



EXAMINATIONS COUNCIL OF ESWATINI
Eswatini Primary Certificate Education

Science (513/02)

Examination Report for 2023

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Key messages

Candidates are advised to carefully read each question before writing their answer and to make sure they address all aspects of the question. Successful candidates pay more attention to the wording of the stem of each question and make use of the information given in the question context.

Candidates should consider the number of marks available when answering each question. This indicates the number of separate points that each candidate will need in order to be awarded full credit. When naming indigenous foods that can be used to prepare a balanced meal, the candidates had to name indigenous sources of carbohydrates, proteins and fruits/vegetables in **Question 1(b)(i)**, instead of naming two sources of the same nutrient for example okra, pumpkin leaves and samp.

When planning an investigation, it is necessary to set out the work in a logical way and for it to be detailed enough for another person to follow. In addition, it is not important to copy out all the information given in the question.

Candidates should use appropriate specific terminology when phrasing their answers. Many candidates lacked the use of appropriate scientific terms for example in **Question 2(c)(i)** they attach / put the wires on the battery instead of connecting wires to the battery.

Many candidates displayed a challenge in answering questions that required investigative / experimental skills. Candidates did not give specific details in their descriptions where they were required to describe an experiment. In **Question 2(b)**, for example, candidates wrote that shine the light on the mirror instead of shine the white light onto the mirror submerged in water.

Inappropriate use of terms hampered candidates in **Question 2(c)(i)**, **Question 3(a)**, **Question 5(c)(ii)** and **Question 6(a)(iii)**.

General Comments

Science Paper 2 is a theory paper comprised of two sections, **Section A** and **Section B**.

Section A comprises of structured questions designed to test Assessment Objective A and B of the Assessment syllabus and has a weighting of 80%. It aims at assessing the level of candidate achievement in knowledge, comprehension, and application of scientific information in various contexts. The nature of this section requires that candidates cover all the theoretical aspects of the syllabus. Candidates need to be familiarised with the use of scientific vocabulary and command terms.

Section B is an alternative to a practical section designed to test Assessment Objective C of the Assessment syllabus and has weighting of 20 %. It aims at assessing the level of candidate achievement in investigative skills embracing the scientific method of inquiry. The nature of the section demands that candidates are exposed to as much practical activities and the science process skills as possible. Candidates need to be familiarised with basic laboratory equipment and apparatus as well as the skills to correctly use them. Over and above that, candidates need to be trained on the scientific method of inquiry, including designing of investigative experiments and the basic principles underlying investigative activities such as ensuring fairness, validity and reliability of experimental data, drawing conclusions from experimental data.

There were about 26 400 candidates who registered and wrote this paper.

There was a declined performance on this paper compared to the previous year.

Most candidates were unable to demonstrate sound knowledge and understanding of some areas of the syllabus. However, they displayed confidence with recall questions. A few candidates were able to develop effective responses in novel contexts by making links with the underlying scientific principles that are rooted in the syllabus.

No candidate scored 50 and above and quite a number scored between 0 and 9.

In general, questions that seemed easy were **Question 1(a)(i), Question 1(b)(i), Question 2(a)(i), Question 2(a)(iii), Question 3(b)(i), Question 4(a)(i), Question 4(c)(i), Question 6(a)(i), Question 6(a)(iii) and Question 6(d)** while **Question 1(a)(iv), Question 2(b), Question 2(c)(i), Question 2(c)(ii), Question 3(a), Question 3(b)(ii), Question 3(b)(iii), Question 4(b)(ii), Question 5(a)(ii), Question 6(c)(i), Question 6(c)(ii), Question 6(c)(iii), Question 7(b)(i) and Question 7(b)(ii)** were found to be the most challenging.

Misconceptions of scientific concepts were common e.g evaporate the mixture and salts crystals remain instead of heat the mixture to evaporate the water until salt crystals remain, incorrect spelling was also common e.g potential was written as potencial / potantion. Candidates should take care with spelling,

particularly in terms such as potential, kinetic and pancreas. Spelling does not have to be perfect, but it does have to be unambiguous.

There was also the interference of colloquial language in description of a scientific process for example in **Question 6(a)(iii)** where some candidates wrote that smoke changes to water instead of water vapour / steam condenses to water.

However, a majority of the candidates had challenge of questions that required application of knowledge. It seemed they were familiar with the contexts but could not apply the knowledge in novel situations e.g. **Question 5(a)(ii)**, most candidates were unable to explain how a smart wrist band can help users improve their health, they copied the physical quantities that are measured by the watch as listed in Fig. 5.1. Instead, candidates were expected to state that the measurements by the smart wristwatch helps users to avoid overtraining.

Candidates had enough time to finish the paper and the paper was of the same difficulty as in previous year.

Comments on specific questions

SECTION A

Question 1

This question was challenging to most candidates.

- (a) (i) This question was fairly done. Candidates were supposed to state the term used to describe salt in a solution. Some candidates wrote incorrect terms including solvent, solution, mixture, solid.

Expected response: solute;

- (ii) This question fairly done. Candidates were expected to define volume. Common wrong responses were: volume is the amount of matter in an object / amount of space in an object which did not earn a mark.

Expected response: amount of space occupied by an object;

- (iii) This question was fairly done. Candidates were expected state a reason why dissolving salt is a physical change. Some common wrong responses were: salt can get back to its original state, salt and water form a solution. The water can be evaporated and the salt

will be left, a response which did not express clearly why the change is a physical change but was describing evaporation, a separating technique.

Expected response: no new substance formed / physical change can be reversed / reversible / constituents of the mixture can be separated by physical means / no energy is taken in / no energy is released;

- (iv) This question was challenging to most candidates. A few candidates managed to score at least one mark. In this question, candidates had to describe steps that they could use to separate salt from a mixture of a salt solution with undissolved salt. Common wrong responses were: decanting, listing the processes filtration and evaporation and not describing them; filtrate the salt solution instead of filter off the salt solution; boil the solution and the mixture will evaporate leaving the salt behind instead of that the water evaporates. In some cases candidates described simple distillation which did not earn a mark.

Expected response: filter off the salt solution/ filter off the undissolved salt;
the undissolved salt remains as a residue;
evaporate water from the solution until salt;
crystals remain;

- (b) (i) This question was challenging since candidates wrote names of non-indigenous foods. Common names of non-indigenous foods that candidates wrote were: spinach, beetroot, cabbage, carrots, lettuce, potato, apples. Common mistake made by the candidates who listed indigenous foods was to write indigenous foods that provide the similar groups of nutrients e.g. pumpkin leaves and blackjack leaves. Some candidates wrote names of indigenous foods in vernacular.

Expected response: any named indigenous sources of:
carbohydrates ; e.g. maize
protein ; e.g. dried beef
vegetables / fruit ; e.g. okra

- (b) (ii) This question was challenging to most candidates as they defined digestion instead of stating why food should be digested. Common wrong responses included: digestion makes food small for swallowing and that digestion is the breakdown of food into small particles.

Expected response: digestion breaks down food for absorption;

Question 2

This question was fairly done by most candidates.

- (a) (i) This question was generally well done. Common wrong response was static electricity.

Expected response: current;

- (ii) This question was challenging to most candidates as they repeated the information that was in the stem as their answer, which is that the switch is off. Another common wrong answer was 'wrong connection'.

Expected response: the circuit is not complete / current is not flowing in the circuit;

- (iii) This question was generally well done. Common wrong responses were sunlight and moon.

Expected response: sun / stars/ lightning;

- (b) This question was challenging to most candidates as they were unable to describe in detail an experiment to show that white light is made of different colours. The common wrong answer was: shine a torch onto a prism and the light shows different colours. Some candidates described an experiment whereby water is put into a bowl. A mirror is put into the water and hold it upright. A friend should shine a torch onto the mirror, and the light shows different colours. The candidates were supposed to be specific that the friend should shine the light onto the part of the mirror that is under the water. The candidates were also not able make it clear in their response that the white light splits into rainbow colours.

Expected response: pass white light through a transparent glass prism / shine a white light onto a mirror submerged in water;
the light will **split** into different colours;

- (c) (i) This was a very challenging question for the candidates due to use of wrong terms in their description of how to construct an electromagnet. Common wrong response was **roll** the wire **on** the nail and **attach** to wire to the battery, which resulted in the loss of marks.

Expected response: tightly **wind** insulated wire / coil wire;
around a core;
connect the wires to the battery;

- (ii) This question was accessible to most candidates as they were able to explain how an

electromagnetic device can be changed to keep heavier doors closed. Common acceptable responses included: add number of cells and increase number of coils. A few candidates gave wrong answers, for example, add wire, add more magnets.

Expected response: increase number of turns on coil;
increase current in the circuit;

Question 3

The question was challenging to most candidates as they were unable to score 5 out of 10.

- (a) This question was fairly done. Most candidates were able to score the first mark where candidates were expected to describe the cause of day and night. Candidates lost the mark by writing that day and night is caused by the rotation of the Earth around the Sun. Another common response was that the Earth revolves around the Sun. A few candidates scored the mark for stating 24 hours as the period for rotation to cause night and day.

Expected response: rotation / spinning of the Earth towards or away from the Sun;
in 24 hours;

- (b) (i) This question was generally well done as most candidates were able to correctly name the instrument used to measure rainfall although there were incorrect spellings of rain gauge, for example, raingange.

Expected response: rain gauge;

- (ii) The question was challenging to most candidates as they could not explain how evolution brings about the temperature changes seasonally. Instead some candidates opted for the definition of revolution or stated that revolution causes seasonal changes which didn't earn them any mark.

Expected response: as the Earth revolves , it is tilted on the axis;
when part of the Earth is tilted towards the Sun, it is hot(ter), it is Summer /when part of the Earth is tilted away from the Sun, it is cold(er), it is Winter;

- (iii) The question was challenging to most candidates as they could not state why the moon is important to the solar system. Instead most candidates response was that the moon give light at night when it reflects light from the Sun to the Earth.

Expected response: influences tides and waves to make the Earth's climate stable / controls the length of day and night on Earth / stabilizes the rotation of the Earth;

(iv) This question was generally well done as most candidates were able to correctly label nimbus as the cloud that causes rainfall. A few candidates named all the clouds which resulted in the loss of marks. Some candidates did not attempt the question.

(v) Question was challenging to most candidates' responses showed inadequate understanding of how drought affects people's lives. A majority stated either that people and animals will die, without stating that the death will be because of water shortage and food scarcity and or/ drought will cause soil erosion, natural disaster, dirty water.

Expected response: shortage of portable water / increased risk of wild fires / hunger and famine / social conflict / scramble / competition for water and food;

(c) This question proved to be challenging to most candidates as they could not suggest common cause of land pollution in areas where sugar cane plants are grown and treated in large quantities. Most candidates wrong responses were that sugar cane makes the ground dirty during the cutting season, and overgrazing, crop rotation.

Expected response: heavy use of machinery / heavy use of chemicals, pesticides, herbicides / spillage of oil;

Question 4

This question was fairly done, most candidates were able to score at least 4 marks.

(a) (i) This question was generally well done by most candidates. Candidates were able to choose letter **A** as the letter which represent a fixed joint. A few candidates who wrote skull instead of choosing a letter, which resulted in the loss of the mark.

(ii) Most candidates were able to correctly state the function of part **B**. A few candidates lost the mark as they listed the kidneys and the stomach as organs that are protected by the ribs and .

Expected response: protects important or vital organs in the chest / assists in breathing;

- (iii)** Candidates were expected to describe the role of muscles in the upwards movement of an arm. A few candidates were able to correctly describe that biceps contract and become shorter and fatter while triceps relax and become thinner and longer. Most of the candidates who remembered that biceps and triceps are antagonistic muscles, had a challenge of describing the roles of these muscles in the upward movement of an arm. Some candidates lost marks due to failure to give a complete response. For example, biceps become shorter and fatter and triceps become thinner and longer.

Expected response: biceps contract;
triceps relax;

- (b)** **(i)** This question was accessible to most candidates. They were required to state an excretory product passed out through lungs. Some lost marks for giving wrong answers such as exhaled air, moist air, wrong spelling e.g. carbon dioxide and wrong formula e.g. CO₂.

Expected response: carbon dioxide / water (vapour);

- (ii)** The question proved to be challenging to most candidates. Candidates were required to describe the importance of excretion in the human body. A few candidates could recall the importance without describing it fully. Common wrong response was to remove waste products which are not needed by the body without stating that the waste products are toxic.

Expected response: expels toxic waste from the body;
to ensure fairly constant amount of materials in the body;

- (c)** **(i)** This question was generally well done as all candidates were able to correctly name part labelled **G** although some wrote wrong spelling e.g. pancreise, pancrease. Some candidates lost the mark for naming part **G** using its vernacular name, lubendze.

Expected response: pancreas;

- (ii)** This question was fairly done as most candidates were able to state the function of part **H**, the small intestines. Common wrong responses were that part **H** transports food to the large intestines and that part **H** stores food.

Expected response: further digests food / absorption of nutrients / absorption of end

products of digestion / moves food along the intestinal tract;

- (d) This question was challenging for most candidates as they could not state the function of iron in the body. Common wrong responses were 'iron is for the formation of blood instead of the formation of red blood cells, iron replaces blood, iron adds blood'.

Expected response: assists in transporting oxygen from lungs to all parts of the body
/ formation of haemoglobin / formation of red blood cells;

Question 5

This question on science and technology was challenging as a few candidates managed to get 5 out of 10 marks.

- (a) (i) This question was fairly done as some candidates were able to describe technology. A few candidates lost the mark as they wrongly described as 'the ability to do work, making tools to improve life, and to solve life problems.'

Expected response: creation /usage / knowledge of tools / techniques to solve problems;

- (ii) This question was challenging to most candidates as they could not explain how the wrist band helps users to improve their health. Most candidates showed lack of application of knowledge as they repeated the information that was given in Fig. 5.1. Common wrong answers were that the smart watch tracks heart rate, energy burnt down tracks and tracks number of steps taken during exercise.

Expected response: helps users to avoid overtraining / reduce injury / reduce fatigue;
gives information about the health of the heart;

- (iii) This question was challenging to most candidates as they could not describe one disadvantage of using a smart T-shirt which was shown in Fig. 5.1. Common wrong responses were electric shock when sweating while wearing the smart T-shirt or when washing it, and that the T-shirt is heavy.

Expected response: could cause skin cancers / smart clothes are expensive
/ producing smart clothes could have negative environmental effect;

- (b) (i) This question was generally well done by most candidates. Most candidates were able to name one technology used in entertainment.

Expected response: mobile phones / tablets / wireless earphones / virtual reality / augmented reality / wearable technologies / Netflix;

- (ii) This question was fairly done. Most candidates were able to identify dangers associated with a named technology in communication. Common correct response was smart phone and the danger being cyber bullying / addiction / sending pictures to strangers. Some candidates had a challenge in stating the appropriate danger e.g. a smart phone with bursting of a battery stated as the associated danger.

Expected response: named technology e.g. cell phone;
omnipresent destruction / social isolation / dehumanizing
/ depersonalisation / lack of privacy;

- (c) (i) This question was generally well done. Candidates were expected to state the forms of energy possessed by water in a tank and energy possessed by moving water. Most candidates correctly recalled the forms of energy as potential energy and kinetic energy. Some candidates lost marks due to incorrect spellings i.e. potencial, potacion, knetic, kaynetic. Candidates should take care with spelling, particularly in terms such as potential, kinetic and pancreas. Spelling does not have to be perfect, but it does have to be unambiguous. Some candidates wrote stored energy and moving energy and were not credited marks.

Expected response: potential energy;
kinetic energy;

- (ii) This question was fairly done. Candidates were required to explain why wind is a better source of energy than coal. A few candidates gave good responses such as 'wind is clean and renewable while coal is non-renewable and pollutes the environment.' Some candidates showed lack of skill in answering questions that require comparison. It was common for these candidates to write that wind is renewable and did nothing mentioned about coal, and this resulted in losing the second mark. Some candidates wrote that the electricity produced from coal pollutes the environment, yet it is the coal that causes pollution.

Expected response: wind is clean energy source / wind is renewable;
coal pollutes the environment / coal is non-renewable;

SECTION B

This section had two questions and candidates were expected to answer either of the two. It was noted with great concern that some candidates answered both questions. In such a case, the first question was considered for grading. As noted in the **key messages**, candidates are advised to carefully read the requirements of each section before responding.

Question 6 was the question of choice for most candidates compared to question 7.

Comments to the individual questions are as follows:

Question 6

This question was challenging to most candidates. Most candidates scored at most 4 marks out of 10. Candidates showed lack of interpolation skills especially in part **(c)**.

- (a) (i)** This question was fairly done as most candidates were able to correctly name the apparatus **N**. Most common answers for apparatus **P** were distilling flask, flask, boiling flask and conical flask. A few candidates were able to identify apparatus **N**. Common wrong responses for apparatus **N** was clinical thermometer or thermometer without being specific about the type. Some candidates were challenged by the spelling for thermometer and they wrote wrong spelling i.e. temometer.-

Expected response: **P:** flask;
 N: laboratory thermometer;

- (ii)** Most candidates were able to name the substance collected in Fig. 6.1. Responses such as distillate and solvent were common wrong answers as the question required the actual name of the substance.

Expected response: water;

- (iii)** This question was challenging to most candidates as they could not describe the process that takes place in a Liebig condenser. Candidates instead stated the process 'condensation' instead of describing it which was not credited. Some candidates wrote the name of the separating technique in Fig. 6.1 'distillation' which did not earn a mark.

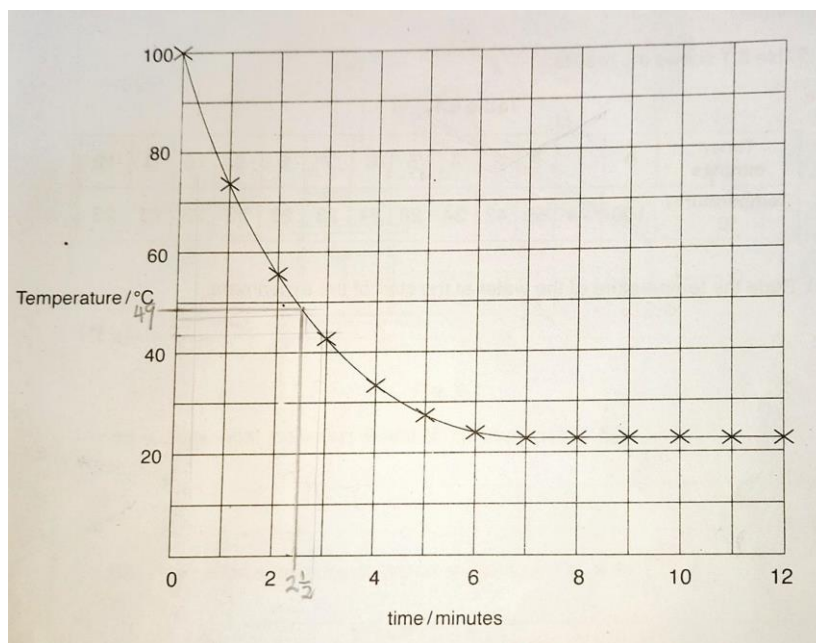
Expected response: water vapour or steam + cools to liquid water / water vapour or

steam + condenses to liquid water;

- (b) This question was fairly done by most candidates. The question required candidates to use the data in Table 6.1, to identify the temperature at the start of the experiment. Most candidates wrote the units incorrectly, for instance, $100\text{ }^{\circ}\text{c}$, 100° which led to a loss of marks.

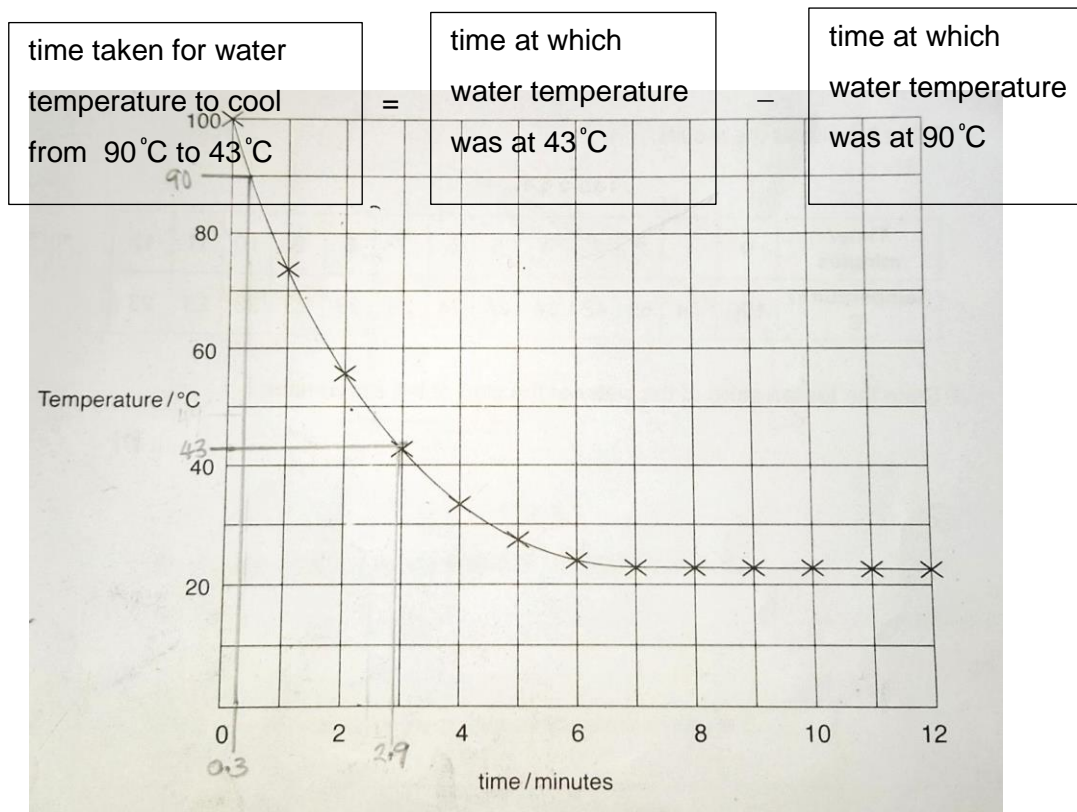
Expected response: $100\text{ }^{\circ}\text{C}$;

- (c) (i) This question was challenging to most candidates. Candidates were expected to find the temperature at $2\frac{1}{2}$ minutes using information from the graph. Most candidates lost the mark due to failure to show how they interpolated (draw a vertical line at 2.5 minutes to the curve and then draw a horizontal line to the temperature axis) to get the correct temperature.



Expected response: 48 ± 1 ;

- (ii) This question was challenging to most candidates. Candidates were expected to draw a horizontal line from the temperature axis, at $90\text{ }^{\circ}\text{C}$ to the curve and then draw a vertical line to the time axis to find the time at which the temperature of the water was at $90\text{ }^{\circ}\text{C}$. Many candidates did not use the graph to get time at which temperature of the water was $90\text{ }^{\circ}\text{C}$ and the time at which temperature of the water was $43\text{ }^{\circ}\text{C}$. Most of the candidates' response was $2\frac{1}{2}$ minutes which was taken from the stem in (c) (i).



Expected response: find correct values on graph; 0.3 min - 0.4 min and 2.8 min - 2.9 min correct time on graph;
= 2.4 min / 2.5 min / 2.6 min

- (c) (iii) This question was challenging to most candidates. Candidates had to look at the lowest temperature where the graph is horizontal which was the lowest temperature of the water after it cooled. A majority failed to use the graph to suggest the room temperature in which the experiment is done. Most candidates were unable to interpret data given in a table and on a graph.

Expected response: 23°C;

- (d) This question was fairly done as most candidates were able to name a possible mixture that can be separated using a bar magnet. Common mixtures named by candidates were pins and sand, paper clip and sand yet candidates were required to name a magnetic substance made of iron /cobalt /nickel and a non-magnetic substance.

Expected response: iron and sand;

Question 7

This question was attempted by fewer candidates, and it was challenging to the candidates. The question tested candidates' ability to use a measuring cylinder to measure the volume of a liquid.

- (a) This question was challenging to a majority of candidates. Candidates were expected to describe how a measuring cylinder can be used to accurately measure the volume of water. Most candidates were able to state that the measuring cylinder is placed on a flat surface and did not describe the specific detail that when reading the volume, *the eyes must be level with water level* and that *the reading must be taken at the bottom of the meniscus*. Another common error was candidates describing how to use a measuring cylinder to find the volume of a stone.

Expected response: place measuring cylinder on a flat surface;
place eye level horizontal with water level;
read volume at lowest point of meniscus;

- (b) (i) Candidates were expected to read and record the volume of water in Fig. 7.1 and the common answer was 43 cm^3 instead of 46 cm^3 . Candidates showed lack the skill of reading an analogue scale.

Expected response: 46 cm^3 ;

- (ii) This question was challenging to most candidates as they could not find the volume in (b) (i). Some candidates did not read the stem of the question carefully, such that they did not use the given formula, $V_3 = V_1 - V_2$. The most common incorrect response was $67 - 43 = 24\text{ cm}^3$.

Expected response: $67 - 46 = 21\text{ cm}^3$;

- (c) (i) This question was challenging to most candidates. Candidates were expected to name the instrument used in the outlined experiment to find the mass of the test tube. A majority of candidates could not remember the name the instrument shown in the diagram. Most candidates' wrong responses were: balance, digital scale, electronic scale, kitchen scale and beam balance.

Expected response: electronic balance;

- (ii) This question was fairly done by most candidates. Candidates were expected to state one difference between mass and weight. It was noted with concern that some candidates still show lack of comparison skills. Some candidates lost the mark for not using comparative statements i.e. mass is the amount of matter in an object and weight is measured in

Newton, which was not awarded a mark.

Expected response:

differences	mass	weight
definition	amount of matter present in a substance	a measure of how strong gravity pulls on that matter
location	remains the same in all planets	changes from one planet to another
measured using a	balance	spring balance
unit	kilogram / gram	newton;

(iii) This question was challenging to candidates even though the candidates were given a formula to calculate density using V_3 in **(b)(ii)**. Common answer were $\frac{67}{60} = 1.12$,

$$\frac{60}{67} = 0.9, \frac{60}{24} = 2.5, 60 - 24 = 36.$$

Expected response: $\frac{60}{21}$;
= 2.86;