Let the mind manage the body
Que l'esprit gère le corps

PSAC 2017

Grade 5 Science

Subject code: **P141/1**

Examiners' Report

MAURITIUS EXAMINATIONS SYNDICATE

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INTRODUCTION

The introduction of the Primary School Achievement Certificate (PSAC) in replacement of the Certificate of Primary Education (CPE) has prompted a major review of the end of primary cycle assessment. In particular, the assessment has been reviewed in line with the new goals and objectives of the revised National Curriculum Framework, Grades 1-6. It seeks to enhance the pedagogical experience pupils would derive from the assessment. The paper design has changed with the focus being on the assessment of scientific skills and competencies across the ability range.

The modular assessment in Science was introduced for the first time in 2017 as part of the new end of primary cycle assessment, the Primary School Achievement Certificate (PSAC). The first part of the assessment is at the end of Grade 5 based on the Grade 5 syllabus and the second part of the assessment is towards the end of Grade 6 based on the Grade 6 syllabus mainly. The weighting given to each part assessment is 50%.

The Grade 5 Science assessment has been designed and developed guided by principles of fairness, the need to set learning standards, the importance of ensuring positive washback, the educational value of the inquiry-based approach and the contribution of the subject to the overall education of the learner.

It also encourages an understanding of the scientific method. While carrying out experiments at classroom level is not new in itself, often the reason and the purpose of each step undertaken in a scientific experiment are not explained. It is expected that a proper understanding of the scientific method (adapted to the level of pupils) will be helpful to the pupils not only in Science but across subjects and also as they continue their learning process in the higher grades.

The Annual Programme for the PSAC describes the assessment objectives of the modular Grade 5 assessment. It also gives the weighting to the different assessment objectives within the paper. The table below shows the weighting:

Assessment Objectives	*Weighting %*
Knowledge & Understanding	*40*
Application	*40*
Inquiry Skills	*20*

At Grade 6, fewer topics will be assessed than in the previous end of primary cycle examinations. It is expected that studying fewer topics will allow a deeper depth in the treatment of the topics and in developing the relevant skills. The assessment will thus reflect this shift and will assess whether those key concepts have been achieved.

This report gives an analysis of each item, highlights the strengths and weaknesses of pupils and advises on the way different topics or skills could be tackled.

ITEM ANALYSIS

This report is largely based on the item analysis of a representative sample of scripts, with consideration given to reports of markers involved in the marking process and observations made during the marking. The performance in each item has been analysed and qualitative information is given.

GENERAL COMMENTS

The assessment contained some types of questions which were rather 'traditional'. These could be one-word or objective type questions but also the open-ended items. It also contained items which prompted the demonstration of other types of competencies than recalling. Candidates were called to show their reasoning or critical thinking, to analyse the information from a given context and interpret this information or to show their understanding of the scientific method.

The skills, competencies and content assessed in the paper were in line with the Teaching and Learning syllabus and the learning objectives spelled therein. It is expected that the assessment in Science will support learning and will feed back into the class. Given that activities carried out at school level where, for instance, pupils are 'working scientifically', is given much importance in the learning process, this should as far as possible be reflected in the assessment paper. It is known that assessment has a strong influence on curriculum and pedagogy, and it is essential to have explicit questions assessing what is intended to be learned.

It was found that candidates have often struggled with items which required skills other than knowledge or understanding. They have difficulty interpreting and extracting relevant information from the given situation. The aim of learning Science at Primary level is to understand the world around them, both the natural environment and that which has been created through the use of Science. Learning Science at primary level should give pupils tools to start to understand key concepts which make the basis of life or which influence them in their everyday life. The understanding that they are gaining is based on the use they are making of the information around them. When they start having questions, they start predicting or they try to find out what would happen, they have embarked on working scientifically.

Making sense of their surrounding and what is happening in their everyday life would require pupils to be able to interpret the information they have. To make sense is not only based on their prior knowledge but rather on what they are doing and how they are using this prior knowledge. The philosophy of the new curriculum at primary level is articulated around the 21st Century Skills. To meet the aims set out in the curriculum, a change in the approach to the teaching, learning and assessment is warranted.

Working scientifically can be a rather informal method which is being carried out as much out of the classroom as inside the classroom. However, it remains the key aspect to the learning of Science and should be reinforced. With the strong link between learning and assessment established, where the assessment can have a

positive washback in the classroom, it is important that the skills within the learning of Science are assessed.

Inquiry skill is not readily and easily tested through a paper-pencil test at the end of a cycle. Rather, it is the continuous observation of pupils working scientifically in the classroom or outside which will give us the best assessment of the acquisition of this skill. It remains important, however, to include the testing of this skill through the paper-pencil test given that it is the only formal test which is expected to feed into the teaching process.

The other area where candidates have struggled is when they have to draw. This is also an important skill which ought to be developed in Science along with skills such as reading tables or graphs, identifying patterns or trends. The ways of communicating (as indicated in the Teaching and Learning Syllabus) include drawings, graphs etc.

The shift to the development of skills and deeper understanding of concepts from the acquisition of sometimes superficial knowledge of a wider range of content urges educators not to focus on the specific content or the ideas might be missed. These key ideas are the development of their critical thinking skills, inquiry skills and a certain attitude towards the learning of Science. Assessment becomes a real tool for learning in the classroom where questioning becomes very important. This can be oral or on paper. However, the questions being put to pupils have to be well-thought out so that they trigger real thinking and consequently help pupils in the development of the deeper understanding.

The mean mark for the paper was 25. In general, it was noticed that candidates struggled with the questions requiring reasoning and application of their knowledge.

The following sections give the comments on the individual items in the assessment paper.

QUESTION 1 (5 marks)

Question 1 is based on 5 multiple choice questions which can be assessing any of the assessment objectives. The items within the question are graded in terms of expected difficulty level. Items within this question assessing recalling based on knowledge were well tackled by candidates. However, the items which required the application of knowledge were found to be more challenging.

Item 1: Item 1 was a knowledge question on the function of a fruit in the plant. The correct answer was *B*. One of the wrong options chosen was *D – Stem*. Pupils, however, explicitly learn the functions of the different parts of the plant and how each part is important.

Item 2: This item was on the identification of the source of energy for evaporation to take place. This is a relatively common context given to pupils, that of the water cycle and its processes. Pupils however, have often been learning about the different processes in a rather mechanical way without really understanding how and why each process is happening and what is the importance of each process within the water cycle. While this item is based on the objectives of knowledge and understanding, it has proven not to be within the reach of many candidates. The whole process of water cycle will not happen without the heat of the sun which is the source of energy for evaporation to take place and the other processes of condensation or precipitation will not take place.

Item 3: The temperature of the ice cubes inside a glass was to be found. Less than 7 out of 10 candidates found the correct answer. The idea of having ice cubes is that the temperature should be close to 0°C. Since the glass is not found in a freezer, it can be estimated that the temperature of the ice cubes is just above 0°C. However, if the temperature was higher, the ice would not be as shown but would be melting or would have melted and would be in the liquid state.

It is useful that pupils explain their reasoning, whether they have to come up to the right or wrong answer. By explaining their own reasoning, they can make better sense of the concept and ensure that they understand. The use of the wrong answers will help the pupils to correct any misconception. Both regular questioning and reasoning based on the different phenomena or observations being made are important to develop a deep understanding of concepts. Pupils can easily forget a superficial understanding and they would have more difficulty in answering questions which is not directly related to this superficial understanding.

Item 4: This item was on the energy transformation occurring in a torch which uses a dry cell as source of energy. Candidates attempted this item relatively well and were able to find the correct answer *Chemical energy to light energy.* The other options given were quite obviously wrong. It is worth strengthening the knowledge of transformation of energy with pupils by encouraging them to find the energy transformation happening all around them, whether in electronic devices, in vehicles, in the body or in animals, in plants or in the environment in general.

Besides understanding the transformation of energy which is taking place, an understanding of the form of energy involved is also important. For instance, pupils often have difficulty with the term 'chemical energy'.

Item 5: Item 5 was found to be quite challenging for many candidates. From the picture and the information given, candidates had to deduce the habitat of an animal. For this item, the animal chosen could have been a polar bear, a cobra, an eagle, a frog or any other animal. It is not the knowledge of the habitat of the animals which is being assessed but rather, based on the information given, how the animal is adapted to live in its habitat.

The information given on the Cape Ground squirrel was that it has a big tail which provides it with shade. This information is supported by the picture of the animal which is given. The reasoning that candidates were to make was where would the animal need shading or protection against sun or light or heat. Among the options

given for the habitat of the animal was option *A – Deserts*. This is the only habitat among the options given where shading will be required for protection against the sun. The other options given, river, inside of caves or dense forests were all shaded or dark places with relatively low temperatures and where an animal will not have to develop or to have an adaptation against the sun or the heat.

When pupils are learning about the habitat of animals, the aim is really to make them aware that each of the living things on Earth is adapted to live in a particular habitat. The adaptation might be a natural feature of the animals or the plant (for instance thick fur to live in the cold or needle-shaped leaves to live in the deserts) or it might be one that is external (for instance wearing thick woolen clothing in the cold). The aim is not that pupils have to learn about the specific animals given in the textbook and learn their adaptation by heart but rather to develop this understanding and apply it to different contexts.

QUESTION 2 (10 marks)

Question 2 assessed the topics of energy and electricity. On average, candidates scored the mean mark in this question. 6 of the 10 marks allocated to this question were one-word answers or did not require the production of any writing. Where candidates had to produce more writing, they found it more difficult. It was also noticed that the answers produced, for instance in part (f), were not accurate enough and often candidates scored lower weightage marks instead of the full marks.

Part (a) (2 marks)

In part (a), candidates had to find the energy transformation which occurred when a girl is playing guitar and when wood is being burnt. To avoid confusion as to where the start of the process should take place, the first form of energy was already given. Thus for the girl playing the guitar, candidates had to find that *movement energy is transformed into sound energy* and for the burning of wood, *chemical energy is transformed into light or heat energy.*

Performance in this item was relatively good. Educators are encouraged to use the examples given or other situations and to probe further. For instance with the picture of the girl playing the guitar, the transformation that was required in the item was movement to sound but there are other energy transformations that are also taking place, for instance chemical energy into movement energy. Pupils can be asked to identify those and explain their reasoning.

Part (b & c) (2 marks)

Candidates were required to give an example of a fossil fuel apart from coal. A number of possible answers were accepted namely petrol, diesel, oil, gas. Despite being a knowledge question requiring a simple recalling and a one-word answer, almost half the number of candidates could not find the correct answer.

In part (c), candidates had to give another use of fossil fuel apart from producing electricity. The textbook gives a list of uses of fossil fuels, including use as a source of fuels in vehicles or to cook food. Candidates struggled to find the correct answer.

Based on the performance in these two items, it would be worthwhile that educators spend some more time on this topic to ensure that the knowledge is acquired. The NASA website https://climatekids.nasa.gov/fossil-fuels-coal/ gives a simple way through a story on a possible way to teach this content to kids. This story can also be used as a basis to have a communicative class in Science where the story can be read as a reading aloud task followed by the interaction with pupils.

Part (d) (2 marks)

The picture showed a sick boy on the bed being fed by his father and the question was why it is important that Kevin eats well when he is sick. This item assessed the knowledge of the importance of our body getting energy for it to function properly. It is not one which is explicitly testing the importance of food for health (which is under a Grade 6 topic, Animals). However, if a candidate does explain the importance of food for health he/she will be scoring all the marks for the item.

A number of candidates had difficulties in explaining their reasoning. Some did not explain why he has to eat well but rather only stated that he is sick. Some candidates also find odd ways to express their answer, for example '*To recharge him'*. Others did not explain why he needs to eat well and gave answers such as '*to be comfortable'* or *'because he needs to eat'*. There are yet others who did not reply according to the context of the question and gave answers such as *'Because he eats too many fast food.'*

Based on these observations, it is worth pointing out again that all questions will not be based on the direct recalling of facts or on knowledge. Candidates would be asked to apply their knowledge to new contexts or to link different concepts or facts they have learnt from different topics and apply them to a given situation. Being able to do that, shows that a candidate has acquired a deeper understanding.

Part (e) (2 marks)

Candidates were required to circle two rooms where energy is being wasted in a house comprising 4 rooms. There were three possible answers here and candidates had to choose any two. A number of them found the item straightforward and scored the 2 marks. However, some candidates circled three rooms (if they were all correct the candidates scored the 2 marks) others circled three rooms including the one they should not have chosen or one correct and one wrong. In the latter cases, candidates were penalized for their wrong choices as it did not show whether they understood the concept of energy wastage.

Such questions can be quite scoring and pupils should be encouraged to pay attention to the instructions given before answering.

Part (f) (2 marks)

The question was about why less salt is produced in winter than in summer. This item assessed the application of the concept of evaporation. In summer it is hotter, there are longer hours of sunshine, and thus there is more evaporation taking place which will cause more production of salt. Candidates were not required to give a lengthy

explanation, but if they simply gave '*In winter there is less evaporation than in summer*' their answers would have been accepted. Some candidates produced very good answers such as '*In winter there are shorter periods of sunlight, so less water evaporates and we get less salt.'*

Some candidates had difficulty in expressing their ideas. As it is often the case, language is a barrier when it comes to responding to open-ended questions. For example, answers such as '*in summer the sun is hotter'* shows that the candidate has difficulty in putting in words his thoughts. A number of candidates gave incomplete answers where they did not explain why less salt is produced. '*Because it is cold in winter'* is an incomplete answer as the candidate had not explained what happens to evaporation when it is cold in winter.

The concepts of evaporation (and condensation) should also be taught while applying them to different situations. Another interesting website where a lot of resources can be available is
https://www.natgeokids.com/za/discover/science/nature/water-cycle/#!/register .

QUESTION 3 (8 marks)

This question was on the electric circuit. Candidates fared relatively well on this question. As in question 2, most of the items required either a one-word answer, a drawing or was a multiple choice question. Only 1 mark out of the 8 marks allocated was for an open-ended question.

Part (a) (2 marks)

Candidates had to give the names of two pictures shown, that of a dry cell and a switch. Most candidates found the word '*dry cell'* but more had difficulty in finding '*switch'*. It is to be noted that '*battery'* was tolerated as well as '*cell'*. It would seem that some pupils have not really understood the difference between a battery and a dry cell and this should be reinforced in class.

The same drawing of the switch is found in the textbook, but a number of candidates were not able to identify it.

Part (b) (2 marks)

In part (b), candidates were required to complete an electric circuit so that the bulb would light up. Many candidates struggled with this question and were not able to complete the circuit with the correct drawing. Drawing is a key skill in Science. A lot of communication in Science is done through drawings and it can also be a used to reduce the demand on language. It could be expected that candidates would find it easier to draw than to explain how to complete the electric circuit.

It was not expected that the drawing is a perfect one, but that there is a correct connection of the wire to the bulb and to the negative part of the dry cell. A number of candidates drew the missing wire in a number of incorrect ways. These included:

- The wire was not correctly connected to the bulb. It sometimes touched the glass of bulb instead of the metal part of the bulb.
- The wire was connected to the positive part of the dry cell.

There are a number of aspects to be taken into consideration. First of all, it is an experiment that could be carried out in the class as demonstration. While doing this activity in class, it should also be demonstrated what would happen if there is a wrong connection, for instance if the bulb is wrongly connected or the wires do not touch the positive and negative sides of the dry cell or if there is a gap in the circuit. The gap can also be created by a damaged bulb and it is interesting for pupils to see this. Pupils should be encouraged to say why the bulb is not lighting up, what is needed for electricity to flow, what happens when a damaged bulb is connected and why.

Part (c) (2 marks)

Candidates found part (i) within their reach and a large number gave the correct answer *C- a metal ruler*. While more than 7 out of 10 candidates gave the correct answer to part (i), only 4 out of 10 could explain why a metal could be used to complete the circuit.

Part (d) (2 marks)

This item required candidates to cross out two images where dangers while using electricity are shown. Less than 5 candidates out of 10 scored 2 marks. The same issue as in question 2, part (e) was noticed. Only two possible correct answers were available. Some candidates crossed out the two correct ones plus one which was incorrect. In this case, they did not score the full marks.

A number of concepts are to be reinforced in this topic – the role of metals as conductors of electricity, what is a complete electric circuit and how to make one, what are the dangers associated with electricity, why these situations can be dangerous and what should be done to avoid them. It is important to ensure that pupils also understand the functions of the different parts of an electric circuit and what will happen if one of these parts is missing. It is interesting to probe their understanding further with situations, where for instance a circuit looks complete – wires well connected, bulb, switch, dry cell- but the bulb is not lighting up. A damaged bulb could be used. Pupils should be encouraged to find out on their own why the circuit is incomplete and what would happen.

Other possible activities can be removing a bulb from an electric circuit and asking pupils whether electricity is flowing. From this activity they can make better sense as to why we need a bulb. A similar set up can be done with and without a switch and pupils asked to predict what will happen.

QUESTION 4 (11 marks)

This question was on plants. The average mark scored on this question was 5.64. Items based on knowledge were relatively well tackled but the item on drawing and those on inquiry skills were found to be more challenging.

Part (a, b) (3 marks0

In part (a) candidates were requested to write the term '*germination'*. Only 38% of candidates found the correct answer. It is to be noted that wrong spelling was not penalized. Wrong answers such as '*Photosynthesis', 'breathing', 'respiration'* were

obtained. The words written were often wrongly written and though misspellings were tolerated, it is important that pupils are encouraged to know how to write the words with particular attention on the scientific terminologies.

In part (b), candidates were requested to give two conditions important for seeds to germinate. Conditions necessary for germination have often been tested in the past and the issues with this question reported. However, less than 4 out of 10 candidates found the two correct conditions.

To remember the conditions and to understand why these conditions are relevant to the germination of seeds, pupils should understand why. Hands-on practical is important for this type of concept development. A number of different activities can be carried out, each testing one condition for germination. For example, we can have seeds sown on moist tissue paper and the same type and number of seeds sown in the soil and see whether they germinate. Another activity could be about growing seeds in the dark and see whether they need light to germinate.

While doing any of these activities, however, it is important to consider the following:

- Pupils understand the aim of each activity.
- Only one condition is investigated in one experiment so that conclusions can be drawn. All other conditions, not under investigation, should be provided.
- A control is always important so that comparisons can be made and conclusions drawn.
- Pupils should be encouraged to write their observations, draw tables etc.
- They should be encouraged to make the correct measurements and observations, relevant to the experiment.
- They should come to a conclusion and interpret their results.

Part (c) (4 marks)

Item (c) required candidates to complete the different stages in the transformation of a seed into a plant. Candidates were required to draw two of the stages. Drawings showing germination – appearance of a root first then appearance of a shoot were

expected. However, drawings which showed the stages in the life cycle of a plant were also accepted.

Candidates had a lot of difficulty with the drawings. Most of the drawings were very badly executed and not scientific at all. Very few candidates were able to produce acceptable drawings. From the performance in this question, it seems that the skill of drawing has not been developed. As said before, drawing is an important scientific skill. There are special ways of drawing in science- for instance line drawings should be clear and not done in an artistic way. However, production of scientific drawings according to the norms was not being assessed. The drawings only had to be clear.

Some candidates showed the shoot first and then the root, some drew the root in stage 2 and only the shoot in stage 3. Some candidates drew fruits at stage 2 and yet others produced drawings which examiners were unable to interpret at all.

Pupils should be encouraged to draw in their science classroom. They can make drawings of the experiments they are carrying out on for examples, plants, electric circuit, water etc. Some points to remember when pupils are producing scientific drawings are:

- They have to draw what they are seeing, not what is in their mind.
- The drawing should be accurate, big enough to be clear, the details are given and labelling is important. For some candidates where the drawing was not accurate at all but correct labelling was given, candidates were rewarded.
- It is important that key features are shown.

Part (d) (2 marks)

Part (d) was based on a scientific experiment where the condition 'water' was being investigated on the growth of a plant.

A few things to remember for this item is that there is a number of information provided which are important to keep it valid. For instance it is important to state the following:

- One condition is being investigated
- Two plants are used – one as control
- The same type of small plant is used
- Fertile soil is provided to both
- Light is provided during the day to both
- Water is available only to one of the plants

Educators can use these types of questions and ask pupils to identify the different steps important in a scientific experiment. These include:

- What is being investigated?
- What are the other conditions provided?
- Can we come to a conclusion based on our set up?

(i) The first part was relatively well done by many candidates. A number of answers were accepted namely, right temperature, water availability, sunshine, fertile soil etc..

(ii) Candidates were asked which condition for plants to grow was being investigated. Very few candidates gave the correct answer, that is, the availability of water. Some candidates only gave water as answer and they were rewarded the mark. However, a number of candidates did not know the condition being investigated or instead of giving the condition, they gave the possible outcome of the experiment, that is, plant A will die.

Asking questions at each step of an experiment is important. Pupils have to understand for instance that at the beginning of an experiment, one cannot draw a conclusion but can formulate a prediction or a hypothesis.

Part (e) (2 marks)

The question was about why it is important to replant trees. The Rodrigues context was given, where seeds are collected over the island and replanted, to prompt candidates to reflect on what is happening in Rodrigues and why it is important to replant trees. A number of answers were accepted and some of these were:

- To conserve endemic plants / to avoid extinction of endemic plants
- To prevent soil erosion
- To provide habitat and food to animals
- To maintain the oxygen-carbon dioxide balance in the atmosphere

QUESTION 5 (8 marks)

Question 5 assessed principally the application of the knowledge of candidates to a given context. There were three multiple choice items within this question but the average marks scored was not higher than 3.24. The context given was that of round island where no people live permanently but goats and rabbits were introduced in 1840.

Part (a) (1 mark)

This was a multiple choice item where candidates were required to identify whether goats and rabbits were endangered, endemic or exotic animals to Round island. The information that these animals were introduced to the island was given. They can thus not be endemic to the island. There is no direct information provided as to whether they are endangered but given that they were introduced, it means that they are exotic.

Candidates more or less equally chose options A, B and C with only slightly more choosing option C, the correct answer. It would seem that despite having learnt about the different types of animals, many candidates could not apply this knowledge to the given context.

Part (b) (1 mark)

The item stated that '*The goats and the rabbits contributed to soil erosion on the island.'* Candidates had to find the answer which explained how. For this item, they had to draw on their knowledge from the topic animal where they learnt about herbivores, carnivores etc… Since goats and rabbits are herbivores, they would feed on grass and leaves. This will bare the soil which remains unprotected from the actions of rain and wind and cause soil erosion. Thus option A – *They overgrazed the land* was the correct answer. Eating all the animals found inside the soil will not cause

soil erosion and if they lived on the rocky parts of the island, they would have minimal impact or influence on soil erosion.

Part (c) (1 mark)

An animal which has disappeared from the Earth is said to be extinct. The word *'extinct'* was the expected answer. Candidates had difficulty in writing the word extinct.

Part (d) (3 marks)

(i)&(ii) Candidates were expected to interpret the information given. If the burrowing boa (the name itself gives away the answer) has disappeared due to soil erosion, it would mean that its habitat has been destroyed. With soil erosion, it is not the concrete walls (since it is an uninhabited island there are no concrete walls) which is affected, nor the seawater. However, the soil would definitely be washed away and the habitat would be destroyed. If candidates understood what soil erosion is, they could easily find the correct answer.

Though a number of candidates found the answer to part (i), they had a lot of difficulty to explain their answer. Even by repeating the given information, candidates could explain their answer. They were expected to say that given that the burrowing boa has disappeared due to soil erosion, it has lost its habitat which was the soil.

Part (e) (2 marks)

In part (e) the context of the keel-scaled boa was given. Information about its habitat and diet were also given. The question required candidates to give one way how this boa can be protected.

The information already provided should help candidates in finding the answer. For instance, preserving the palm trees would mean preserving their habitat and in the same way, conserving the lizards/geckos would imply that their source of food is preserved and thus they are protected from extinction.

Other answers were also accepted though not related to the context given. For example, passing laws to protect them/ not to kill them was one of such answers.

QUESTION 6 (8marks)

The mean mark on this question was 3.2 which suggests that candidates found it generally challenging. This question assessed the inquiry skills of candidates but also the application of their knowledge. It also tested skills such as reading information given in a table and the identification of a trend or pattern.

Part (a) (1 mark)

Part (a) assessed one of the conditions necessary when carrying out an experiment so that the results of the experiment are valid. In an experiment, the fixed variables should be the same in all the set up. Thus if the investigation is about finding which of the tap water or the bottled water will boil first, the other variables such as the intensity of the flame, the recipient used to boil the water, whether they are covered or not, the amount of water, should all be the same for the two types of water. The only thing which varies is the type of water – one tap and one bottled. Thus option A – *Use exactly the same amount of tap water and bottled water* – was the correct answer. Many candidates were able to find this answer.

Part (b) (2marks)

In the first part, candidates were expected to read the table with the information given on the temperature at regular intervals for the tap and bottled water. They had to identify which of the tap or bottled water was at a higher temperature at 12 minutes. The information could be extracted directly from the table and candidates only had to tick the correct box. Most candidates were able to find the correct answer for this part.

For part (ii) candidates were to suggest a possible temperature of the tap water at 9 minutes. This item was based on their reading of the table and identification of a pattern. The expected answer was a temperature somewhere mid-way between 72°C and 85°C, most probably 78°C to 80°C. However, any answer between 72°C and

95°C was accepted. This is because when we conduct an experiment, we often do not obtain the expected results.

Not obtaining the expected results is in fact a good way to develop a deeper understanding of the concepts or skills being taught. If here the temperature was indeed higher than 85°C when conducting the experiment, pupils should be encouraged to find out why this is so. It could be that when the recipients were uncovered to take the temperature, one was uncovered for a longer time for example.

In this way, pupils can more easily understand why the different precautions we take when conducting an experiment are important.

Part (d) (2 marks)

Part (d) is also about scientific investigation. It assesses the precautions one should take when conducting an experiment. A number of answers was possible as long as they were logical. These would include:

- Make sure the thermometer is correct
- Ensure that all steps are followed well
- Use a different thermometer in each pot
- Record the measurements again/replicating the experiment.

One of the key aspects being assessed here though was the importance of replicating an experiment to ensure that the results obtained are reliable.

Candidates had difficulty with this question and often did not respond to the question. Some stated *'use a thermometer'* .A thermometer was used in the experiment to measure the temperatures. Thus it is not by using a thermometer that one will ensure that the measurements are correct.

Part (e) (3 marks)

Part (i) was mostly well attempted. Candidates had to find the word '*condensation'*. The issue was rather that it was often wrongly written.

In Part (ii), candidates had to explain how the process of condensation is important in everyday life on the planet. It was expected that candidates related the process of condensation with the formation of rain and how without rain/ water life on Earth would be at stake. Though it was expected that candidates explain what happens when there is no rain – drought, plants and animals die, etc – even if they did not do so, their answer was accepted if they could say that rain will not be formed or there will be no rainfall.

CONCLUSION

The main finding from the Grade 5 paper is that pupils have not developed their inquiry skills enough. They should be encouraged to carry out hands-on activities and to develop a deeper understanding of concepts. They should be encouraged to constantly apply their knowledge to new situations. As given in the Grade 6 PSAC 2017 report, the following steps are important when conducting an experiment:

- The first step is to make an observation. Based on this observation and their prior knowledge, the observation can lead to a question.
- Forming a question is thus the second step. In this step, learners do not know the outcome of their investigation. They only want to know about a specific problem or question, for instance would seeds need soil to germinate, or what will happen if a plant is kept in the dark, or what will happen if hot water is put to a temperature below 0°C.
- Following the above steps, pupils can then come up with a hypothesis or a prediction. This is based on their prior knowledge, which allows them to make such a prediction. The outcome of the experiment can meet their prediction or it might not.
- It is only when the above steps are done that the actual experiment is conducted. During the conduct of an experiment, pupils should be encouraged to take the correct recordings or measurements and observations. They have to write down these information. This part will further develop another skill,

which is that to communicate the findings which can be in a tabular form or as drawings.

- Based on the observations made, a conclusion can be made where the hypothesis or the prediction is confirmed or not.
- If the expected outcome of the experiment is not achieved, it is interesting to interpret why it is so. This step will help in the deeper understanding of the different concepts.

All schools are encouraged to have a Science corner or a Science room where simple equipment and materials are readily available. The materials can be kept in different boxes, each box named for a particular topic, for example materials, soil, plants, energy & electric circuit, air etc… The following website gives a list of material that each school can have: http://ppds.pdst.ie/pcsparchive/science/equipmentreview.pdf . This list can be adapted according to the teaching and learning syllabus.
More ideas can be found on: https://www.fizzicseducation.com.au/Blog/x_post/Ideas-for-setting-up-a-primary-science-room-00127.html