PSAC 2023

Grade 6
Modular Assessment
Science

Subject code : **P141/2**

Examiners' Report

1.0 INTRODUCTION

The assessment in Science is modular in nature and students are required to take the first assessment at the end of Grade 5 and the second part of the assessment in Grade 6. The first part of the assessment covers the content studied at the level of Grade 5 and subsequently the second part of the assessment covers the content studied in Grade 6.

The content of the assessment is based on the learning outcomes of the Grade 6 Science Teaching and Learning Syllabus (MIE 2015). The cognitive dimension of the assessment is based on three assessment objectives (AOs), namely:

- AO 1: Knowledge and Understanding (40%)
- AO 2: Application (40 %)
- AO 3: Scientific Inquiry (20%)

The examiner's report for PSAC Grade 6 Science offers a constructive feedback on candidates' performance and guidance for future candidates. The contents of the syllabus that gave rise to misconception are included in the report. The report also highlights gaps in conceptual understanding of candidates. Key messages have been included to draw the attention of educators on the essential area to focus on.

This report should be read in conjunction with the question paper for the assessment.

2.0 PAPER OVERVIEW

The mean mark for this paper was 33 out of 50 marks.

The Grade 6 Science paper for the year 2023 consisted of six questions. Question 1 comprised 5 multiple-choice questions (MCQs). Questions 2-6 included objective-type questions as well as short-answer and open-ended questions that enabled candidates to demonstrate their knowledge and application of essential scientific concepts.

3.0 KEY MESSAGES

- Language is still a barrier for candidates to express themselves in open-ended questions. It is recommended that students write short sentences/ phrases with the key ideas rather than long sentences where they contradict themselves.

- It is crucial that candidates read questions carefully as they tend to lose marks due to misinterpretation or misreading of questions. An example for MCQ is that candidates circled two answers inclusive of the correct one. No mark is awarded in such cases when the choice of the answer is left to the examiner.

- Candidates have to be careful not to provide telescoped answers – both answers conveying the same idea.

- Although misspelling of scientific terms was not penalised, candidates are encouraged to practise writing key scientific terms.

- Key terms such as ‘characteristics’, ‘examples’, ‘properties’ seem to be unclear to candidates.

4.0 GENERAL COMMENTS

Most candidates showed a good grasp of the syllabus content and there was a range of correct responses to the open-ended questions. They started the paper well but found the last items in each question more challenging. The last items are normally items pertaining to application questions and require candidates to apply the concepts learnt in an unknown or different situation than that given in the textbook. The application of concepts and questions assessing scientific inquiry skills remain a challenge for a significant number of candidates at this level.

Items relating to AO1 seem to be generally well-answered by most candidates. The weighting of the paper on the AOs 'Application' and 'Inquiry skills' is around 50%. It is, therefore, very important that these skills are developed.

The majority of candidates appeared to have sufficient time to complete the paper.

5.0 SPECIFIC COMMENTS

Question 1

Question 1 comprises five multiple-choice items that were accessible to students of all abilities. Each item assessed a specific concept from the syllabus. This question was generally well-attempted by the majority of candidates.

Item	Key	% Correct	Most common incorrect choice
(a)	B	83.9	A
(b)	A	79.9	B
(c)	C	67.6	A
(d)	D	79.7	A
(e)	B	67.2	D

The mean mark for this question was 3.8. Item (c) and (e) proved to be the most challenging ones.

Comments on specific items

Item(a) assessed the candidates' knowledge of the different animal groups. They had to identify the animal that belongs to the reptile animal group. The correct answer was crocodile and most candidates selected the correct answer, B. This reveals that the classification of animals in the different animal groups is a concept that has been well grasped by the majority of students of Grade 6.

Item (b) was well-answered on the whole. Candidates who identified A as the correct answer showed good understanding of the difference between the total number of teeth that a child can have. A common misconception was to identify 22 instead of 20 as the total number of milk teeth that a child can have.

Item (c) was a knowledge-based question on sources of energy. One of the learning objectives of the unit 'Energy' is to be able to distinguish between renewable and non-renewable sources of energy. The question was '*Which one of the following is a non-renewable source of energy?*' Option C – Heavy oil was the correct answer. However, there was a significant number of candidates who opted for Option A – Bagasse. Whilst, candidates could easily identify falling water and wind as renewable sources of energy, they failed to recognise bagasse as a renewable fuel. It is possible that there is confusion between the terms renewable and polluting. Attention of candidates should be brought to the fact that bagasse is a renewable fuel, and yet a polluting one as burning of bagasse produces harmful gases.

Item (d) was the unit 'Air' and candidates had to identify a gas based on a pie chart. Whilst the majority of candidates could identify D – Oxygen as the correct answer, there was quite a number of candidates who opted for carbon dioxide. This is a knowledge-based question and students are required to know the composition of the air in different types of representations such as pie charts and bar charts among others.

Item (e) was the most challenging item. It showed the representation of a thermal power station. Students were required to identify a part of the representation of the thermal power station, which was the generator. Candidates confused the terms 'generator' and 'turbine'. A possible way to ensure that students grasp thoroughly the detailed labelling of the thermal power station is to have charts of same displayed in the classroom.

Question 2

This question was on the topic 'Animals'. The first part of the question was about the classification of food items into the correct food groups whereas the second part was about the type of animal and teeth. The total mark for the question was 9 and the mean score was for this question was 6.5.

Comments on specific items

(a) A good number of candidates could classify the food items into the correct food group. There was good understanding that fish is food for growth, pasta is food for energy and carrot is food for health. However, there seems to be some confusion regarding lentils which was often classified as food for health instead of food for growth.

(b)(i) The diagram of a cow was provided. The candidates were required to name for the teeth used by the cow to crush food. The most common correct answer was molars although some candidates also gave premolars. Some candidates also mentioned 'back teeth', which showed that reference is made to molars/ premolars. Some common incorrect answers included 'incisors' and 'pointy teeth'.

(ii) Only a few candidates could answer this question correctly. From the answers given, it was clear that candidates failed to read the question properly. Candidates were required to describe the type of teeth in part (b)(i). The common mistake was to give the use of the molar, which is to crush food. Candidates were required to describe the molars as large and flat teeth. It is recommended that reinforcement regarding the requirement of command verbs such as 'describe' and 'explain' be done in class.

(iii) The majority of the candidates could identify cow as a herbivorous animal.

(iv) Candidates were required to state two characteristics of mammals. The common correct answers were ‘to reproduce by giving birth’, and ‘they have hairs on their body’. More than 50% of the candidates got both answers correct. It is worth noting that incorrect reading of questions led a few candidates to give examples of mammals such as ‘whale’ and ‘dolphin’ instead of mentioning the characteristics of mammals.

QUESTION 3

This question was on the unit ‘materials’. The mean mark for this question was 6.49 marks out of 9 marks.

Comments on specific items

(a) Candidates were required to match each material to its correct description. Four materials, namely nylon, gold, aluminium and cotton were given. A large number of candidates scored full marks on this item. Whilst candidates opted for the description of the gold, aluminium and cotton correctly, they failed to recognise that nylon is a special type of plastic.

(b)(i) For this item, the diagram of a window was shown and candidates were required to give two properties of glass that made it suitable for window panes. More than 75% of candidates could identify at least one property of glass that makes it suitable for window panes. However, some had difficulty identifying the second property. The expected correct answers were ‘impermeable’ and ‘transparent’. Whilst many candidates were familiar with the term ‘impermeable’, a few candidates referred to the idea of impermeability and gave answers such as ‘glass is water proof’. As for the term ‘transparent’, there seems to be confusion between the terms ‘transparent’, ‘translucent’ and ‘opaque’.

(b)(ii) This item was accessible to the majority of candidates who gave the correct answer 'It breaks easily or is fragile.' The common mistake was to give the properties of glass. This reveals that the command terms 'properties', 'advantage', 'disadvantage' requires revisiting by Educators when preparing students for assessments.

(c) A significant number of candidates provided the correct answers. Any two among 'oiling', 'greasing', 'galvanizing' and 'painting' were awarded marks. Candidates often lost marks for incorrect spelling which changed the meaning of the word. One such example was using 'Greece' instead of 'Grease'. Other common mistake was to give the conditions necessary for rusting rather than the ways to prevent rusting.

Question 4

This question was on the unit 'Plants'. The mean score for this question was 5.6 out of 8 marks suggesting that candidates fared relatively well on this question. The focus of the question was mainly on the process of photosynthesis.

Comments on specific items

(a)(i) This item was generally well-answered by the majority of candidates, who showed a good grasp of the fundamental concept of gas exchange during the process of photosynthesis. They could easily recognise that plants take in carbon dioxide and release oxygen during photosynthesis.

(a)(ii) The majority of the candidates gave the correct answers. The expected answers were any two among sunlight, chlorophyll and water. The common incorrect answer was carbon dioxide. Although carbon dioxide is a condition for photosynthesis, the question required

candidates to give a condition other than carbon dioxide. Attention of candidates is to be drawn to the key words in bold in the stem of a question. The word ‘other’ was given in bold to focus the attention of candidates on the requirement of the question.

(b) In this part of the question, candidates had to give two ways in which plants are useful to people. There was a range of correct answers where candidates demonstrated good understanding of the usefulness of plants to people. A common mistake was to give a correct and an incorrect idea in the same answer. For example, ‘plants provide carbon dioxide for breathing to people and food to people’. Whilst the answer is partly correct, there is an incorrect idea as well. No mark is awarded in such cases.

(c) This item proved to be one of the most challenging ones in the paper and the majority of candidates could only score up to one mark. Those candidates who understood that they were required to compare and find the difference between photosynthesis and respiration scored full marks. A good number of candidates mentioned about the time of occurrence of both processes, which was awarded marks. For example, photosynthesis occurs during the day and respiration in plants occurs at night or during day and night. Others mentioned that carbon dioxide is taken in during photosynthesis and oxygen is taken in during respiration. This was also awarded full marks. There was a panoply of correct comparison for this item. Those who scored partial mark mentioned only about one process and did not proceed further to give the difference. Another common mistake was to give the definition of photosynthesis. Some incorrect answers revealed there is a confusion about the gas exchange which occurs during photosynthesis and respiration.

Question 5

This question was on the unit 'Air'. The items included objective-type items, short-answer items and extended-type items. The mean for this question was 5.45 over 9 marks.

Comments on specific items

(a)(i) The majority of the candidates gave the correct answer which was oxygen. This question revealed that candidates often do not read questions properly before answering. This item required candidates to name the gas needed for burning to take place. Whilst the majority answered the question well, a few candidates gave answers such as 'candle A' or 'candle B'.

(a)(ii) More than 80% of the candidates could identify that candle B will extinguish first showing that there is good grasp of the concept of burning.

(a)(iii) This part of the question follows up from part (a)(ii) which required candidates to justify their choice of the candle which will extinguish first. Here, it seems that language is a barrier to the expression of ideas. Many candidates simply gave broad non-comparative answers such as 'there is little amount of oxygen.' Candidates were required to compare the sizes of the jars. Correct answers included 'Candle B is smaller than that of Candle C and Candle B does not get a constant supply of oxygen'.

(b)(i) This part of the question was about oil fire. Many candidates understood that pouring water over oil fire will not extinguish it, but they found it challenging to express their ideas correctly. Many candidates who gave the correct answers mentioned about oil floating on water and the spreading of the fire. Incorrect answers such as 'Oxygen in the water makes the fire bigger' which is a wrong concept, were not awarded marks. Other incorrect

answers such as ‘when we put water on it, it will make smoke’ did not answer the question and hence was not awarded any marks.

(b)(ii) This item required candidates to suggest a way to extinguish an oil fire in the kitchen. The most common correct answer was ‘to cover the fire with a metal lid’. However, it was observed that candidates tend to give partial answer such as ‘cover it’ or ‘a metal lid’. In such cases, mark was not awarded because the answer was too vague.

(c)(i) This part of the question was on ‘air pollution’. This was one of the most poorly attempted items on the whole paper. Candidates were required to give the definition of air pollution as the presence of harmful/toxic substances in air. Examples of common incorrect answers were ‘Air is polluted’, ‘dirty air’ and ‘air pollution is air that is bad for us’. There was a range of incorrect answers that revealed that recalling definitions is an area that is not well grasped by candidates.

(c)(ii) A large number of candidates could identify a source of air pollution.

(c)(iii) This item required candidates to go the extra mile and provide details to be able to score two marks. The question was ‘*Describe how air pollution affects growth of plants*.’ It was expected that candidates mentioned about the pollutants which affected plant growth and how plant growth is affected. Examples of correct answers, that were awarded two marks, were ‘Dusts block the pores and this affected exchange of gases in the plants’ and ‘the air that is polluted block the pores of the leaves and prevent them from carrying out photosynthesis’. These types of answers showed that the candidates had good grasp of pollutants such as ash, dust and smoke blocking the pores of the leaves of plants and eventually impacting on gas exchange during photosynthesis. There was quite a significant

number of candidates who merely mentioned ‘Dust/Ash/Smoke blocks the pores.’ Such answers secured only a partial mark.

Question 6

This question had items from the unit ‘Earth, Moon and Sun in the solar system’ and the unit ‘Ecosystems of forests and lagoons’. The mean mark for the question was 5.45 out of 10 marks.

Comments on specific items

(a) This item was one of the most accessible ones in the paper and the majority of candidates gave moon which was the correct answer. The weaker ability candidates failed to read the question properly and did not pay attention to the word satellite and gave ‘Mars’ which is obviously an incorrect answer.

(b)(i) Many candidates gave the correct answer, which was ‘eight’.

(b)(ii) This item required candidates to explain what causes day and night on Earth. A considerable number of candidates gave the correct answer ‘Rotation of the Earth on its own axis.’. Of those candidates who could not score this mark, the common incorrect answer was ‘Rotation of the Earth around the sun.’ While it is common for many students to rote learn at this stage, rote learning is not to be encouraged in science. Students should be more exposed to scientific concepts along with drilling to ensure that concepts are well understood.

(c) A significant number of candidates were able to identify one reason for the existence of life on planet Earth. The most common answers included ‘presence of air or water’. The more able candidates mentioned about Earth being at the right distance form the sun and hence is neither too cold or too hot.

(d)(i) This part of the question was about the different types of waste. Candidates were required to identify the waste that can be turned into compost. Most of the candidates could easily identify the waste from plants.

(d)(ii) This item was about how used plastic bottles can be turned into useful objects. A significant number of candidates gave plausible ways of turning used plastic bottles into useful objects. The concepts of recycling and re-use were well understood and most of the correct answers referred to these concepts. Some examples are 'use it to water plants', 'make pencil holder', 'make decorative objects', 'melt them and make new plastic bottles' and 'can be melted and shaped into useful objects.'

(d)(iii) Candidates were required to explain why used cells should not be thrown in the environment. It is encouraging to note that a good number of candidates understood that cells contains toxic/poisonous substances and hence will contaminate the soil.

(e) This item was poorly attempted by the majority of candidates. Only a few candidates could score full marks on this item. The majority either left it blank or gave irrelevant answers. Candidates were required to explain how a high level of carbon dioxide is harmful to the environment. Candidates were expected to mention that carbon dioxide traps heat as it is a greenhouse gas and hence causes global warming. Some candidates mentioned the word 'global warming' without any further details. Other answers that scored full marks made reference to 'carbon dioxide is responsible for global warming and this results in sea level rise/ climate change/ flash floods/ melting of icebergs'.

CONCLUSION AND RECOMMENDATION

This assessment reveals that there are some concepts that require some further grounding with students of Grade 6. Units such as air and animals seem to be well mastered by students. Experimentation forms an integral part of the teaching of science. Hands-on experiments and demonstrations are encouraged as they promote observation skills, which are primordial in the learning of Science. Experiments promote learning for all types of learners and linking the skills acquired during an experiment to various scenarios can make students relate scientific concepts to everyday-life situations. It is definitely beneficial for students to carry out experiments in a science laboratory/room. However, in the absence of a science room, it is encouraged that a science corner be created so that students have the opportunity to perform the experiments in their textbooks.

Open-ended questions remain a challenge to the majority of candidates and they should be encouraged to write full elaborate answers in class instead of giving one-word answers. The language barrier is one major issue when it comes to these types of questions. Students should be encouraged to read the questions attentively and extract the important information from the stem of the question. This will allow them to know exactly what is required from them in terms of answers.