142,000	Debtors	39,000
			Cash and	
			Bank	<u>7,000</u>
				<u>82,000</u>
<u>Current Liabilities</u>				
Trade creditors	28,000			
Accruals	<u>12,000</u>	<u>40,000</u>		
		<u>182,000</u>		<u>182,000</u>

You are required to calculate any six of the following:

- Gross profit percentage;
- Net profit percentage;
- Return on capital employed;
- Current ration;
- Acid test ratio;
- Rate of stock turnover;
- Working capital;
- Shareholders fund;
- Liquid assets.

This was among the very least attempted question. The problem could be linked to limited syllabus coverage. About 16% of the candidates did attempt it and very few of them scored very good marks. However, some candidates did not know the formula well so they could not apply it correctly to earn them good marks.

Question 9

The following information was extracted from the books of Dauda Manufacturing Company for the year ended 31st December, 2012.

<i>Stock of goods – 1st January, 2012:</i>	<i>D</i>
<i>Raw materials</i>	8,000
<i>Finished goods</i>	28,000
<i>Work-in-progress</i>	2,000
<i>Purchases of raw materials</i>	40,000
<i>Carriage inwards</i>	1,000
<i>Manufacturing wages</i>	100,000
<i>Sales</i>	390,000
<i>Rent</i>	50,000
<i>Factory expenses</i>	60,000
<i>Royalties</i>	1,500
 <i>Stock of goods – 31st December, 2012:</i>	
<i>Raw materials</i>	6,000
<i>Finished goods</i>	26,000
<i>Work-in-progress</i>	1,500
<i>Depreciation:</i>	
<i>Machinery</i>	7,500
<i>Delivery van</i>	1,280
<i>Selling expenses</i>	3,000
<i>Discount allowed</i>	1,500
<i>Additional information:</i>	
(i) <i>Factory expenses prepaid amounted to D5,000;</i>	
(ii) <i>Selling expenses accrued was D2,500;</i>	
(ii) <i>Rent is apportioned between factory and selling department in the ratio 5.3 respectively.</i>	

You are required to prepare;

Manufacturing Trading and Profit and Loss account for the year ended 31st December, 2012.

This was also a very popular question on Manufacturing, Trading and Profit and Loss Account. Not less than ninety eight 98% of the candidates attempted it. The topic from which the question was drawn usually was mostly covered by many schools. Since the topic was not difficult to understand, majority of the candidates were able to have some knowledge or idea about the topic. Majority scored very good mark. Few performed very poorly.

WASSCE FOR SCHOOL CANDIDATES 2016
CHIEF EXAMINER'S REPORT
PRINCIPLES OF COST ACCOUNTING 2

1. GENERAL COMMENTS

The examination paper comprised two sections: Section A, Theory (ESSAY) of Principles of Cost Accounting (30 Marks), and Section B, Principles of Cost Accounting Practice (45 marks). In Section A, there were four questions, each question carrying 15 marks. Candidates were required to attempt any two questions.

In Section B there were five questions, each question carrying 15 Marks. Candidates were required to answer any three of these five questions. Summary of the number of candidates who sat to the WASSCE (SC) 2016 Principles of Cost Accounting paper 2 in The Gambia was 251. The paper was considered to be fair.

The performance this time around was average. Few candidates scored outstanding marks and demonstrated understanding of basic cost accounting concepts. However, there was also a group of candidates who performed dismally, demonstrating their lack of knowledge of simple Cost Accounting Principles and concepts. I noticed that there was little evidence of time shortage. A small number of candidates answered questions 4, 5 and 9. The performances on these questions were unsatisfactory especially question 5 which was much more appalling for all candidates who attempted it scored zero mark. It is essential that candidates read questions and rubrics carefully before selecting the questions to be answered.

Although the standard of presentation was good for high performing candidates, some candidates still need to take greater care with their presentations in order to improve their marks. Some candidates compressed their answers into one single page, rather than spreading out their answers in a more presentable way. This made things difficult for examiners to read figures and calculations. It is important that candidates number each question carefully. A small number of candidates did not write their answers coherently and consequently, lost marks.

2. CANDIDATES' STRENGTHS

The level of preparedness of candidates was mixed because while others performed extremely well others performed poorly. The strength of most candidates was demonstrated in the preparation of Process Account, preparation of Stock Ledger Card using both weighted average and LIFO and a theory question on cost classification. Candidates who prepared and were ready for the examinations scored more than half of the total marks. Candidates with high understanding of costing principles and effectively completed the syllabus, scored high marks.

3. CANDIDATES' WEAKNESSES

The performance of candidates was average compared to the previous years. A small number of candidates exhibited a high sense of preparedness while most were not well prepared. The most prevalent reasons for some candidates obtaining low marks were the same as the previous highlighted weaknesses for the past years i.e. studying only few selected topics, not reading the questions carefully enough, or lack of structure in the

approach to answering questions. The orderly and logical presentation of answers was below average.

A significant number of candidates did not perform well in the Practice elements of the questions especially questions 5 and 9. Their presentations on these questions were very bad and hence performed woefully. The selection of questions by candidates in this section was quite poor. A few candidates selected questions which were quite involving and left out the simple and straight forward ones. A few candidates attempted only two questions instead of three in section B.

4. **SUGGESTED REMEDIES**

The Chief Examiner suggested the following as remedies:

- Candidates are advised not to take the exams for granted.
- Candidates should ensure that they take steps to complete the syllabus and worked through series of questions before the exams.
- Candidates need to be coached on how to approach examinations.
- Candidates should read and fully understand the questions before attempting them.
- Candidates need to stick to the examination instructions.
- Candidates should be encouraged to prepare properly for the exams and manage their time well.
- Candidates are advised to attempt all the two and three questions required in section A and section B respectively.
- Candidates should know that it is not the aim of any examiner to fail candidates.
- Finally, schools should endeavour to get recommended cost accounting textbooks and stop relying on pamphlets which are mere supplementary materials.

5. **DETAILED COMMENT ON INDIVIDUAL QUESTIONS**

SECTION A

Question 1

- (a) *What is cost classification?*
- (b) *State **three** bases for cost classification.*
- (c) *Outline **five** reasons for cost classification by enterprises.*

COST CLASSIFICATION

Under this question, candidates were asked to explain cost classification, state three bases for cost classification and outline five reasons for cost classifications. More than 90% of candidates attempted this question. The level of understanding of candidates was good.

(a) Many Candidates generally explained the term cost classification well. However, some candidates could not give full explanation. It should be understood that “Cost classification is the process of arranging cost into groups according to their common characteristics or features or similarities”.

(b) Most candidates were able to state bases for cost classification. However, some were engaged in mere repetitions which make them to lose marks.

The major problem of candidates was the C part which asked them to outline five reasons for cost classification by enterprises. The answers provided clearly showed that some of them did not know the reasons for cost classification. Here are some of the requirements of the question:

REASONS FOR COST CLASSIFICATION BY ENTERPRISES:

- To assist in the choice of a suitable method for use in costing products
- To help accumulate cost in an appropriate manner
- To assist in allocation and apportionment of cost into their respective cost centres or units
- To help examine the behaviour of costs for the purpose of decision making.
- In order to know how much it costs to run a particular department or section.
- To assist in establishing realistic prices.
- To assist in controlling cost.
- To assist in profit planning.
- To help measure the efficiency of supervisors.

Question 2

- (a) *State three costs associated with labour turnover.*
- (b) *Describe the two circumstances under which it will be suitable to use each of the following methods of labour remuneration:*
 - (i) *piecework*
 - (ii) *overtime*
 - (iii) *time rate*
 - (iv) *bonus scheme*

Here, most candidates had no understanding of what was involved.

The approach to this question was poor. The question asked candidates to state three costs associated with labour turnover. The B part required candidates to describe the two circumstances under which it will be suitable to use each of the above methods of labour remuneration:

Question 3

- (a) *State five consequences of under-stocking materials by a manufacture.*
- (b) *Describe the following forms of stock:*
 - (i) *raw materials;*
 - (ii) *consumables;*
 - (iii) *component parts;*
 - (iv) *work-in-progress;*
 - (v) *finished goods.*

Almost all the candidates attempted this question. The approach to the question was above average. Most candidates were able to explain consequences of under-stocking materials by a manufacturer. The approach to the B part of the question was good although most candidates were unable to describe consumables and component parts of stock.

Question 4

- (a) Explain the following:
- (i) Budget committee;
 - (ii) Budget manual;
 - (iii) Budget centre
- (b) State **six** duties of a budget officer.

This question was not popular among the candidates. Although, the overall performance on part (a) of the question was good, but there were some candidates who could not answer part (b) of the question well. It should be noted that there are various duties of a budget officer candidates could state. But some candidates were merely repeating themselves on items they can remember. The duties of a budget officer are as follows:

- Issuing instructions to various departments.
- Receiving and checking budget estimates.
- Prepares a timetable for the preparation of the budget.
- Providing information on department managers to help them in their forecasting.
- Suggesting possible revision of estimates.
- Discussing challenges with managers.
- Making follow ups to ensure that managers prepare budgets on time.
- Submitting the budget to the budget committee and giving explanations on particular points.
- Preparing budget summaries.
- Coordinating all the budget work.
- Monitors the performance of the budget

Question 5

Two Guys Limited prepared the following budgets for the next six months based on projected outputs of 1000 units and 2000 units respectively.

	1,000 units	2,000 units
	Le	Le
Direct materials	25,000	50,000
Direct labour	60,000	120,000
Production overhead	45,000	60,000
Administration and distribution Overhead	70,000	100,000
Sales revenue	350,000	700,000

The actual production for the six months was 1,600 units, all of which were sold.

You are required to prepare an income statement for the six months based on actual production and sales, showing the contribution and profit for the six months.

Only few of the candidates attempted this question and those who attempted it messed up. They could not prepare an income statement based on actual production and sales as required by the question. Instead they used projected outputs of 1000 units and 2000 units respectively. All the candidates have difficulty solving the question and eventually scored zero mark.

The requirements of the question highlighted below:

TWO GUYS LIMITED

Income Statement for six months

Le Le

Sales Revenue (Le350 x 1,600)	56,000
Direct Materials (Le25 x 1,600)	40,000
Direct Labour (Le60 x 1,600)	96,000
Variable (admin and distribution) overhead (Le30 x 1,600)	48,000
Variable Production Overheads (Le15 x 1,600)	24,000
	<u>208,000</u>

CONTRIBUTION 352,000

Less Fixed Overheads:

Production 30,000

Admin and Distribution 40,000

70,000

282,000

Question 6

Afolabi and Sons produces one standard product called. Osah.

The following standards have been given:

	₦
Materials: 25 kgs @ ₦60	1,500
Labour: 18 hours @ ₦50	900
	<u>2,400</u>

For the first quarter of the year 2015, 1,500 units were produced.

A total of 39,500 kg of material were bought at a total cost of ₦2,449,000.

A total of ₦1,273,700 was paid as wages for 27,100 labour hours used in the period.

Materials issued to production was 37000 kg.

You are required to calculate:

- (a) *Material price Variance;*
- (b) *Material Usage Variance;*
- (c) *Material Cost Variance;*
- (d) *Labour Rate Variance;*
- (e) *Labour Efficiency Variance.*

The candidates had little difficulty in working variances. However, some candidates had interchanged the workings of Material Price Variance and Material Usage Variance. It is worth mentioning that candidates need to recall the formulae which attract some marks. The following points were tested:

$$\text{Material Price Variance} = \text{Actual Quantity (Standard Price – Actual Price)} \text{ ₦}60(37,500 - 37,000) = \text{₦}74,000(\text{A})$$

$$\text{Material Usage Variance} = \text{Standard Price (Standard Quantity – Actual Quantity)} \\ \text{₦}37,000(60-62) = \text{₦}30,000(\text{F})$$

$$\text{Material Cost Variance} = \text{Material Price Variance} + \text{Material Usage Variance} \text{ ₦}74,000(\text{A}) + \text{₦}30,000(\text{F}) = \text{₦}44,000(\text{A})$$

$$\text{Labour Rate Variance} = \text{Actual Hours (Standard Rate – Actual Rate)} \text{ ₦}27,000(50-47) = \text{₦}81,300(\text{F})$$

$$\text{Labour Efficiency Variance} = \text{Standard Rate (Standard Hours – Actual Hours)} \text{ ₦}50(27,000 - 27,100) = \text{₦}5,000(\text{A})$$

Question 7

Edzofu Ltd manufactures a product which passes through three processes before completion. The following data was extracted from the books of the company for the year ended 31st December, 2014.

	Process A	Process B	Process C
<i>Material cost (GH¢)</i>	15,000	12,000	8,000
<i>Labour cost (GH¢)</i>	20,000	15,000	10,000
<i>Direct expenses (GH¢)</i>	5,000	3,000	2,000
<i>Factory input (units)</i>	1,000	-	-

Total factory overhead for the period which was GH¢ 24,000 was apportioned on the basis of direct expenses. There was normal loss of 200 units with scrap value of GH¢ 10.00 per unit in process B and a further normal loss of 100 units of no scrap value in process C.

You are required to prepare accounts for Process A, Process B and Process C.

This is a very popular question. Most candidates did well. However, marks were lost in a rather careless way by some candidates. The approach to the question was good as some candidates scored the maximum marks.

Question 8

Onuku Limited has decided to adopt a new method of pricing stock issues that will reduce fluctuations in profit due to price changes.

Transactions for February 2015 were as follows:

<i>1st February,</i>	<i>Balance 4,500 units for D54,000</i>
<i>3rd February,</i>	<i>Purchases 5,500 units @ D14</i>
<i>5th February,</i>	<i>Sales 3,000 units @ D20</i>
<i>6th February,</i>	<i>Sales 2,000 units @ D22</i>
<i>12th February</i>	<i>Purchases 5,000 units @ D15</i>

You are required to prepare:

- (a) A stock ledger card using.*
 - (i) Weighted average;*
 - (ii) Last in first out.*
- (b) A profit statement using the two methods above.*

Almost all the candidates attempted this question. The approach to the question was satisfactory. Some candidates lose marks for quoting wrong weighted average price.

Question 9

The following transactions relate to the stores of Kunka Ltd for June, 2014.

	<i>GH¢</i>
<i>June</i>	
<i>1. Total value of items in store</i>	<i>50,000</i>
<i>3. Direct materials bought on credit.</i>	<i>120,000</i>
<i>5. Direct materials issued to production.</i>	<i>110,000</i>
<i>6. Direct materials returned to suppliers.</i>	<i>3,000</i>
<i>10. Direct materials bought in cash</i>	<i>8,000</i>
<i>18. Indirect materials issued to production</i>	<i>25,000</i>
<i>20. Direct materials returned to store by production department</i>	<i>4,000</i>
<i>25. Indirect materials returned to store by production department</i>	<i>3,500</i>
<i>30. Value of stock of materials written off.</i>	<i>1,000</i>

You are required to prepare:

- (a) Stores Ledger Control Account;*
- (b) Work-In-Progress Control Account;*
- (c) Cost Ledger Control Account;*
- (d) Production Overhead Control Account;*
- (e) Material stock adjustment Account;*
- (f) Costing Profit and Loss Account (Extract).*

The performance of the candidates is barely unsatisfactory. Most of them did not know how to handle the question and as a result performed poorly. The requirements of the question highlighted above:

HOME SCIENCE SECTION

**WASSCE FOR SCHOOL CANDIDATES 2016
RÉSUMÉ OF CHIEF EXAMINERS' REPORTS
THE HOME SCIENCES**

1. STANDARD OF THE PAPERS

The standard of the papers as reported by all Chief Examiners was fair and was within the syllabus and scope of the candidates.

2. CANDIDATES' PERFORMANCE

All the Chief Examiner reported that candidates' performance was not satisfactory. For example the Chief Examiner for Clothing and Textiles 2 cited that candidates were unable to illustrate using diagrams.

3. CANDIDATES' STRENGTHS

The Chief Examiners for Foods and Nutrition 2 did not say much on candidates' strengths. However, the Chief Examiners for Clothing and Textiles cited some strong points such as:

- Candidates were able to sew with their hands where there was a problem with the sewing machine.
- Candidates were able to do the open seam.
- Candidates were able to attach the facing.

4. CANDIDATES' WEAKNESSES

Candidates' weaknesses were stated as follows:

- Candidates did not follow the instructions on the question papers.
- Incorrect table setting.
- Use of wrong cooking equipment.
- Use of wrong terminology.
- Candidates misunderstood terms.

5. SUGGESTED REMEDIES

Below are some of the recommendations stated by the Chief Examiner:

- Candidates should have access to the Chief Examiners' reports.
- Candidates should be offered adequate guidance and counseling in Home Science
- There should be in-service training courses for Home Science teachers annually.
- There should be complete syllabus coverage.

WASSCE FOR SCHOOL CANDIDATES 2016
CHIEF EXAMINERS' REPORT
CLOTHING & TEXTILES 2

1. GENERAL COMMENTS

The Clothing and Textiles paper 2 was fair. The standard of the paper was good. Despite that the candidate's performance was very unsatisfactory. The candidate's performance this year was below average.

2. CANDIDATES' STRENGTHS

Candidates' strengths were stated as follows:

- Candidates were able to attempt four questions out of the six.
- Candidates were able to tabulate where necessary.

3. CANDIDATES' WEAKNESSES

Candidates' weaknesses were stated as follows:

- The use of a conjunction in differentiating.
- Candidates were unable to illustrate using diagrams.
- Poor construction of sentences.
- Poor spelling mistakes.
- The use of wrong terminology.

4. SUGGESTED REMEDIES

Below are some of the recommendations stated by the Chief Examiner:

- There is a need for in-service training workshops for Clothing and Textiles teachers.
- Heads of schools should encourage students by providing the basic materials needed for course work.
- Teachers should have access to the Chief Examiners' report.
- Proper Clothing and Textile rooms should be provided for schools.

5. DETAILED COMMENTS ON INDIVIDUAL QUESTIONS

Question 1

(a) *Explain the following terms as used in clothing and textiles:*

- (i) *fibres*
- (ii) *yarns*
- (iii) *spun yarns*
- (iv) *continuous filament yarns.*

(b) *Mention **four** ways fibres can be identified.*

(c) *Identify **four** fabrics which need special care while cutting out.*

(d) *State **three** points to bear in mind when caring for silk.*

This question attracted 50 % of the candidates and less than 20 % of them could score marks ranging from 6 - 15.

In the (a) part less than 1% of the candidates could explain the following terms as used in clothing and textiles.

- Fibres
- Yarns
- Spun yarns
- Continuous filament yarns.

The answer should have read:

- Fibres
- Basic materials used to make yarns

Or

- Flexible tiny hair-like structure used to produce yarns for fabrics.
- Yarns : long textiles strands made up of staple fibres or filaments.
- Spun yarns: they are made up of short staple fibres which are spun/ twisted together after being drawn out and combed.
- Continuous filament yarns: they are made up of one or several long fibres which are twisted together.

The (b) part was poorly done by 80% of the candidates. The question was misinterpreted by most of the candidates. The answer should have read:-

- Visual inspection/ sight, appearance/ observation.
- Feel/ touch/ texture/ hand
- Microscopic examination
- Burning/ flame test
- Strength / tensile test
- Chemical / solubility test.

In the (c) part, 99 % of the candidates had it wrong, they couldn't understand the question and wrote the different types of fabrics such as nylon, rayon, cotton, silk.

The answer should have read: -

- Napped fabric
- Stony fabrics
- Large motif designs
- Slippery fabrics
- Stretch fabrics
- Fabrics with up and down designs
- Checks

The (d) part was satisfactorily done by 60 % of the candidates. The following points were raised:

- Do not soak in water
- Read and follow instructions on the care label
- Dry in a shady place
- Wash by kneading and squeezing
- Do not boil.
- Use warm iron
- Iron when partly dry.

Question 2

- (a) (i) List **six** classes of tools and equipment used for clothing construction based on their functions.
(ii) Give **two** examples each of the classes listed in 2(a) (i) above.
- (b) Mention **four** types of needle and state the function of each.

This was one of the most popular questions. 90% of the candidates attempted it and were able to score marks ranging from 4- 12.

The six classes of tool were correctly named as follows:

- Pressing - e.g. iron, ironing board, pressing cloth, pressing pad, seam roll
- Sewing - e.g. machine, needle, thread, pins. Pin cushion, thimble.
- Fitting - e.g. full length mirror, dummy/ dress form, pins.
- Measuring - e.g. tape measure, metric rule, ruler, French curve, T- square, compass, protractor
- Storing - e.g. wardrobe, cupboard, box, bag, drawers, hangers.
- Cutting - e.g. scissors, shears, table, stiletto, seam ripper.
- Marking - e.g. pencil, tracing wheel, dressmakers carbon, thread, tailors chalk.
- Drafting - e.g. French curve, metre rule, tracing wheel, brown paper, compass, protractor, T square.

In the (b) part, 60% of the candidates were able to mention the four types of needles but most of them could not state their functions.

The answer should have read:

- Sharps: all purpose needle used for plain hand sewing.
- Betweens :used for fine detailed hand sewing
- Crewel: used for hand embroidery
- Darners : used for mending holes in heavy fabrics
- Beading: used for threading beads
- Machine needle: attached to the machine for stitching.
- Tapestry: used for working tapestry and needle point projects
- Ballpoint: used for sewing knitted fabrics
- Upholstery: used for sewing upholstery and furniture.

Question 3

- (a) (i) Define fastenings
(ii) List **eight** examples of fastenings
- (b) State the **two** functions of fastenings.
- (c) (i) list the **three** methods of applying a conventional zipper.
(ii) Explain any **two** of the methods in 3© above.

This question attracted 90% of the candidates.

60% of them did not do well in it. Candidates did not use the word sewing notion to define fastenings. Words such as equipment, materials, items were used to describe.

The definition of Fastenings should have read: sewing notions which are attached to garments/ articles to secure/ close openings.

In the (ii) part, most of the candidates were able to give examples of fastenings as, zip fasteners, buttons and loops. Buttons and button holes, Velcro, ribbons, hooks and eye, press studs, rouleau loops.

The (c) part of the question was not properly treated by most candidates. None of the candidates had the explanation correct.

The answer should have read:

Methods of applying a conventional zipper:

- Centered/ semi concealed zipper application – it has the zipper in the centre of the seam with one row of stitching along each side. Equal widths of fabric cover the zipper teeth or coil on either side. It can be used in side seams, centre front and back seam.
- Lapped/concealed zipper application:- this is where the zip cannot be seen at all but one row of stitching shows down one side and across the bottom.
- Fly- front/ fly- flap zipper application: this has one placket or a lap of fabric covering the zipper which is wider than the one in the lapped zipper application. Only one row of stitching shows on the outside.
- Invisible zipper application: no stitching shows at all on the right side and zip is invisible when closed.

Question 4

(a) *Explain five characteristics of nylon which make it a good choice for making drying lines.*

(b) *State five points to bear in mind when constructing nylon garment.*

40% of the candidates attempted this question and it was poorly answered.

The (a) part was not properly answered by 50% of the candidates. The answer should have read;

Characteristics	Explanation.
- Strength	extremely strong
- Resiliency	will return to its original length after stretching
- Absorbency	does not absorb moisture easily
- Shrinkage	does not shrink
- Flammable	does not burn easily
- Abrasion resistance	it does not wear off easily. It is durable

In the (b) part, none of the candidates were able to score any mark. They could not state the points to bear in mind when constructing nylon garments.

The answer should have read:

- Trimmings, linings, and interfacing should be washable
- Non shrink trimmings should be used on nylon garments
- Materials including thread should be compatible with fabric strength, colour.
- Sharp scissors should be used for cutting
- Do not leave allowance for shrinkage
- Do not tear fabric
- Leave enough allowance to allow fraying
- Never leave raw edge, use French seam
- Use shorter than average stitch length.

Question 5

- (a) *Show how to lengthen a blouse pattern using four diagrams.*
- (b) (i) *What is clothing accessory?*
(ii) *Name **four** clothing accessories for a school child attending an interview.*
- (c) *List **six** items that can be found in a teenager's wardrobe.*

The question was attempted by 80% of the candidates and the (b) and (c) part was satisfactorily answered. The (a) part which reads show how to lengthen a blouse pattern using for diagram was poorly done. Candidates couldn't illustrate and even those who did, made poor diagrams.

In the (b) part, (i) the answer should have read: clothing accessory is an item worn on the body in addition to the person's garment in order to improve one's appearance.

(ii) should read:

- Bags
- Ties
- Belt
- Small earrings
- Socks
- Shoes
- Wrist watch.

Question 6

- (a) *Explain the following terms:*
 - (i) *entrepreneur*
 - (ii) *entrepreneurship*
 - (iii) *enterprise.*
- (b) *State **two** advantages and **two** disadvantages of being an entrepreneur.*
- (c) (i) *State **two** points to consider when setting up a clothing and textiles enterprise*
(ii) *State **three** factors that promote the success of a clothing and textiles enterprise.*

This question was amongst the most popular question. 90% of the candidates attempted it but unfortunately less than 10% of them could answer it properly.

In the (a) part 90% of the candidates could not define:

- (i) Entrepreneur – a person who sets up and manages a business.
- (ii) Entrepreneurship- a process of establishing and managing a business.
- (iii) Enterprise – a business set up in a specific area of work which is run privately.

In the (b) part, 60% of the candidates were able to state the advantages of being an entrepreneur. The (c) part of the question was poorly answered.

The c(i) should have read the points to consider when setting up a clothing and textile enterprise as follows:

- Capital
- Location of enterprise
- Knowledge and skills in clothing and textiles
- Positive attitude to work
- Interest
- Infrastructure and equipment
- Knowledge of where to get raw materials

WASSCE FOR SCHOOL CANDIDATE 2016
CHIEF EXAMINERS' REPORT
CLOTHING AND TEXTILES 3

PRACTICAL

1. GENERAL COMMENTS

The Clothing and Textiles practical paper was fair. The standard of the paper was good and the instructions were easy and straight forward. It is observed that the number of candidates for clothing and textiles has improved slightly and I hope to see more of that in the future.

The following six pattern pieces were provided and candidates were expected to cut out and make a girl's night gown.

- | | | |
|---|---|------------------|
| A | - | Front night gown |
| B | - | Back night gown |
| C | - | Front facing |
| D | - | Back facing |
| E | - | Straps |
| F | - | Motif |

Laying Out And Cutting Out Of Pattern Pieces:

- In the laying and cutting out of the pattern pieces, only 15% of the candidates did not lay and cut out the pattern pieces correctly. Few of them were unable to separate the pattern pieces despite the clear instructions. Blunt scissors were used in some cases and 25% of them could not handle the scissors correctly. The wrong type of scissors was used; it was either too small or too big to be handled. 60% of the candidates find it difficult to transfer the pattern markings on the pattern to the fabric. The pattern markings were wrongly interpreted by few candidates. The place on fold symbol was not followed by 20% of the candidates and as a result of that the pattern pieces were wrongly cut.
- It is a concern that none of the candidates used the correct dress maker's carbon. Ordinary typing carbon paper was used which was wrong. Schools can improvise by using plain A4 papers and crayons. Candidates spent too much time in the laying out and cutting out of the pattern pieces. 60% of the candidates made use of the sewing machine and iron.

Making Up

- In the (a) part which reads: Embroider the motif on the front night gown using not more than three different stitches. 80% of the candidates cut out a separate piece of cloth and transferred the motif which should have been transferred on the front of the gown. 50% were not able to do the embroidery because of time.
- In the (b) part, 60% of the candidates were able to join the sides of the gown using French seam and 40% of the candidates used the wrong type of seam which is open seam.
- In the (c and d) part which reads stitch and turn out straps and place straps in position and tack, 90% of the candidates were able to do the process and attached the straps and only a few did not do anything with the strap.

- The (e) which reads: join sides of facing using open seam and neaten the lower edge. 60% of the candidates were able to join the sides using open seam but 30% of them did not neaten the seam. In the (e) part which reads, attach band to waist of skirt, 80% of the candidates scored low marks in this section. The attaching of the band was not properly done by most of the candidates.
- The (f) part which reads: attach facing to the night gown, 90% of the candidates were able to attach the facing correctly.
- In the (g and h) which reads, attach bias binding to the lower edge of night gown and finish the binding with a suitable stitch (10 cm long), only 40% of the candidates were able to attach the bias binding using a suitable stitch. 60% of the candidates did not use the bias binding and therefore were not able to attach it to the gown.
- The (i) part of the question which reads attach label was done by 99% of the candidates
- Candidate's performance was not very satisfactory. They could have scored high marks if the instructions were read and carefully followed.

2. **CANDIDATES' STRENGTH**

Candidates' strengths were stated as follows:

- Candidates were able to improvise using the needle where there was a problem with the sewing machine.
- Candidates were able to do the open seam.
- Candidates were able to attach the facing

3. **CANDIDATES' WEAKNESSES.**

Candidates' weaknesses were stated as follows:

- Most candidates were unable to finish on time.
- Candidates did not follow the instructions on the question paper.
- Candidates were not able to do French seam.
- French seam was too bulky.
- Open seam was not properly finished.

4. **SUGGESTED REMEDIES**






Below are some of the recommendations stated by the Chief Examiner:

- School administration should encourage the teaching of Clothing and Textiles in schools from grade seven and provide most of the materials needed for their course work.
- There is needed to run in-service training courses for Clothing and Textiles teachers.
- Competent teachers should be appointed to teach the subject.
- Clothing and Textiles rooms should be well equipped.
- School administration should make sure that staff and students read the Chief Examiners' report and take note of the areas of concerns.

5. DETAILED COMMENTS ON INDIVIDUAL QUESTIONS

PATTERN INSTRUCTIONS

PATTERN SYMBOLS

	GRAINLINE
	ADJUSTMENT LINE Indicates where to lengthen or shorten your pattern
	FOLD GRAIN Place on fold of fabric
	SOLID LINE Indicates exact cutting line
	NOTCHES Match up with corresponding numbers

1.5cm is allowed for all seams

Materials provided

- (a) Six pattern pieces for a girl's night gown;
- (b) Fabric: 115 cm × 75 cm poplin or plain cotton polyester;
- (c) Bias binding 80 cm long;
- (d) Sewing thread to match fabric;
- (e) Tacking thread;
- (f) Embroidery thread: 2 different colours;
- (g) Pencil and eraser;
- (h) Tracing wheel and dressmaker's carbon.

Preparation and cutting out

Question 1

You are expected to cut out and make a girl's night gown so that the finished article will look as in Figure 1 and Figure 2 below:



Figure 1



Figure 2

- (a) *Lay out the pattern pieces A, B, C, D and E economically on the fabric, pin and cut out.*
- (b) *Transfer all necessary pattern markings.*
- (c) *Trace out the motif onto the front night gown as shown in **Figure 1**.*

MAKING UP

Question 2

- (a) *Embroider the motif on the front night gown using not more than three different stitches.*
- (b) *Join sides of night gown using French seam.*
- (c) *Stitch and turn out straps.*
- (d) *Place straps in position and tack.*
- (e) *Join sides of facings using open seam and neaten the lower edge.*
- (f) *Attach facing to night gown.*
- (g) *Attach bias binding to the lower edge of night gown.*
- (h) *Finish the binding with a suitable stitch (10cm long).*
- (i) *Attach label.*

WASSCE FOR SCHOOL CANDIDATE 2016
CHIEF EXAMINERS' REPORT
FOODS AND NUTRITION 2

1. GENERAL COMMENTS

This year's Foods and Nutrition 2 paper was a good one. The questions were within the ability of the candidates. The candidates' performance was not very satisfactory although some candidates did well in some questions.

2. CANDIDATES' STRENGTH

Candidates' strengths were stated as follows:

- Candidates were able to follow the instructions and answers four question out of the six
- Candidates were able to differentiate using a table or conjunction.

3. CANDIDATES' WEAKNESSES

Candidates' weaknesses were stated as follows:

- Candidates were not able to define the terms appropriately.
- Spelling mistakes.
- Poor construction of sentences.
- Wrong interpretation of questions.

4. SUGGESTED REMEDIES

Below are some of the recommendations stated by the Chief Examiner:

- Heads of schools should make sure they hire the services of qualified teachers who can teach the subject.
- There is need for in-service training programs for Home Science teachers to enhance their performance in the subjects.
- Teachers should be encouraged to read the chief examiners' report.
- Students should be encouraged to use the internet to search for foods and nutrition related ideas.
- Teachers should make sure they prepare the students well and cover all topics in the syllabus.

5. DETAILED COMMENTS ON INDIVIDUAL QUESTIONS.

Question 1

- (a) *Define the term entertainment*
- (b) *List **four** types of entertainment.*
- (c) *Explain **three** factors that contribute to the success of parties.*

The question attracted 60% of the candidates. 80% of the Candidates scored low marks in the (a) part because they could not give the definition of entertainment. 70% of the candidates could only write about the use of music and drums as entertainment. The answer should have read, a way an individual, host/ hostess expresses hospitality to guests making them feel welcomed and appreciated.

In the (b) part, 50% of the candidates only concentrated on parties (birthdays, naming, weddings, funeral and graduation) as type of entertainment and were only able to score ½ mark. Other forms of entertainments are – sports, dancing, singing, festivals, and carnivals.

In the (c) part which 90% of the candidates could not answer should read:

- Planning
- Effective ordering of activities
- Available space
- Available money
- Invitation
- Appropriate music.

About 80% used all or most of the points in a single sentence and as a result, they were only able to score (2) marks, e.g. Planning – one should consider the type of party, money to be spent, age of invited guests, food to be prepared, money available, place, invitations to be sent out on time and the music to be played.

Question 2

- (a) State **four** uses of eggs in cookery
- (b) In sequential order, describe how to test for freshness of an egg using the brine method.

This was one of the most popular questions. 98% of the candidates attempted it and did fairly well and were able to score marks ranging from 4 - 10.

In the (a) part, candidates were able to state the uses of eggs as:

- As an emulsifier
- As a glazing agent
- For coating food
- As a main dish
- As a thickening agent
- As a binding agent
- As a raising agent
- As an appetizer
- For garnishing/ decorating
- To improve the nutritive value of food /enricher

In the (b) part, only 20% of the candidates know what brine solution is? Brine solution is a solution of salt. The quantity of the salt or the water was not mentioned by 99% of the candidates.

The answer should have read:

- Dissolve 2 tablespoon of salt in 500 ml water in a jug or bowl.
- Put the egg in the solution
- If the egg sinks, it is fresh.
- If it floats, it is stale.

Question 3

- (a) Differentiate between re- heating and rechauffe.
- (b) State **three** reasons for reheating left over foods.
- (c) List **two** rechauffe dishes that can be made from the left over of each of the following dishes:
- (i) Bread
 - (ii) Fish
 - (iii) Cake
 - (iv) Rice

This question attracted 90% of the candidates and they were able to score marks ranging from 5-10. 80% were able to differentiate between Reheating and Rechauffe using a table or

conjunction. In the (b) part of the question, 90% of the candidates were able to give reasons for reheating leftover foods as:

- To kill harmful germs
- To cut down cost
- To prevent wastage
- To make it palatable
- To save time
- To make it appetizing
- To make it easily digestible.

In the (c) part, candidates were able to give examples of dishes except for few candidates who could give for bread. 60% of them wrote breadcrumbs as a dish which made it wrong. Bread crumbs is considered as an ingredient and not a dish.

Question 4

(a) Explain **one** effect **each** of the following on short crust pastry:

- (i) too much shortening;
- (ii) too little shortening;
- (iii) too much water;
- (iv) too little water.

(b) State **two** factors to consider when selecting tomatoes for vegetable salad.

This question attracted less than 20 % of the candidates and less than 2% of them could explain the effect of water and shortening on short crust pastry.

The answer should have read:

Too much shortening:

- Causes the gluten strands to weaken
- Makes pastry fragile and crumbly
- Makes the pastry too soft, soggy and difficult to handle.
- Breaks easily after baking.

Too little shortening:

- Pastry becomes tough
- Pastry becomes hard
- Pastry becomes difficult to roll
- Pastry shrinks when baked.

Too much water:

- Makes pastry tough
- Pastry becomes too soft and sticky to handle
- Pastry becomes elastic and difficult to roll.

Too little water:

- Makes the dough dry and crumbly
- Dough becomes difficult to roll
- Pastry becomes hard and heavy.

The (b) part was properly answered by 90% of the candidates.

Question 5

(a) Explain the term budget

(b) State **four** factors to be considered when making a food budget

(c) Give **four** advantages of purchasing foods in bulk.

The question attracted 65% of the candidates and they were able to do well in the (b) and (c) part of the question. In (a) the definition of food budget was not properly treated by most candidates. Instead, shopping list was defined and that made the answer wrong.

The answer should have read: a food budget is a plan showing how money allocated for food should be spent over a period of time.

In the (b) and (c) candidates were able to state the factors to be consider when making food budget as:

- Income of the family
- Taste of family members
- Number of people in the family
- Nutritional needs of family members
- Food in season
- Likes and dislikes
- Shelf life of food.

Question 6

- (a) Give **two** reasons why frozen chicken should be thoroughly thawed before cooking.
- (b) Enumerate **four** points to be considered when buying a dressed chicken.
- (c) What is tripe
- (d) List **four** examples of offal.

This question attracted 40% of the candidates. In the (a) part, reasons why frozen chicken are thawed before cooking was not poorly answered. The meaning of thawed was not understood by most candidates.

The answer should have read:

- Saves cooking time
- Saves fuel
- Allows the chicken to be thoroughly cooked
- For cutting of the chicken
- For easy penetration of heat to kill the bacteria/ prevent/ contamination prevent food poisoning.
- Allows seasoning to be effective.

In the (b) the answer should have read:

- Plump breast
- Firm flesh
- Size of the chicken
- No slime/ not slimy when touch
- Expiry date/ pull date should be checked before purchase
- Should have no unpleasant odour
- There should not be any trace of feathers
- White skin/ there should be no greenish tinge
- Buy from a hygienic environment.

In the (c) part, the meaning of trip was misinterpreted by 60% of the candidates. The answer should have read. Tripe comprises of the stomach or intestines of animals eaten as food.

**WASSCE FOR SCHOOL CANDIDATE 2016
CHIEF EXAMINERS' REPORT
FOODS AND NUTRITION 3**

PRACTICAL

1. GENERAL COMMENTS

The question was a good one. It was simple and straight forward. The candidates were able to make use of the available beans dishes in the Gambia. It is observed that the number of candidates registered this year has also increased reasonably and that is very encouraging. 98% of the candidates chose the right type of dishes for the (a) and (b) part but had problems with manipulative skills.

2. CANDIDATES' STRENGTHS

Candidates' strengths were stated as follows:

- Candidates were able to choose appropriate bean dishes.
- Some Candidates were able to improvise the cooker with the charcoal pot which was a good move.
- Candidates were able to compote themselves during the practical exam.
- The quantity of food served was appropriate for the question.
- 60% of the candidates were able to serve drinks to go with the snacks.

3. CANDIDATES' WEAKNESSES

Candidates' weaknesses were stated as follows

- Use of wrong serving plates
- Use of wrong cooking utensils/equipment
- Incorrect table setting.
- Beans were not soaking and cleaned at home.

4. SUGGESTED REMEDIES

Below are some of the recommendations stated by the Chief Examiner:

- The Foods and Nutrition practical should be done before the theory exams to avoid rushing into the practical exam.
- Foods and Nutrition teachers should make sure that candidates are exposed to practical lessons.
- It should be a requirement that all labs should have a fire extinguisher.
- Re-inspection all food labs in the schools and encourage school heads to have a proper food lab with the facilities needed.
- Qualified Foods and Nutrition teachers should be appointed by school authorities.
- Candidates and teachers should be encouraged to read the Chief Examiner's report so that some of the mistakes can be avoided.
- There should be in-service training courses for Home Science teachers annually.

5. **DETAILED COMMENTS ON INDIVIDUAL QUESTIONS.**

Question 1

- (a) *Using beans as the main ingredient, prepare, cook and serve a suitable dish for*
(i) *Snack*
(ii) *Lunch*

Dishes such as beans stew, oleleh, moimoi, akara, beans cake, beans porridge, rice and beans, beans croquettes, beans ebbeh 90% of the candidates could clean the beans at home and only 10% of the candidates cleaned it during the practical making them a bit slow, and so they were not able to finish on time.

- (b) *Prepare and serve a suitable accompaniment and a dessert for the lunch dish.*
(c) *Set the table for lunch.*

Suitable accompaniments such as cassava, rice, bread, fufu, vegetables were served. It is also noted that most schools do not have a proper foods and nutrition lab. Some schools are still using firewood to cook, making it very inconvenient. 90% of the candidates were able to interpret the questions. Candidates were able to make suitable desserts, like fruit salads, custards, puddings etc.

WASSCE FOR SCHOOL CANDIDATE 2016
CHIEF EXAMINERS' REPORT
HOME MANAGEMENT 2

1. GENERAL COMMENTS

The WASSCE for school candidates 2016, Home Management 2 theory examination test questions were derived from themes and topics within the Home Management syllabus of the Senior Secondary course programme of grade 10 to 12. It has also been internationally moderated, coordinated to the required standard and examinations conducted at selected centers accordingly.

Candidates were assessed on 5 questions only of their choice from the 6 questions given.

2. CANDIDATES' STRENGTHS

Candidates' strengths were stated as follows:

- Candidates were able to explain some of the terms.
- Most of the candidates attempt five questions.
- The number of candidates that offered the subject had increased at most centres.

3. CANDIDATES' WEAKNESSES

Candidates' weaknesses were stated as follows:

- Some candidates selected questions, but never attempted to write the answers.
- Incorrect numbering of answers to the questions selected.
- Manifested incomplete coverage of course program in the syllabus.
- About 20% of the candidates demonstrated a beginner's knowledge in the subject
- Misunderstood terms manifested in the candidates responses to some questions.
- The candidates did not understand the instructions.
- Most candidates did not understand the key terms in questions like explanations where examples should be included, stating in a sentence, listing by itemizing answers, etc.

4. SUGGESTED REMEDIES

Below are some of the recommendations stated by the Chief Examiner:

- Candidates should have access to the annual Chief Examiners' report on Home Management to acquaint them with some of the observations made.
- Teachers should also make effective use of both the Home Management teaching and examination syllabus.
- Candidates should be offered adequate guidance and counselling in the Home Management subject.
- Schools should effectively conduct internal assessment of Home Management teachers in both content and pedagogy.
- Home Management teachers should treat all topics on their scheme/syllabus at all levels and also assess candidates on all topics covered to measure their competency level.
- Home Management teachers should regularly include the practical demonstration of processes to enhance better understanding of concepts.
- Schools should provide motivational measures to assist candidates' mastery of the subject.

- Subject teachers should be dedicated and committed to their work to fulfill the obligations they owe the candidates during their course program. Remedial classes should be arranged to assist those candidates who showed interest in the subject but did not do Home Management at the GABECE level.
- Schools should conduct staff development workshops to build teachers' capacities in the subject, schools should also provide facilities to reinforce and enhance the effective teaching of the subjects in both theory and practice.
- Schools should put in place an internal monitoring system that should monitor the teaching and learning processes in schools and candidates' progress to justify candidates' choice and preparations for the Home Management subject.

5. **DETAILED COMMENTS ON INDIVIDUAL QUESTIONS.**

Question 1

Explain the following

- (a) *Antiperspirants*
- (b) *Cosmetics*
- (c) *Food nutrients*
- (d) *Family value*
- (e) *Sleep*

The above question was popular and chosen by 74% of the candidates. As for the explanation of antiperspirants in (i), the majority of candidates' responses manifested the term antiperspirant as misunderstood word. However, only 50% of the candidates performed satisfactorily in the explanation of the term cosmetics in (ii) as products used to beautify ourselves only and that reduced the marks awarded to them.

The explanation should have been products used to beautify ourselves and the maintenance of our body and hair e.g. body lotions, hair shampoos, lipsticks, nail polishes etc. As for food nutrients in (iii) candidates gave statements like: food nutrients are nutrients found in food which does not explain the term because the word nutrient is already in the stem. The appropriate response should have been as follows:

Food nutrients are chemical substances found in food. They assist in the maintenance of the body, provision of energy and growth and they are protein, fats/oils, carbohydrates, minerals, vitamins and water.

As for sleep in (v) the candidates' responses were very short for the explanation of the term. They just state that sleep is to rest. The explanation should have been sleep is a natural process where the body and mind are put to rest. Every animal (including Man) sleeps and it could be at any time of the day. One sleeps when one is tired, at night or just to relax.

The responses to the explanation of family value was attempted with the statement "the measures of worth of the family" only without further explanation and giving examples and because of that almost 90% of the candidates that chose this question scored only 50% of the allocated scores.

The explanation on sleep also was in a statement like "it is the time when the person lies down to rest." Others supplied irrelevant answers that made no sense or even related to the topic.

Question 2

- (a) State **three** uses of electricity in the home
- (b) List **two** utilities in the home
- (c) State **three** guidelines for the use of electric iron
- (d) State **three** factors to be considered when choosing a house

The above question was a very popular one that 99% of candidates selected and performed satisfactorily in the (a) and (d) sections and scored more than 50% of the allocated marks.

Surprisingly, some candidates performed unsatisfactorily in (b) section. Almost every household interacts with their monthly utility bills for either electricity or water. The performance candidates at almost all centres has manifested beyond all reasonable doubt that the topic on utilities in the home was never treated.

The (c) section was poorly answered by almost 75% of candidates. The guidelines for the use of electric iron were responded as the uses of electric iron.

Question 3

- (a) List **two** classes of toys/ play materials and give two examples of each listed
- (b) Explain **two** ways by which beans can be prepared for a baby during weaning
- (c) State **three** causes of rashes on babies

The above question was not popular at some centres and therefore acquired the least number in terms of selection by candidates - 60% of the candidates those that selected it manifested lack of knowledge to almost all the sections especially in the (a) and (b) sections.

Most candidates did not attempt the (a) section of the question and the few that did gave irrelevant answers like “natural and artificial toys” and “household and non household toys” were stated for the two classes of toys/play materials and examples like – animal and human statue.

In the ' b ' section, where candidates were to explain ways in which beans can be prepared for a baby during weaning, candidates supplied answers like - to fry the beans into akara which is not suitable for a baby.

Babies need bean dishes that are soft, semisolid and easily digestible like bean porridge, pudding, stews etc.

The (c) section was satisfactorily attempted. Most of the answers to the causes of rashes on babies scored the full marks. However, some responses were synonymous in meaning e.g. “frequent urinating without removing the nappy of the baby” and “when the nappy stays in the baby for sometimes.” Others gave irrelevant answers like –“wooden and plastic toys”, donkey cart wheel

Question 4

- (a) List **eight** domestic accidents
- (b) State **six** ways by which domestic accidents can be prevented

A popular question chosen by 60% of the candidates. Their performance was very satisfactory in the 'a' section only. However, the performances on the 'b' parts were weak. Candidates gave irrelevant answers like” you should be careful in order to avoid burning during domestic works like cooking ” instead of specifically determining how to prevent the domestic accident like shock by avoiding to be in contact with electricity when ones hands are wet.

Question 5

- (a) *Explain the term household linen*
- (b) *State **four** ways of caring for household linen*
- (c) *List **four** alternative uses of worn –out bed sheets*
- (d) *State **two** ways of caring for a food cupboard in the home.*

The above question was the least popular and therefore only chosen by 55% of the total candidates. The performance of students in the (a), (b) and (c) was very unsatisfactory. Only 1 candidate explained the term household linen. Instead of explaining household linen as household articles made of cloth and for daily use such as bedding, table cloth, towels, pillow cases etc.

Irrelevant and out of context explanations were given. In the (b) part uses were stated for the care. An example of care could be: to wash after each use. In the (c) section the listing of the alternative use of a worn – out bed sheets was really a misunderstood question for almost all the candidates that chose the above question.

This question was a giveaway item if the candidates have understood the term as most of them used their worn-out bed sheets in the preparation of their GABECE Clothing and textiles renovated article where most of them prepared pillow cases, kitchen towels etc.

The performance of candidates in the (d) section also manifested candidates' weaknesses. One could sense a lot of guessed responses as the statements were incomplete. E.g. clean the cupboard, wash the cupboard, and close the cupboard etc. but why those actions would have completed the statements.

Question 6

- (a) *State four principles of consumer education*
- (b) *Explain the following terms:*
 - (i) *Market*
 - (ii) *Market survey*
 - (iii) *Cost analysis*

The above question was also popular and chose by 86% % of the candidates. Instead of the principles of consumer education in the (a) section, candidates gave the rights of consumers and lost valuable marks and some just copied the questions and supplied no answers.

The performance of candidates in the 'b i' was however satisfactory, although the term market was not fully explained. 80% of the candidates just explained market as "a place where buying and selling takes place". The performance of candidates in the 'b ii & iii' was very unsatisfactory. Market survey and Cost analysis were misunderstood terms for almost all candidates that attempted the above question.

WASSCE FOR SCHOOL CANDIDATE 2016
CHIEF EXAMINERS' REPORT
HOME MANAGEMENT 3

PRACTICAL

1. GENERAL COMMENTS

The WASSCE for School Candidates 2016 Home Management 3 (practical) examination test question was derived from both the theoretical and practical topics within the Home Management syllabus of the Senior Secondary course programme of grade 10 to 12. It has also been internationally moderated, coordinated and conducted at the qualified school centres accordingly.

2. CANDIDATES' STRENGTHS

Candidates' strengths were stated as follows:

- Candidates were punctual.
- Candidates showed interest and determination.
- Candidates followed the instructions.
- Candidates attempted all the questions.

3. CANDIDATES' WEAKNESSES

Candidates' weaknesses were stated as follows:

- Wrong sequence of cleaning activities.
- Lack of practical experience.
- Candidates did not scrub the floor.
- Incomplete choice of dishes.
- Use of wrong equipment for preparation cooking and serving.
- Wrong choice of dishes.

6. SUGGESTED REMEDIES

Below are some of the recommendations:

- The WASSCE for school candidates should make effective use of the annual chief examiners' report on Home Management.
- Teachers should master the subject matter in both theory and practice.
- Teachers should make effective use of both the teaching and examination syllabus.
- Candidates should be offered adequate guidance and counseling in the Home Management subject.
- Candidates should experience internal practical assessment.
- Schools should provide remedial classes as motivational measures to assist candidates master the subject.

4. DETAILED COMMENTS ON INDIVIDUAL QUESTIONS.

Your aged grandmother is coming to stay with you:

- A. *clean her room and make her bed;*
- B. *clean a plain wooden stool for her;*
- C. *launder her cotton bed sheet;*
- D. *prepare and serve a two - course dinner for her.*

Candidates were assessed on all the four activities of the test questions as listed on the above at the selected examination centres only.

A. *Clean her room and make her bed;*

Satisfactory performance of candidates was recorded on the cleaning of the room, following the top to bottom sequence of cleaning the room. However, almost 50% of candidates manifested lack of practical lessons during the thorough cleaning of the room. The sequence of cleaning from top to bottom was not demonstrated by many. Some even cleaned the floor first before cleaning the ceiling and walls. Others, just cleaned from all directions, some even cleaned the floor first and lastly mopped the ceiling.

B. *Clean a plain wooden stool for her;*

All the candidates' inexperience in practical lessons were manifested during the execution of the WASSCE candidates test activities especially the cleaning of the stool. Some just took a cloth and wiped the stool. None of the candidates applied polish.

C. *Launder her cotton bed sheet;*

All the candidates' inexperience in practical lessons was manifested during the execution of the laundry work. Only one or two candidates at every centre applied the correct steps in laundering their bed sheets. Others, instead of steeping as the first step, just washed, rinsed once and dried. Some did the laundry activity very late and therefore their bed sheets could not get dried.

D. *Prepare a suitable two - course dinner for her;*

Candidates' performance on the above activity of the test was unsatisfactory. Practical skills in food preparation were lacking.

No aspect of gradual cleaning and clearing mentioned or demonstrated during the preparation and cooking process in the candidates' order of works / time plans until at the end of the whole exercise.

Only cleared, cleaned and washed at the tail end of the whole preparation and cooking during the whole process of the activities.

E. *Set a table*

All candidates covered their tables with table cloths without thoroughly cleaning the table especially the under section where dust and cobwebs harbored on the surfaces. Inappropriate table cloths, serving utensils and cutleries were used and therefore reduced candidates' marks in presentation.

TECHNICAL/VOCATIONAL SECTION

WASSCE FOR SCHOOL CANDIDATES 2016
RÉSUMÉ OF CHIEF EXAMINERS' REPORTS
THE TECHNICAL/VOCATIONAL

1. STANDARD OF THE PAPERS

The Chief Examiners reported that the papers were of the right standard and compared favourably with those of previous years. They also reported that the questions were balanced and within the scope of the syllabuses.

2. CANDIDATES' PERFORMANCE

The performance of the candidates had improved compared to previous years as reported by Chief Examiners in Technical Drawing 2 & 3, Woodwork 2 & 3, Auto Mechanics 3, Applied Electricity 3, Visual Art 3C and Metalwork 2 & 3. While the performance in Auto Mechanics 2, Applied Electricity 2 and Visual Art 2,3A and 3B declined.

3. CANDIDATES' STRENGTHS

In Technical Drawing, candidates were able to read and draw in orthographic projection. Candidates also had a good knowledge of applying the right conventional symbols on drawings.

In woodwork, candidates were able work within the time frame. The timber for the practical was adequate and 85% of the candidates were able to assemble their work on time.

The ability in selecting the correct tools for the job was reported by the Chief Examiners for Auto Mechanic and Applied Electricity.

The Chief Examiners for Visual Art reported that some candidates drew neatly, wrote legibly and labels were done. Candidates used correct dimensions.

In Metalwork, marking out was well done and most of the measurements were correct and this led to proper practical.

4. CANDIDATES' WEAKNESSES

The chief Examiners observed various weaknesses in candidates' performance. These include:

- Lack of good visualization techniques in the determination of pattern development of a given figure and failure to apply the correct hatching conventions.
- Failure to draw to the correct scale.
- The use of blunt tools and hard wood made it very difficult for candidates to do the work. Sketches were poorly presented and poor paper layout.
- Inability to provide the proper safety gears for the precaution needed in the workshop.
- Candidates also lacked knowledge in all electrical work.
- In ability to construct letters and the inability to design.
- Some candidates found it difficult to file to the required measurement. Labeling and putting the required features was a problem.

5. **SUGGESTED REMEDIES**

These solutions were identified to remedy the poor performance:

- Subject teachers and candidates should work on the following, i.e. drawing to the correct scale coupled with neatness and good quality of line work.
- Coverage of the syllabus must be emphasized and more practical work should be given to the candidates.
- To enhance the teaching of electrical work, candidates should have adequate equipment, tools and use appropriate instrument during the practical exercise.
- Schools should come together and organize training workshops and Art exhibition for their art teachers and candidates.
- More practical lesson for improvement of drawing ability.

WASSCE FOR SCHOOL CANDIDATE 2016
CHIEF EXAMINERS' REPORT
METALWORK 2

1. GENERAL COMMENTS

The metalwork essay type questions consisted of five questions out of which, only four were to be answered. Twelve schools did the examinations with a total of 246 candidates.

The standard of the questions were most appropriate to the level of the grade 12 candidates. The five questions covered a lot of grounds on the syllabus and tested a wide variety of knowledge.

The candidates answered all the five questions. Most of the candidates (about 65%) understood the questions very well but the rest of them had no idea about what the questions were asking for. Another area that candidates found difficult was the area on the properties of metals. Teachers need to concentrate some time on the properties of metals which was an important sector of the Metalwork Syllabus. Marks were also appropriately allocated for the different questions.

2. CANDIDATES' STRENGTHS

About 40% of the candidates were able to make very good drawings. Majority of the candidates demonstrated very well in answering the question.

3. CANDIDATES' WEAKNESSES

Candidates found it difficult to make proper sketches. Labelling of sketches and putting in the required features was a problem.

4. SUGGESTED REMEDIES

These solutions were identified to remedy the poor performance:

- All students doing Metalwork should also do Technical Drawing.
- Students should have special drawing and sketching lessons.
- Emphasis should be put on the importance of all aspects of the syllabus.

5. DETAILED COMMENTS ON INDIVIDUAL QUESTIONS.

Question 1

(a) *State four sources of danger in the workshop.*

(b) *In a tabular form, classify the following metals into ferrous and non-ferrous:*

- (i) *copper;*
- (ii) *zinc;*
- (iii) *wrought iron;*
- (iv) *brass;*
- (v) *aluminum;*
- (vi) *lead;*
- (vii) *carbon steel;*
- (viii) *cast iron.*

(c) *State **one** use **each** of the following:*

- (i) *Lead;*
- (ii) *Wrought iron.*

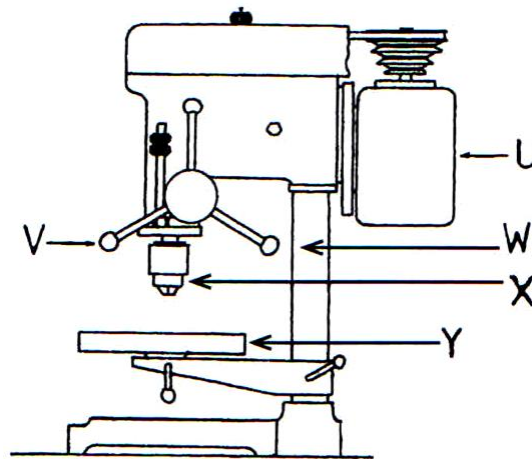
This question was a basic question in which all candidates were able to answer at least one or two sub-questions. Safety precaution is one of the pillars of the Metal workshop. All students should know a lot about workshop safety. The question was very good for the level of the candidates.

Properties of metals should be given priority in the syllabus. Candidates did extremely well (about 58%) in treating this question. Some candidates did not even know what tabulation was all about and teachers should spend more time on questions of this nature.

- (i) This part of the question was very well answered by about 75% of the candidates.
- (ii) Candidates answered this part of the question well. Students should spend more time on the use of materials.

Question 2

- (a) *Explain the following operations:*
 - (i) *Drilling;*
 - (ii) *Grinding.*
- (b) (i) *Identify the machine shown in the sketch below.*



- (ii) *List the parts labeled U, V, W, X and Y.*
- (c) *Make a sketch of curved snips.*
- (a) (i) This was one of the easiest questions in the paper. Any candidate who knew the workshop should be able to answer this question.
- (ii) As mentioned above, the candidates answered this question well.
- (b) Identification of machines and machine parts was very important in the Metal workshop. Candidates did well in treating this part of the questions.
- (c) Sketching as it has always been the case was very important in this subject. Teachers should spend more time in addressing the problem of sketching. About 75% of the candidates understood the question but could not draw or make a sketch of the tool.

Question 3

- (a) State the results of the following operations:
- (i) quenching hot carbon steel in water;
 - (ii) heating mild steel in a box full of carbon.
- (b) Explain why patterns are slightly made oversize.
- (c) List **three** types of fuel used in forging.
- (d) Sketch the following forging tools:
- (i) flatter;
 - (ii) hot set.
- (e) State **one** use **each** of the tools sketched in (d)
- (a) Heat - treatment which is a very important topic in the Metalwork syllabus and needs special treatment. About 65% of the candidates were unable to treat this question properly. Teachers please do not forget to put more emphasis on this topic.

Question 4

- (a) Copy and complete the table below

		Soft soldering	Hard soldering
(i)	Filler metal		
(ii)	Flux used		
(iii)	Source of heat		

- (b) Sketch the following joints in sheet metalwork:
- (i) lap joint;
 - (ii) grooved seam joint.
- (c) State **two** defects in a butt welded joint.

Soldering (soft and hard) is a major topic in metal joining. The composition of soft solder and hard solder should be known by all candidates wishing to write this exam. Fluxes and their uses should also be known by all candidates of this level. Fluxes are very important in soldering as every metal has its own soldering flux. Identification of joins in sheet metal work was important. Most candidates were able to answer this question correctly. Teachers must be congratulated in that.

Question 5

- (a) List **four** types of vice.
- (b) What is casting?
- (c) Describe how the following are used in sand casting:
- (i) Cope;
 - (ii) Drag;
 - (iii) Pattern.
- (a) This was a very simple question. Vices are commonly used in the workshop. About 80% of the candidates answered this question properly.
- (b) "Casting" should be a common topic in the metal workshop. All candidates should be able to identify the tools use and the accessories. About 45% of the candidates answered this topic diligently but other did not. Teachers should spend more time on this topic.
- (c) The accessories used in "sand casting "was the question here and their uses. Candidates were able to answer this question very well.

WASSCE FOR SCHOOL CANDIDATE 2016
CHIEF EXAMINERS' REPORT
METALWORK 3

1. GENERAL COMMENTS

This paper consisted of two practical exercises, out of which, one was to be attempted. One was a fitting exercise and the second, a machining exercise. The machining exercise was not chosen by any candidate in the Gambia. All the candidates (100% of them) went in for the fitting exercise which was to the level of the candidates. The total number of candidates was 246 from 12 schools. The exercise covered all the basic hand tools and their uses. The following operations were also addressed:

(1) Marking-out – Scribing

- Centre Punching
- Use of the Steel Rule
- Hack sawing
- Files and filing (different types)
- Hammers and hammering
- Rivets & riveting
- Drills and drilling machine
- Chiselling (the “V” in Parts A& C and slot in B)

(2) Filing - Different filing operations

The use of all these tools and equipment were a real challenge to all the candidates because it revealed familiarity with their uses. The exercise was good and candidates measured to the challenges but some failed to even understand the question and the drawings.

2. CANDIDATES' STRENGTHS

Most of the candidates about 75% of them did extremely well in the general use of the hand tools.

The marking-out was well done. Most of the measurements were correct and this led to the proper practical.

3. CANDIDATES WEAKNESSES

Some candidates found it difficult to file to the required measurement.

4. SUGGESTIONS REMEDIES

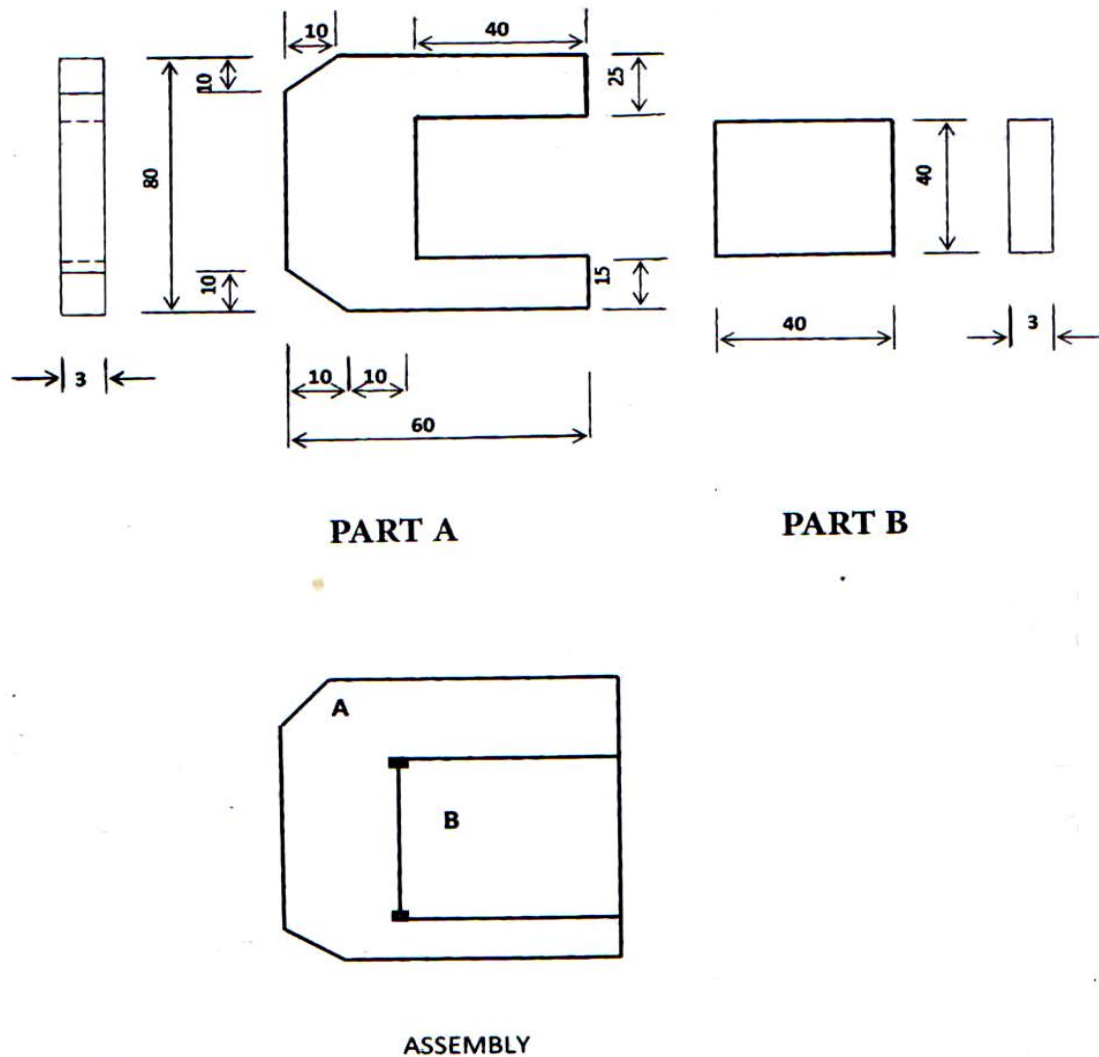
Teachers should concentrate more on mark-out and filing exercise. Teachers should give more attention to accuracy and good finish in the practical work. More practical lesson should be emphasized.

5. DETAILED COMMENTS ON INDIVIDUAL QUESTIONS

Question 1

The following materials are supplied:

- (a) **one** flat mild steel plate, 82 mm x 62 mm x 3 mm;
- (b) **one** flat mild steel plate, 42 mm x 42 mm x 3 mm;
- (c) **one** cotton bag, 100 mm x 80 mm to enclose the finished work;
- (d) **two** tie-on labels.
- (e) The diagram below shows the assemble and detailed views of each part of a fitting exercise. Using the materials supplied, prepare the parts and assemble the pieces.



NOTE

1. Not drawn to scale
2. All dimensions in mm
3. Tolerance ± 0.1

The PART “A” measured 82mm each and the breadth was 62mm and PART “B” measured 42mm in length and 42 mm breadth. Marking-out was one of the most important things in any practical work. If properly done, it would go a long way in helping the candidates to finish the assignment correctly.

Some candidates found it difficult to file to the required measurements but others did extremely well with it. Looking at the work, it seemed that some candidates never did any practical work before much more using the tools. Teachers should put more emphasis in the reading of drawings and the proper use of hand tools.

PARTS A and B

These two parts carried different marks but had the same tasks and challenges. The tools used are the same and required a lot of concentration for accuracy. The chamfer on Part A was also a challenge but candidates did extremely well in tackling the tasks. Some candidates did extremely well in that; half a job well done carried good and equal marks also. For those who understood the diagrams and the dimensioning, they did extremely well.

Marking-out is the most important thing in any practical work as mentioned above. Once that was done properly, then the rest, with a little bit of efforts would be easy. About 80% of the candidates did well with the marking-out. Almost 75% of the candidates did well in the production of parts A & B.

One thing, which was always a challenge to candidates, was the assembly of the two parts.. Parts A and B were also well done by over 65% of the candidates. All the candidates demonstrated the proper use of files but the finishes were not very good at all. Considering the level of the candidates (pre-vocational), I can say that the candidates did well on average but emphasis should be put on more practical work.

WASSCE FOR SCHOOL CANDIDATES 2016
CHIEF EXAMINER'S REPORT
TECHNICAL DRAWING 2

1. GENERAL COMMENTS

The paper was generally of the same standard as compared with those of the previous years. The questions were within the parameters of the syllabus as well as the level of the candidates.

However, the general performance of the candidates for this paper was just average. It was still evident that some schools did not sufficiently cover all aspects of the syllabus and as a result, their candidates were unable to provide good answers for the majority of questions attempted. For improved performance, it is of vital importance for candidates to have good coverage of the prescribed syllabus.

2. CANDIDATES' STRENGTHS

Candidates' strengths were stated as follows:

- Good understanding of orthographic projection drawings.
- Drawing to correct scale.
- Some satisfactory skills in providing drawings with good line work and neatness.

3. CANDIDATES' WEAKNESSES:

Candidates' weaknesses were stated as follows:

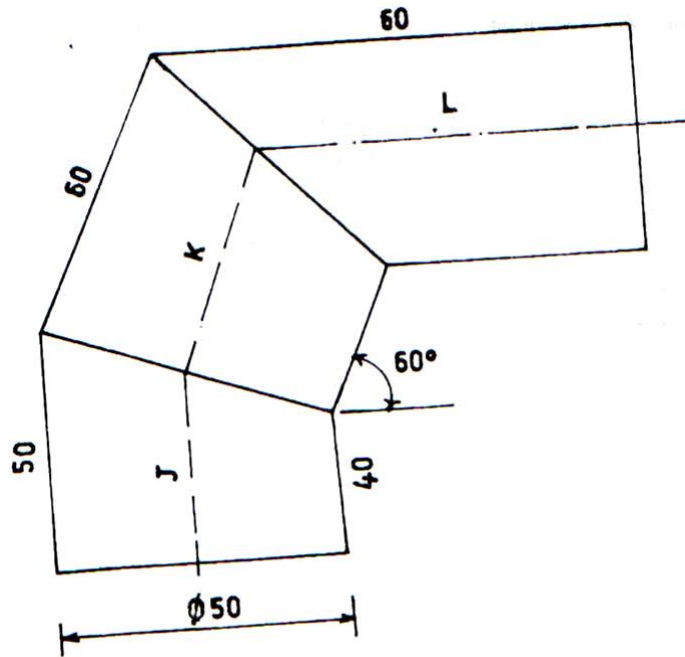
- Lack of good visualization techniques in the determinations of:
 - (a) Pattern development of a given figure.
 - (b) Conversion of orthographic views to isometric views or vise-versa.
 - (c) True lengths, angles of inclination to both the horizontal and vertical planes of lines in space.
- Construction of an ellipse using the foci method and to a tangent at a given point to the ellipse.

4. SUGGESTED REMEDIES

Subject teachers and candidates should work on the following:

- Visualization skills in the determination of geometrical figures.
- Knowledge of constructing tangents and normal to a circle and ellipse.
- Drawing to the correct scale couple with neatness and good quality of line work.
- Knowledge and skills of determining traces, true lengths and angle of inclination of lines in space.

5. **DETAILED COMMENTS ON INDIVIDUAL QUESTIONS.**



Question 1

The figure above shows **three** cylindrical pipes (**J,K,L**) of same diameter **50** and of negligible thickness joined together:

Draw full size, the:

- (a) given view
- (b) development of the pipe **K** using the shorter side as the seam.

This question was on pattern development. It was attempted by almost 90% of the candidates but not more than 30% of the candidates obtained the pass mark in it. However, the weaknesses in the solutions of the majority of candidates include:

- The inability to draw the given view to the correct scale.
- Lack of knowledge of drawing the plan (circle) and dividing it into 12 equal parts.
- Using projection lines for the development of the pipe **K** making the shorter side as the seam is not known.
- Some candidates drew a right cone which gave a wrong perception and thereby no mark was awarded.

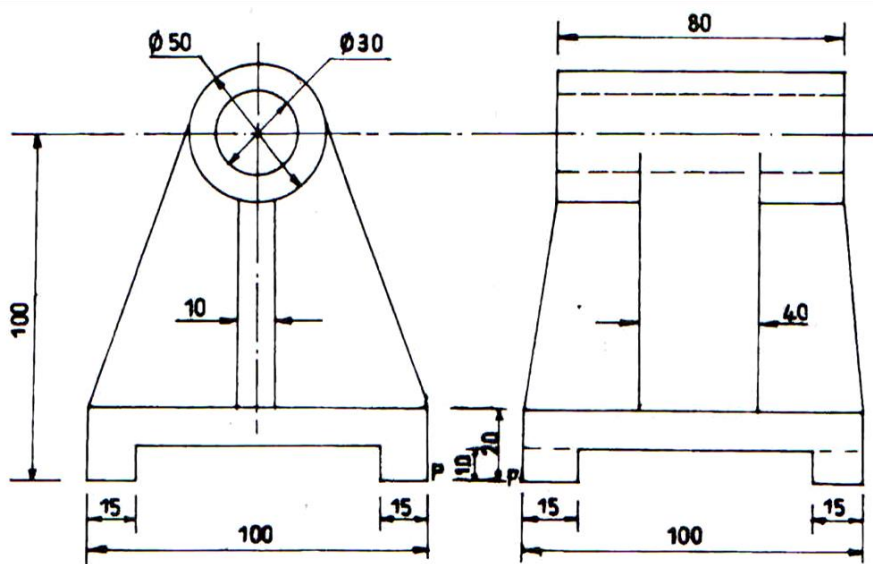
Question 2

An ellipse has a major axis 120 long and its foci are 80 apart.

- (a) (i) Construct the ellipse.
- (ii) Measure and state the length of the minor axis.
- (b) Draw a tangent and normal to the curve at a point **P** above the major axis and 35 to the right of the minor axis.

This question was attempted by the majority of the candidates but not more than 40% of the candidates excelled in it. However, the weaknesses in the solutions of candidates includes:

- Many candidates used wrong scale and the determination of the major and minor axis was a problem.
- Different methods of construction of the ellipse (like the rectangular and concentric circles) were used by candidates instead of the foci method and thereby had problem of locating the focal points.
- Construction of the tangent and normal to the point 'P' on the curve of the ellipse was also a major problem.

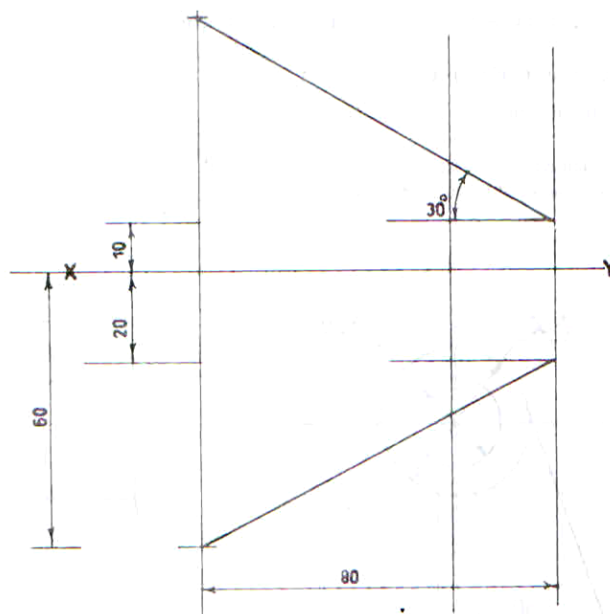


Question 3

The figure above shows a machine component. Draw full size, the isometric view of the component with point **P** as the lowest.

This question is on conversion of orthographic views to isometric view. It was attempted by almost 95% of the candidates. A fairly good number of them scored good marks in it. However, well over 40% of the candidates lost the majority of marks for:

- Presenting their answers as given in the question paper.
- Using different lowest point or drawing in oblique projection.
- Lack of visualization and poor quality line work.



Question 4

Two views of a line are shown above

(a) Draw full size the given view.

(b) Determine the:

(i) horizontal and vertical traces;

(ii) true angles of inclination of the horizontal and vertical planes;

(iii) true length.

This question posed a lot of problem to the candidates. Very few candidates were able to draw the given views of the lines correctly and obtained some marks but could not proceed to determine the horizontal and vertical traces, the true angles of inclination and the true length thus indicating that this part of the syllabus was generally unknown.

WASSCE FOR SCHOOL CANDIDATES 2016
CHIEF EXAMINER'S REPORT
TECHNICAL DRAWING 3

1. GENERAL COMMENTS

The questions set for this paper were of standard and pitched within the span of the syllabus as well as to the level of the candidates.

The general performance of the candidates for Section A of this paper was not quite impressive. The majority of candidates lacked the skills of sketching components in either isometric or three dimensional views and thereby lost most of the mark allocated.

Although, the very few candidates who were well prepared for the paper presented good work and thereby obtained high marks.

Section “b” building was very well attended with high marks scored in it. The very few schools who attempted the Mechanical Drawing also scored some good marks and the attendance to this part of the paper is gradually increasing as compared to previous years.

2. CANDIDATES' STRENGTHS

Candidates' strengths were stated as follows:

- The adoption of good visualization skills in converting given orthographic views to isometric drawing.
- Ability to read and draw in orthographic projections.
- Ability to sketch/ draw in good proportion.
- Good knowledge of applying the right conventional symbols on drawings.

3. CANDIDATES' WEAKNESSES:

Candidates' weaknesses were stated as follows:

- Location of the lowest point of the block was not adhered to.
- Failure to draw to the correct scale.
- Failure to apply the correct hatching conventions.

4. SUGGESTED REMEDIES

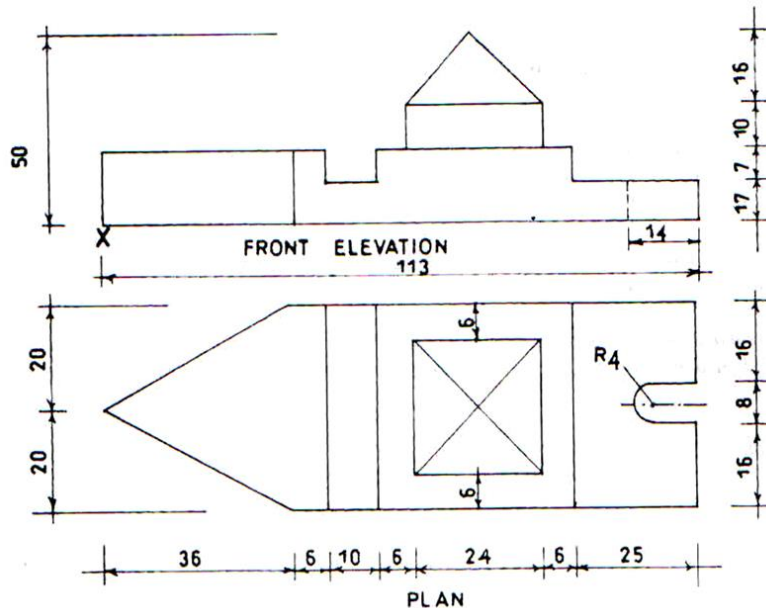
Subject teachers and candidates should work on the following:

- Improve visualization techniques in the sketching of both Building and Mechanical components with emphasis on proportionality are required.
- More knowledge is required on sectioning conventions for both Building and Mechanical drawings.
- Candidates should be made aware of the importance of applying the correct line symbol on drawings.
- Drawing to the correct scale with emphasis on good quality of line work and neatness.

5. DETAILED COMMENTS ON INDIVIDUAL QUESTIONS.

Question 1

The figure below shows two views of a block drawn in first angle orthographic projection. Make a freehand pictorial sketch of the block, making **X** the lowest point.



This question virtually tested the knowledge and skills of converting orthographic views to isometric view. Well over 90% of the candidates attempted it and not more than 40% of them scored good marks.

The weaknesses for this question include:

- Failure to draw the block making point '**P**' the lowest.
- Drawing the block in oblique view instead of isometric.
- Lack of skills in fixing all features of the block in their respective place.
- Copying the given orthographic views.

Question 2

Make a freehand pictorial sketch of a builder's square.

The question tested the skills and knowledge of free hand pictorial sketch of a Builder's square. It was a very unpopular question attempted by not more than 30% of the candidates and the performance was unsatisfactory.

Question 3

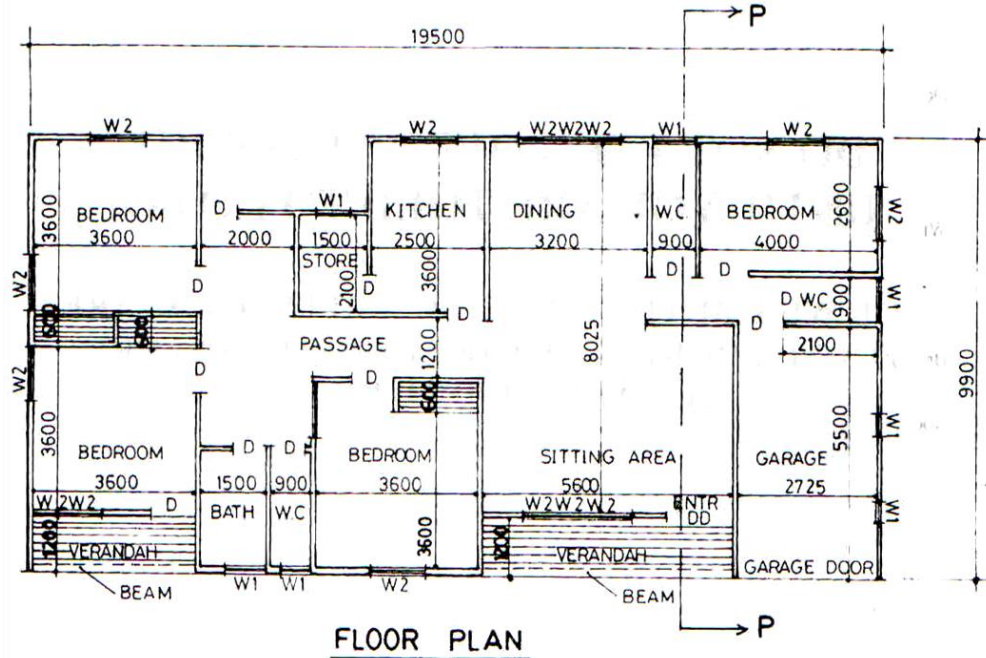
Make a neat freehand pictorial sketch of a junior hacksaw.

This question tested the knowledge and skills of sketching a junior saw in pictorial view. The performance of candidates for this question was fairly good. The weakness in the solution of candidates was that most of the candidates had problem in drawing the saw in pictorial view as well as drawing the actual frame in good proportion.

SECTION B BUILDING DRAWING

Question 4

The figure below shows a sketch plan of a bungalow.
Study the given specifications and answer the questions that follow:



SPECIFICATIONS

FOUNDATION: 675 × 450 laid over 100 cement concrete blinding at a depth of 900 below ground level.

FLOOR: 300 hardcore;
150 concrete slab;
25 mortar screed;
Finished floor to ceiling 3150.

WALL: All walls 225;
Lintel: 225 × 225 reinforced concrete.

DOOR: All doors are flush wooden 1850 × 750 × 40
On 100 × 50 timber frame.
Garage door – roller shutter 2725 × 2100

WINDOWS: All windows are sliding glazed sash in aluminum frames:
W₁ - 600 × 800;
W₂ - 900 × 1200

BEAM: 225 × 225 reinforced concrete and 2400 above floor level.

ROOF 15° double pitch gable with corrugated iron sheet;
Timber rafter – 200 × 52 at 100 centres;
Eaves 600

[Assume suitable dimensions where necessary]

- (a) Draw, to a scale of 1:100, the:
 - (i) Floor plan;
 - (ii) Rear elevation.
- (b) Draw to a scale of 1:50, the section on plane P-P.

FLOOR PLAN: This question tested the knowledge and skills in drawing the plan of a bungalow to the given specifications. This was a popular question attempted by a vast majority of candidates, with over 80% of them obtaining pass marks. Some vital marks were lost by candidates for failing to identify the apartments, to draw the beams, cutting plane PP and for writing floor plan.

REAR ELEVATION: This part of the question examined the knowledge and skills of drawing the rear elevation of a bungalow to the given specifications. The overall performance was fairly good. However, some valuable marks were lost for failing to draw to the correct scale; for not drawing the floor level using hidden lines and writing rear elevation.

SECTION P-P: This question also examined the knowledge and skills of drawing the sectional elevation of the bungalow to the given specifications. This part of the question was also highly attempted by candidates and the general performance was fairly good. Many candidates lost marks for failing to apply the correct conventions on sectioned walls, and doors drawn in elevation. The omission of wall plates, lintels and ceiling boards on drawings has also created the loss of some vital marks.

FRONT ELEVATION: This question examined the knowledge and skills of drawing the front elevation of a machine component in first angle projection. The attendance to this question though low but better than previous years. However, the overall performance was quite good.

STRONG POINTS IN THE SOLUTIONS OF CANDIDATES INCLUDE:

- Ability to draw to the given scale.
- Ability to draw all features of the component in their respective position.
- Adoption of good line work and neatness.

WEAKNESSES IN THE SOLUTIONS OF CANDIDATES INCLUDE:

- Omission of the cutting plane, centre lines and hidden lines on drawings.
- Failing to draw the threaded and countersunk holes at the base of the component.

SECTIONAL PLAN ON Y-Y

This part of the question essentially examined the knowledge and skills in drawing the sectional plan Y-Y in first angle projection. The general performance was fairly good.

STRONG POINTS DEMONSTRATED BY SOME CANDIDATES INCLUDE:

- Knowledge of drawing in first angle projection.
- Ability to draw to the given scale.
- Ability to draw all features of the plan in their respective positions.
- Good knowledge of sectioning convention and line work.

WEAKNESSES IN SOLUTIONS FOR MOST CANDIDATES INCLUDE:

- Lack of knowledge of the hatching conventions.
- Centre lines and the cutting plane -Y are either ignored or drawn wrongly.
- Poor quality of line work and inaccurate placement of features.
- Failing to draw the hidden lines.

SECTIONAL END ELEVATION X-X

This part of the question examined the knowledge and skills of drawing the sectional end elevation of a machine component in first angle projection. The sectional elevation was not so easy to solve by the majority of candidates who opted for the Mechanical drawing. However, the general performance was just fair.

STRONG POINTS IN THE SOLUTIONS OF SOME CANDIDATES INCLUDE:

- Ability to visualization and draw all portions of the elevation in their respective position.
- Ability to draw in first angle projection.
- Good knowledge of sectioning conventions.
- Neatness and good quality of line work.

WEAKNESSES IN THE SOLUTIONS OF THE MAJORITY OF CANDIDATES INCLUDE:

- The use of wrong scale/ measurement.
- The application of poor quality of line work.
- Negligent of using projection lines for correct positioning of view.
- Lack of good understanding of sectioning conventions.
- Poor visualization skill.

WASSCE FOR SCHOOLS CANDIDATES 2016
CHIEF EXAMINER'S REPORT
VISUAL ART 2

1. GENERAL COMMENTS

Generally, the standard of the paper was within the scope of WASSCE syllabus. The questions were clear and consistent. The performance has continued to decline over the years. However, some candidates performed better this year.

2. CANDIDATES' STRENGTHS

Some candidates did commendable works, they obeyed instructions, they had their facts corrects, their writings were legible. They had actually studied for the examination. These contributed to their good performance in the paper.

3. CANDIDATES' WEAKNESSES

Many of the weaknesses observed during the marking exercise, were similar to that of May/June 2015. Examiners reported poor command of the English Language, poor writing skills, unreadable scripts, inadequate preparation, inability to follow instructions on the question papers and answer booklets.

4. SUGGESTED REMEDIES

Candidates should read all subjects. They should stop thinking that visual art is simple. Teachers and students should buy and read visual art textbooks to broaden their knowledge. Also candidates should:

- improve their handwritings skills;
- be adequately prepared for the paper;
- strictly follow instructions during the paper;
- read more reference materials.

5. DETAILED COMMENTS ON INDIVIDUAL QUESTIONS.

Question 1

- (a) *Explain graphic art*
(b) *Write notes on any **three** of the following:*

- (i) *Lithography;*
- (ii) *Serigraphy;*
- (iii) *Illustration;*
- (iv) *Poster.*

Candidates were to explain graphic art. Some candidates explained graphic art as the art work that is shown on a graph paper. Poster was also defined as a person who posts pictures on face book. Some candidates mistook lithography for calligraphy by defining it as the art work of beautiful handwriting. Some described lithography as the act of generating image from light or atmosphere. Some candidates were able to write good answers and they were well rewarded. Surprisingly, the best answers were written by the candidates from a physically challenged school.

Question 2

- (a) Highlight the **major** difference between a museum and art gallery.
- (b) State **five** functions of an art gallery.

It was a popular question; about 70% of the candidates attempted this question. Few of them did not do well. Some defined museum correctly but could not define art gallery. This made it difficult for some candidates to state the five functions of a gallery.

About 80% of the candidates who answered this question were familiar with the two art terms. They had defined them. They had their facts correct. They were also able to state functions of an art gallery.

Question 3

Highlight **five** effects of religion on West Africa art.

Instead of writing on the effects of religion on West Africa art, about 60% of the candidates who answered this question wrote on the effects of religion on West African culture. Some of the candidates could not differentiate between art and culture. Some of the candidates repeated the same point several times.

About 30% of the candidates who attempted this question wrote good points. Some of them scored the maximum points.

Question 4

Write on West African wood carvings under the following headings:

- (i) location;
- (ii) **one** tool;
- (iii) **two** functions;
- (iv) **three** characteristics;
- (v) **two** art forms.

About 60% of the candidates who attempted this question did not know the meaning of art forms. They wrote wood, gold, Benin art, Ife art etc. Also they could not differentiate between materials and tools, wood, clay, ivory were written as tools. Candidates were able to score good marks in other parts of the question. About 90% of the candidates wrote correct answers. They got good marks in the question.

Question 5

Write notes on Ablade Glover focusing on:

- (a) nationality;
- (b) training;;
- (c) area of specialization;
- (d) **four** characteristics of his works;
- (e) **one** of his contributions to the development of art.

This question was not popular among the candidates, less than 5% of the candidates answered this question, and they did not do well. Most of them did a guessed work. A few candidates who answered this question managed to score some marks.

Question 6

- (a) Outline **three** characteristics of Benin art.
- (b) State **three** functions of Benin art.

Candidates were offered the opportunity to express their knowledge about Benin art. It is the art of Nigeria. About 65% of the candidates attempted this question. Some candidates did a guess works. Some wrote the characteristics of other works which they had read.

Benin art is a popular topic. It is available in almost all visual art textbooks of West African art. It may probably be the reason why candidates wrote various correct answers.

Question 7

Write notes on the sculpture of archaic period of Greek art focusing on:

- (a) *subject matter;*
- (b) **four** characteristics.

Many misinterpreted the word archaic to mean prehistoric art. Therefore they based their answers on their knowledge of prehistoric art. Some wrote beautiful notes on Greek architecture. Some candidates wrote the characteristics of Egyptian art.

Some candidates had good knowledge of the topic. They wrote correct answers and they got good marks.

Question 8

Write on the life of Claude Monet with popular reference to:

- (a) *nationality;*
- (b) *area of specialization;*
- (c) *associated art movement;*
- (d) **three** characteristics of his works.

The question was unpopular. Most of the candidates who attempted this question did not know the answers. They chose it to complete their answers. Some wrote that he was an African from Nigeria, Ghana, and Mali etc. Most of them scored zero. Few of the candidates scored maximum marks, while others got marks from some parts of the question.

**WASSCE FOR SCHOOLS CANDIDATES 2016
CHIEF EXAMINER'S REPORT**

VISUAL ART 3A

1. GENERAL COMMENTS

As in previous years, the questions were suitable for the level. The questions were also drawn from the syllabus. However, the performance in drawing was rather poor when compared with last year's paper. There was certainly lack of enough preparation towards the exam. Consequently, candidates failed to apply the necessary requirements in the papers.

2. CANDIDATES' STRENGTHS

Candidates' strengths were stated as follows:

- Some strength was observed in the paper. Some candidates draw neatly.
- Candidates also wrote legibly and labels were done.
- Candidates use correct dimensions.

3. CANDIDATES' WEAKNESSES

Generally, weaknesses were recorded in all the three questions. In each of the questions, poor drawing ability, poor composition and poor shading techniques were observed. Candidates lack drawing skills, with free hands. Instead they applied the use of mechanical instruments. Composition was another weak area. In all the three questions, there were poor arrangements and presentation; small drawings also resulted to poor performance. In the aspect of shading, candidates did not show enough shading techniques as expected. The few ones who attempted to shade only presented unfinished shaded drawings. Virtually, all the candidates presented small drawings compared to the size of the paper.

4. SUGGESTED REMEDIES.

The major obstacle to drawing in schools can be linked either to poor trained teaching staff for the subject or lack of teaching staff for the subject. The following suggestions can improve the performance in Visual Art:

- Teachers should have frequent art workshops and exhibitions to promote their skills in drawing and other areas of art.
- Frequent practice on shading techniques should be done.
- Candidates should be trained on composition.
- Visual Art teachers need to offer frequent guidance to candidates.
- Emphasis should be put on more practical lessons to improve candidates' drawing ability.
- Candidates should read instructions carefully before attempting to answer questions.

5. COMMENTS ON INDIVIDUAL QUESTIONS

ALTERNATIVE A

Drawing from Objects

Question 1

On a low platform, arrange the following into an interesting composition:

- (a) a slightly opened dust bin;*
- (b) a bunch of brooms;*
- (c) a rake.*

Draw object as composed.

This question was slightly confusing to the teachers and candidates. Collecting the items did not indicate a dust bin with a lid. However, the performance of candidates for this question was below standard as some of them drew the short handle of the rake. Some of them used rulers or mechanical instruments in drawing the handle of the rake. Other problems in were small size drawings, poor shading techniques and composition.

ALTERNATIVE B

Drawing from Nature

Question 2

Make a detailed drawing of an animal skull.

This is the most unique question of the alternatives. Most of the candidates who opted for this question depended on drawings printed from web sites. Therefore, there were identical drawings compositions and shading techniques. However, there were few artistic skills in the case of the candidates who attempted the question.

ALTERNATIVE C

Drawing from Life

Question 3

A female model wearing a camisole and wrapper stands in a comfortable position and clasps an empty basket under her left arm. She holds a broom in her right hand.

Draw the model as posed.

As usual, this was always the least attempted question in the three options. Candidates are always scared of life drawing as most schools never introduce life drawing to candidates; this is perhaps due to the fact that having a human model to pose during class work is a bit difficult. Virtually, all the candidates who attempted the question drew out of proportion, size or composition of the drawing. Also the candidates presented small size works compared to the size of the paper. A poor shading technique was another weak area for this option.

1. **GENERAL COMMENTS**

This examination seeks to evaluate candidates' abilities in painting, graphic design, craft and sculpture. The general performance of candidates was below the standard when compared with previous years.

2. **CANDIDATES' STRENGTHS**

Candidates' strengths were as follows:

- A few of them followed the instructions.
- Some have legible drawings.

3. **CANDIDATES' WEAKNESSES**

Candidates' weaknesses were as follows:

- Candidates' ability to draw.
- Compositions of drawings did not show effective use of the space of the paper to show foreground and background.
- Use of colour meaningfully was almost absent i.e. show ability to choose and blend colours, effective mixture, application and distribution of colour to show harmony, contrast and colour relationships.
- Inability to construct letters.
- Inability to design.

4. **SUGGESTED REMEDIES**

These solutions were identified to remedy the poor performance:

- A trial exam should be conducted as a screening process to reduce the number of mediocre candidates.
- Only candidates who show the possibility of doing well in the exams should be registered.
- Art classes should be kept small. In this way, Art teachers would have enough time to coach students and to help them develop their area of interest.
- School Heads should acquaint and familiarize themselves with the philosophical principles of art education in order to appreciate and support the Art programmes in their schools.
- Schools should organise art exhibitions to motivate, inspire and encourage art students.
- School Administration should provide materials for their students.
- School Administration should organise training workshop and art exhibitions for their art teachers and students.

5. COMMENTS ON INDIVIDUAL QUESTIONS

VISUAL ART 3B

SECTION A GRAPHICS

Questions 1

In order to stop the spread of cholera in your country, the National association of Public Health Physicians is embarking on a campaign for improved sanitation.

*Design a pictorial poster for the campaign incorporating the slogan.
LIVE CLEAN, LIVE WELL.*

*Colours: **Not more than three***

Size 40 cm by 30 cm.

Questions 2

The Ministry of Culture in your country is launching a campaign to promote national culture through dress.

*Design a pictorial poster for the campaign using the slogan:
PROUDLY AFRICAN*

*Colours: **Not more than three***

Size: 40 cm by 30 cm.

Generally, questions 1 and 2 on graphics work was poorly executed because of weaknesses highlighted above, inability to plan, design, construct letters and apply colours meaningfully.

SECTION B TEXTILE DESIGN

Questions 3

*Adopting pawpaw leave as motif, design a fabric for children wear.
Use half-drop repeat pattern.*

*Colour: **Not more than three***

Size: 25 cm by 15 cm.

Textile design question 3 required candidates to adopt paw paw leaves as motifs size 25cm by 15cm, candidates generally showed inability to interpret this question. This resulted in very poor execution of work. They didn't know what motif and what repeat pattern meant. Their colour application generally did not show harmony, contrast or colour relationship.

Questions 4

*Design a fabric to be used by the Poultry Farmers Association.
Use any suitable motif.*

*Colour: **Not more than three***

Size: 25 cm by 15 cm.

This required candidates to design a fabric to be used by the Poultry Farmers Association using any suitable motif. The performance was generally very poor due to poor execution because of weaknesses highlighted in question 3.

SECTION C PICTURE MAKING

Make an imaginative painting on any of the following topics.

Questions 5

The Trumpeter

Questions 6

Child Abuse

This question required candidates to make pictures of either the trumpeter or child abuse. These were the most unpopular, but very poorly executed questions. Some candidates drew the trumpet instead of the trumpeter. Others drew other musical instruments like flutes, saxophone, and bugle and not trumpet suggesting a misunderstanding and ignorance of musical instruments.

VISUAL ART 3C

SECTION A CERAMICS

Question 1

*Design and produce a planter to be hung in a sitting room.
Decorate the planter with a traditional motif.
Height; 25cm*

Candidates were to design and produce a planter to be hung in a sitting room. Planter should be decorated with a traditional motif height 25cm. This was a popular question that showed works that have been produced in similar way. Most of the works were wheel thrown.

SECTION B
SCULPTURE

Question 2

Design and produce a sculpture-in-the-round depicting a Dancer.

*Height: **not more than** 30 cm.*

Medium: terracotta, Wood or Cement.

This question demands that candidates design and produce a sculpture in the round depicting a dancer. Height 30cm. medium: terracotta, wood or cement. Most of the works executed in wood were below standard. A good number of works done in clay or cement were broken before they arrived at the marking centre.

SECTION C
PRODUCT DESIGN/MODELLING

Question 3

Design and produce a model of a new brand of handset by JONIA

Candidates were required to design and produce a model of a new brand of handset JONIA. This was the least popular question with two outstanding scripts.

SECTION D
`CRAFTS

Question 4

Using beads of different colours, produce a jewel box with cover.

Size: 12 cm by 8 cm.

Candidates were to use coloured beads to produce a jewel box with cover. Size 12cm x 8cm. no height was indicated. This was the most popular question.

WASSCE FOR SCHOOL CANDIDATES 2016
CHIEF EXAMINERS' REPORT
APPLIED ELECTRICITY 2

1. GENERAL COMMENTS

The paper consists of structural questions. The questions were up to standard and drawn within the syllabus. Candidates' performance this year was really unsatisfactory compared to the past two years. These questions were drawn from six sections of the WASSCE syllabus namely:

- Bar and Electro magnets
- R-L-C -A.C series circuit
- Fuse and Earthing
- D.C Machines
- Power Distribution system
- Hydro Electric and thermal station
- Power transmission system.

2. CANDIDATES' STRENGTHS

Candidates understood very well question 1,2 and 3 and did extremely well.

3. CANDIDATES' WEAKNESSES

Based on the percentage responses to individual questions, about 100% of the candidates responded poorly on these five questions attempted. The weakness of candidates was shown in their responses. This was an indication that these questions were not properly treated in class or the topics were not properly dealt with.

6. SUGGESTED REMEDIES

To enhance the teaching of Applied Electricity as an applied science, proper teaching aids must be provided and these include textbooks, practical training materials.

I therefore, encourage the principals and all staff dealing with these technical subjects, to redouble their efforts and maintain the standard.

DETAILED COMMENTS ON INDIVIDUAL QUESTIONS

In this section, each question was dealt in detail. Table B shows the percentage responses of candidates to questions attempted.

<i>Questions Number</i>	<i>Topic</i>	<i>Responded %</i>	<i>Did not respond %</i>
1	Bar and Electro magnets	58	42
2	R-L-C A.C series circuit	95	5
3	Fuse and Earthing	92	8
4	D.C. Machines	55	45
5	Power Distribution system	58	42
6	Electrical safety	65	35
7	Power transmission system	35	65

Question 1

- (a) Sketch and label the following:
- (i) A bar magnet;
 - (ii) An electromagnet.
- (b) State **two** different **each** between a bar magnet and an electromagnet.

Fifty six (56) candidates representing 58% of the total candidates attempted this question. Eleven (11) candidates representing 11% of the candidates were able to get the average mark. Forty five (45) candidates representing 46% of the candidates did badly and scored zero mark.

Question 2

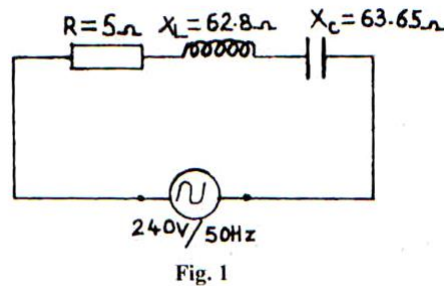


Figure 1 is a series RLC circuit,. Calculate the:

- (i) Impedance of the circuit;
- (ii) Total current;
- (iii) Phase angle.

About ninety two (92) candidates representing 95% of the candidates attempted this question. About thirty five (35) candidates representing 36% of the candidates were able to get the pass mark. Fifty seven (57) candidates representing 59% of the candidates scored below the pass mark.

Question 3

- (a) Define a fuse.
- (b) List **two** types of fuse.
- (c) State **three** reasons for ear thing in an electrical installation.

Eighty nine (89) candidates representing 92% of the candidates attempted this question. Twelve (12) candidates representing 12% of the candidates were able to n score the average pass marks. Seventy seven candidates (77) representing 79 % of the candidates responded poorly and scored below the pass mark. Eight (8) candidates representing 8% of the total did not respond at all.

Question 4

A shunt motor has the following features:

- Back e.m.f. (E_b) = 220V;*
- Field resistance (r_f) = 150 Ω ;*
- Field current (I_f) = 15A;*
- Supply current (I) = 31.5A.*

Calculate the:

- (i) terminal voltage;*
- (ii) armature resistance;*
- (iii) power output at the motor shaft.*

Fifty three (53) candidates representing 55% of the total candidates attempted this question. Only one (1) candidate representing 1% of the candidate managed to score the pass mark. The other fifty two (52) candidates representing 54% of the candidates scored below the pass mark.

Question 5

- (a) State **three** advantage of a ring distribution system of electrical supply.*
- (b) State the **two** operating voltage levels for a transmission line.*

Fifty six (56) candidates representing 58% of the total candidates attempted this question and did badly.

Question 6

- (a) State **three** advantages of a hydroelectric power station over thermal power station.*
- (b) Explain how a gas turbine is used to generate electricity.*

Sixty three (63) candidates representing 65% of the total candidates attempted this question. Only one (1) candidate representing 1% of the candidates was able to score the pass mark and the remaining sixty two (62) candidates scored below the pass mark.

Question 7

- (a) State **three** reasons why power is transmitted at high voltage and low currents.*
- (b) State the function of lighting arrestors in distribution sub-station.*
- (c) When a test lamp is used to check a socket outlet, all the points indicate live. State the **two** possible faults.*
- (d) An electric kettle containing water is connected to a socket outlet. When touched an electric shock is experienced. State the possible fault.*

Thirty four (34) candidates representing 35% of the total candidates attempted this question. Only one (1) candidate representing 1% of the candidates was able to score the pass mark. The remaining thirty three (33) candidates representing 34% of the candidates did poorly.

WASSCE FOR SCHOOL CANDIDATES 2016
CHIEF EXAMINERS' REPORT
APPLIED ELECTRICITY 3

1. **GENERAL COMMENTS**

This report has been prepared following the practical examination on Applied Electricity 3. The WASSCE (SC) 2016 was a well structured practical test that provided good chance for candidates to proof their ability in demonstrating practical skills.

2. **CANDIDATES' STRENGTHS**

Candidates were able to select the correct procedure for the job in hand. About ninety five (95) candidates representing 100% of the candidates attempted all the questions. 96% of the candidates were able to perform the task. This indicated that this topic was well covered during practical classes in the workshop.

3. **CANDIDATES' WEAKNESSES**

Candidates' inability to provide the proper procedure for the job in hand was obvious. Four (4) of the candidates representing 4% of the candidates attempted the question and achieved a poor performance.

7. **SUGGESTED REMEDIES**

To enhance the teaching of electrical practical, candidates should have adequate equipment, tools, and use appropriate instruments during the practical exercise. Good electrical installation, books and finally a good and experience teacher will make a great difference.

4. **DETAILED COMMENTS ON INDIVIDUAL QUESTIONS**

Question 1

AIM: To verify the relationship between current and voltage at constant resistance.

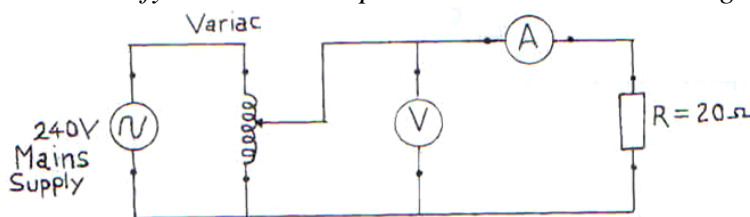


Fig. 1

- (a) Connect the circuit as shown in figure 1.
- (b) Ask the supervisor to check the circuit connection.

(c) Copy Table 1 into your answer booklet.

Voltage (V)	Current (A)	Resistance (Ω)= V/I
0		
2		
4		
6		
8		
10		

- (d) Switch on the variac;
 (e) Set the variac to 0.V.
 (f) Read and record the ammeter readings in Table 1.
 (g) Increase the variac voltage in steps of 2V up to 10 V and record three corresponding ammeter readings in Table 1.
 (h) Switch of the variac.
 (i) Complete Table 1.
 (j) Plot a graph of voltage (V) on the vertical axis against current (A) on the horizontal axis.
 (k) De termine the slope of the graph.
 (l) Comment on the graph.

In this section, each question was dealt in detailed. Table B shows the percentage responses of candidates to questions attempted.

Quantity	Topic	Responded %	responded below average %
1	Variac transformer, voltmeter, Ammeter ,resistors connected in circuit , to verify current and voltage at constant resistance and graph	96%	4%
2	Variac transformer, voltmeter, Ammeter ,resistors connected in circuit , to verify current and resistance at constant voltage and graph	99%	1%

Analyses of table ‘B’ with regards to the percentage of marks scored indicated that about ninety five (95) of the candidates representing 100% of the candidates attempted the question. Ninety one (91) candidates representing 96% of the candidates were able to get the pass mark. Four (4) candidates representing 4% of the candidates scored below the pass mark.

Question 2

AIM: To verify the relationship between current and resistance at constant voltage.

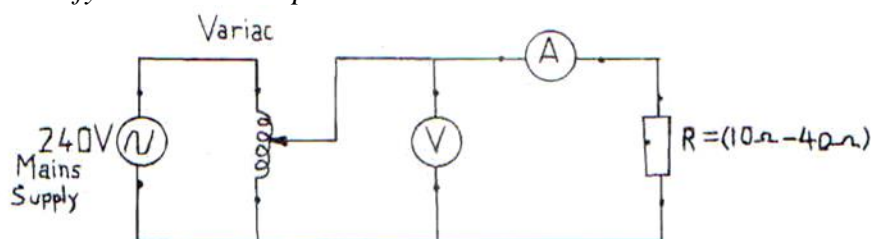


Fig. 2

- (a) Connect the circuit as shown in figure 2.
- (b) Ask the supervisor to check the circuit connection.
- (c) Copy Table 2 into your answer booklet.

Resistance/(Ω)	Current (A)	Voltage (V) = IR
10		
20		
30		
40		

- (d) Switch on the variac and set it to 10 V.
- (e) Read and record the ammeter reading in Table 2.
- (f) Switch off the variac.
- (g) Repeat steps (d) to (f) for each corresponding total resistance value connected in series as shown in Table 2.
- (h) Complete Table 2.
- (i) Plot a graph of current (A) on the vertical axis against resistance (Ω) on the horizontal axis.
- (j) Comment on the graph.

About Ninety four (94) candidates representing 99% of the candidates attempted the question. Only one (1) candidate representing 1% of the candidates did poorly and scored below the average mark.

**WASSCE FOR SCHOOL CANDIDATE 2016
CHIEF EXAMINERS' REPORT
AUTO - MECHANIC 2**

1. GENERAL COMMENTS

The WASSCE for school candidates 2016 provided short answer questions in testing candidates' knowledge and understanding in both theory and practical lessons. It also tested the syllabus coverage and how well topics were treated.

2. CANDIDATES' STRENGTHS

Candidates were able to interpret the sketch in questions three and identifying the type of filtration shown. Candidates were also able to name another type of filtration system.

3. CANDIDATES' WEAKNESSES

Candidates lacked knowledge in all electrical questions such as question 4 the coil ignition system and question 5 the earth return starting circuit. As in today's era vehicles are electrical/electronic operated. Then it was essential that these topics be treated well in the classroom.

8. SUGGESTED REMEDIES

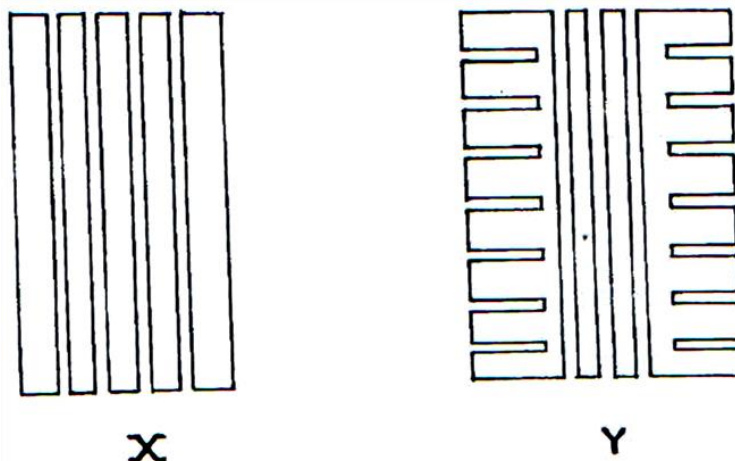
This year's marks did not indicate any improvement to candidates' performance when compared to 2015 results. Only 12% of the candidates managed to pass this paper and the remaining 88% of the candidates raised a big concern. One of the difficulties candidates faced was the misinterpretation of automotive terms. I want to suggest that lecturers should encourage students to be using the right terms during practical and in classroom.

It was important for candidates to know the difference between valve Timing and setting the Valve clearance or Tappet clearance. Lecturers should discourage candidates using local garages terms such as Top cylinder which should be cylinder head, Engine Timing which should be valve timing, Valve Timing which should be setting tappet clearance. These were some of the difficulties candidates had during this paper. Finally, for good coverage of the syllabus, students should have textbooks and access to the syllabus.

4. DETAILED COMMENTS ON INDIVIDUAL QUESTIONS

Question 1

The Sketch below show tyre tread patterns.



- (i) State **one** merit of pattern X.;
 - (ii) State **one** demerit of pattern X ;
 - (iii) Give **two** characteristics of pattern Y.
- (a) (i) List **two** types of tyre construction;
- (ii) Explain the difference between the two types listed in 1 (b) (i).
- (b) List **two** types of wheel.

About 53% of the candidates attempted this question and 47% of the candidates abstained from a well constructed question. Candidates failed to make an effort in securing good marks in all the questions. 13% of the total candidates managed to solve question one, 20% of the candidates were able to score half mark and the remaining 67% of the candidates gave wrong answers. The lowest number of candidates who attempted this question with a very poor performance was an indication that this topic was not well covered.

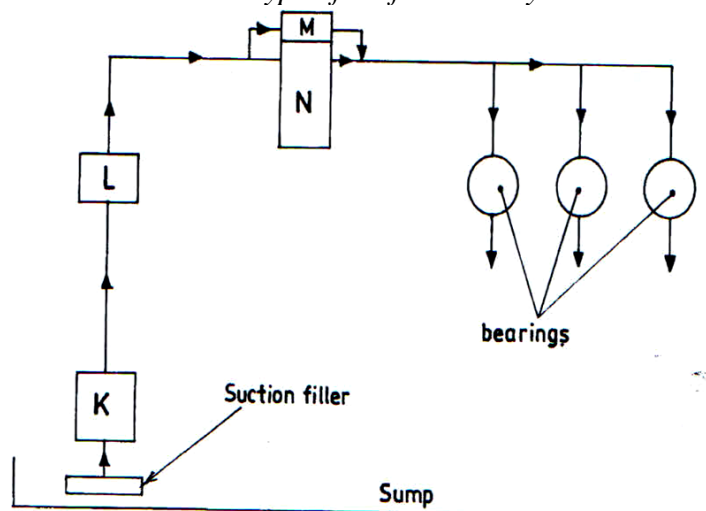
Question 2

- (a) Explain the term *valve timing*.
- (b) Sketch a typical valve timing diagram of an overhead valve mechanism showing.
- (i) Valve lead;
 - (ii) Valve lag;
 - (iii) Valve overlap.
- (c) Define the following terms.
- (i) Valve lead;
 - (ii) Valve overlap.

Only 80% of the candidates attempted this question. Candidates were unable to secure a pass mark. The marks registered for this question were as follows: 9% of the candidates had correct answers and 10% of the candidates secured half mark and the remaining 81% of the candidates gave wrong answers. Again this indicated that the topic was not well covered.

Question 3

The sketch below shows a type of oil filtration system.



- (a) (i) *Identify the type of filtration shown;*
- (ii) *Name the parts labelled K, L, M and N;*
- (iii) *State **one** purpose of each of the parts labelled K, L and M.*
- (b) (i) *What is crankcase ventilation?*
- (ii) *Name **one** other type of oil filtration system.*

About 87% of the candidates attempted this question. This question registered the highest percentage of candidates (34%) who got correct answers. 24% of the candidates were able to score half mark while the remaining candidates got the answer wrong.

Question 4

- (a) (i) *Sketch the layout of a **four**-cylinder coil ignition system.*
- (ii) *Label **four** parts.*
- (b) *State the function of any **three** parts labelled in 4 (a) (ii).*

Only 92% of the candidates attempted this question and only 8% of the candidates abstained from the question. This indicated that this topic was well covered at classroom level. What was difficult to understand was that only 13% of the candidates had correct answers, 24% of the candidates were able to score half mark and the remaining 63% of the candidates got wrong answers. The only suggestion I would like to make now is the methods of evaluation used by lectures to be tested again or their method of teaching.

Question 5

- (a) *Draw a line diagram of a solenoid operated earth return starting circuit.*
- (b) *Label the following parts on the circuit in 5 (a).*
 - (i) *battery;*
 - (ii) *starter switch;*
 - (iii) *solenoid switch;*
 - (iv) *starter motor.*
- (c) *Name **two** parts of an alternator.*
- (d) *State the purpose of colour coding in a vehicle electrical wiring system.*
- (e) *State **one** function of a lead-acid battery.*

Only 78% of the candidates attempted this question and 22% of the candidates abstained from it. Here candidates were having problem with question 5, (a), (b), and (c). Only 2% of the candidates had correct answers. As for question 5 (d) and (e), candidates did well for 50% of them got the correct answers. As mentioned above, lecturers should be putting more emphasis on electrical and electronic topics in both theory and practical lessons.

WASSCE FOR SCHOOL CANDIDATE 2016
CHIEF EXAMINERS' REPORT
AUTO - MECHANIC 3

1. **GENERAL COMMENTS**

The paper was a well-structured practical test that provided good chances for candidates to proof their ability in demonstrating practical skills.

2. **CANDIDATES' STRENGTHS**

Candidates demonstrated their ability in selecting the correct tools for the job in hand.

3. **CANDIDATES' WEAKNESSES**

Candidates were unable to provide the proper safety gears for the precaution needed in the workshop.

4. **SUGGESTED REMEDIES**

Practical assessment should always be conducted with the proper safety gears. Enough practical machines should be provided for candidates during the assessment period. Due to the number of candidates being registered at St. Peter's, at least three examiners would be needed to reduce the waiting time of the candidates. Another possibility was to divide candidates into two groups. Group one will begin from the starting time of the assessment to 12:00 noon and group two starts from 12:00 onwards. This could reduce the waiting period since the second group would not be at school before 12:00 noon.

5. **DETAILED COMMENTS ON INDIVIDUAL QUESTIONS**

Question 1

From the engine provided:

- (a) *remove one injector. report to the examiner,*
- (b) *test the injector to ascertain its pressure. report to the examiner,*
- (c) *dismantle the injector and clean the parts. report to the examiner,*
- (d) *reassemble the injector. report to the examiner,*
- (e) *test and adjust the injector to a pressure specified by the examiner, report to the examiner,*
- (f) *refit the injector to the engine. report to the examiner,*
- (g) *answer **two** relevant questions from the examiner.*

A well constructed question which provided the candidates with the ability to remove and replace an injector. It also provided the candidates with the ability to dismantle, clean, reassemble, test and adjust the injector to a specified pressure. 60% of the candidates were able to perform the task without difficulty but there was still room for improvement for practical classes.

Question 2

From the engine provided:

- (a) remove the valve cover. report to the examiner,*
- (b) remove the rocker shaft assembly. report to the examiner,*
- (c) remove one rocker arm. report to the examiner,*
- (d) inspect the condition of the rocker arm. report to the examiner,*
- (e) refit the rocker arm. report to the examiner,*
- (f) refit the rocker shaft assembly. report to the examiner,*
- (g) refit the valve cover. report to the examiner,*
- (h) answer **two** relevant questions from examiner.*

This question was well structured. It provided the candidates with the ability to remove and refit the whole rocker assembly. It also provided the candidates with the ability to remove a rocker arm, inspect and refit the rocker arm. The candidates' performances were good since 75% of the candidates were able to perform the task correctly. This indicates a good coverage of practical exercise in the workshop.

WASSCE FOR SCHOOL CANDIDATE 2016
CHIEF EXAMINERS' REPORT
WOODWORK 2

1. **GENERAL COMMENTS**

The woodwork paper 2 consists of structural questions, drawing and design. The general performance on the structured question was satisfactorily. Most of the candidates scored poor marks in the design and drawing. The questions were up to standard and drawn within the syllabus. Some of the candidates misunderstood the instructions especially in the design and drawing paper

2. **CANDIDATES' STRENGTHS**

Candidates were able to answer all the two questions in section A within the time frame.

3. **CANDIDATES' WEAKNESSES**

Sketches were poorly presented. About 40% of the candidates made one preliminary free hand sketch instead of two sketches. These observations were also made:

- Writing on the margins
- Poor labeling
- Poor paper layout

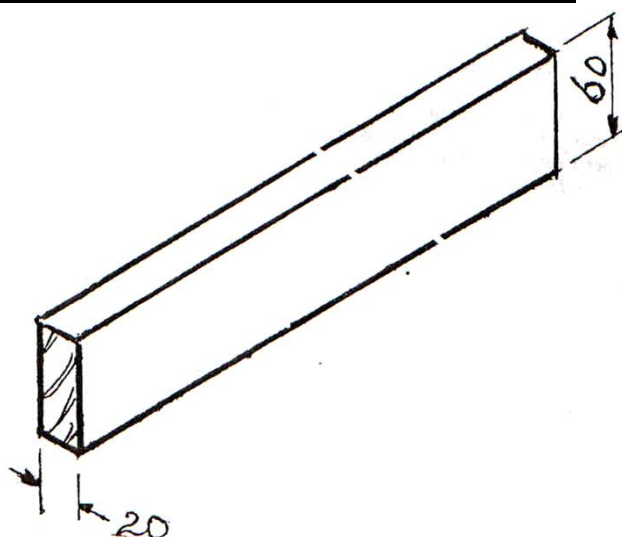
4. **SUGGESTED REMEDIES**

The Chief Examiner proposed the following remedies:

- Teachers should endeavour to cover the syllabus.
- Candidates should be able to read and understand the questions.

5. **DETAILED COMMENTS ON INDIVIDUAL QUESTION**

Question 1



- (a) The piece in Figure 1 is to be prepared using the following machines, jointer, radial arm saw, thicknesser and rip saw. Use a line diagram to show the movement of the piece through the machines in the correct sequence.
- (b) List **four** operations carried out on the circular saw machine.
- (c) Name **two** types of portable sander.

This was a popular question about 98% of the candidates attempted this question. A piece of stock was to be prepared using the following machines; jointers, radial arm saw, thicknesses and rip saw. The question was fairly attempted by 40% of the candidates.

To list four operations carried out on the circular saw machine. Candidates were required to list the operation. Each operation listed carried one mark. Some of the operations were as follows: ripping, rebating, grooving, housing etc. (c) two types of portable sander

Some of the candidates avoided the “C” part of the question and scored zero. Only 10% of the candidates were able to give correct answers to this part of the question. The correct answers should be: disc sander, drum sander, belt sander, orbital sander.

Question 3

- (a) List **four** manufactured boards.
- (b) Name **one** timber defect caused by **each** of the following:
 - (i) drying timber too rapidly;
 - (ii) improper stacking.
- (c) State **two** advantages of casein glue over animal glue.

A very popular question, about 75% of the candidates attempted this question and scored a fair mark. Part (a) manufactured boards are manmade boards, it is a common material. They are timber products the most common types are as follows:

- Plywood, lamina board, batten board, blackboard etc.

Timber defects caused by rapid dry: honeycombing, checks, splits etc. this part has been found difficult for the candidates who attempted this question.

Defect caused by improper stacking are as follows: twisting, wrapping, bowing etc. Most of the candidates attempted and were able to state the advantages casein glue has over animal glue. Casein glue is more resistant to heat than animal glue. Casein glue is more resistant to water etc.

Question 4

- (a) Name the **two** wood lathe centres
- (b) List **two** types of wood stain.
- (c) State **one** purpose of quality control in mass production.
- (d) Sketch an upholstery ripping tool.

The most unpopular question about 5% of the candidates attempted this question and scored a very low mark.

Two lathe centres are: live drive-centres and dead/tail stock Centre.
The types of stain used on wood are oil, water, sprit and chemical.

Purpose of quality control in mass production has been poorly attempted, the expected response: dictates and correct faults ensure products meet specification. Few candidates attempted to sketch the upholstery ripping tool.

SECTION B
DESIGN AND DRAWING

*Design an open wall cabinet to be used in a school's sports office. The cabinet has **two** partition and **two** shelves. It is made with 18 mm plywood. The overall dimensions of the unit are:*

<i>Width</i>	-	<i>450mm</i>
<i>Depth</i>	-	<i>200mm</i>
<i>Height</i>	-	<i>300mm</i>

(All dimensions are in millimeters)

Question 1

*Make **two** preliminary freehand pictorial sketches each for a different design of the cabinet.*

Question 2

*Select **one** of the sketches in question 1 and indicate the selected sketch with a tick () to a scale of 1:5.*

- (a) (i) Draw the isometric view;*
- (ii) Dimension the view indicating the sizes of the members and compartments*
- (b) Name **two** joint to be used in constructing the cabinet.*

About 65% of the candidates sketched only one preliminary free hand sketch instead of two therefore loosing half of the marks. None of the candidates scaled the drawing. The views were poorly dimensional and indicating the sizes was ignored.

Name two joints used in constructing the cabinet. About 50% of the candidates were able to named two joints. In general most of the candidates draw no border lines and no title block. It was important that candidates offering woodwork practice sketching and used sharpen pencils.

WASSCE FOR SCHOOL CANDIDATE 2016
CHIEF EXAMINERS' REPORT
WOODWORK 3
PRACTICAL

1. **GENERAL COMMENTS**

The woodwork paper 3 consists of the practical test. The general performance was satisfactory. The questions were up to standard and drawn within the syllabus.

2. **CANDIDATES' STRENGTHS**

The timber for the practical was adequate and 85% of the candidates were able to assemble their work on time.

3. **CANDIDATES' WEAKNESSES**

The use of blunt tool makes it very difficult to do the work. Some candidates used very hardwood which was hard to work with and got split easily.

4. **SUGGESTED REMEDIES**

Teachers should endeavour to cover the syllabus. More practical exercises should be given to the candidates.

5. **DETAILED COMMENTS ON INDIVIDUAL QUESTION**

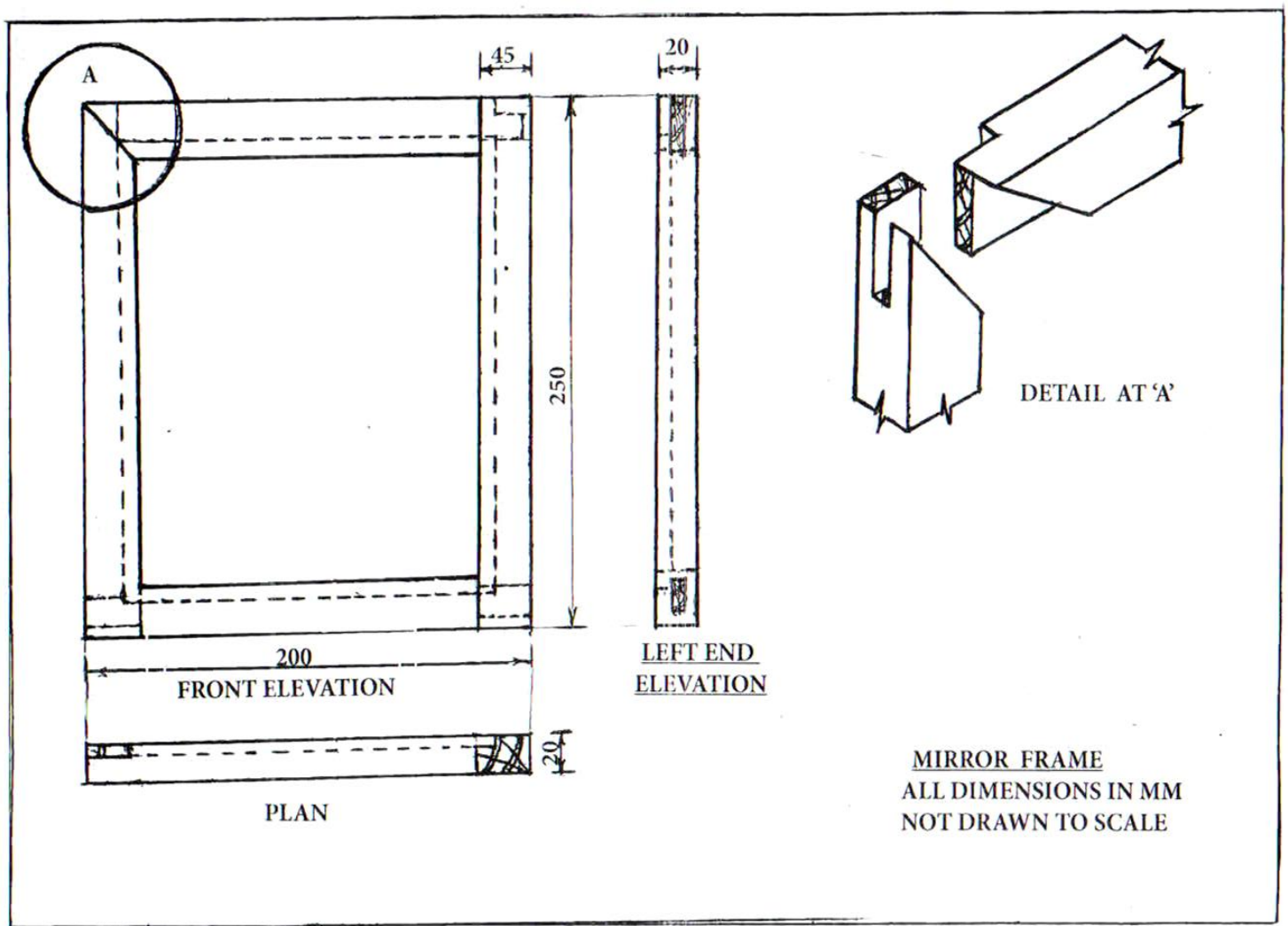
Question 1

Make the test piece shown on page 2, using the timber which has been planed to the following sizes (all dimensions are in millimeters);

***two pieces** 260 x 45 x 20;*

***two pieces** 210 x 45 x 20;*

***one piece** 200 x 20 x 20.*



Most of the candidates performed very well in this part of the examination compared to section A and B. about 85% of the candidates were able to assemble their work. Mitred corner bridle joint most of the candidates were able to make the joint and scored minimum 18 out of 24 possible marks.

Stopped haunched mortise and tenon this task has been attempted. About 85% of the candidates made marks out of 22 possible marks.

Through mortise and tenon joint this joint has been well done. About 70% of the candidates scored over 20 marks out of 32 possible marks.

Rebates:

About 10% of the candidates assemble the frame without rebating the four pieces. Another 20% of the candidates only rebated two pieces and left out the other two. Most of the candidates assemble the mirror frame and wrote their name on all the four pieces.

In general, the performance in the practical was much better than in the structural questions and design and drawing. It was much easier to work with sharp tools than blunt tool.