

# PRINCIPAL EXAMINER'S REPORT



BOTSWANA  
EXAMINATIONS  
COUNCIL

**JCE SCIENCE**

**2021**

## GENERAL COMMENTS

### PAPER STRUCTURE

According to the Science Assessment Syllabus, paper 2 accounts for seventy percent (70%) of the final grade awarded in the subject. There were eighty marks available to assess knowledge, understanding, and application in the three major science domains of physics, chemistry, and biology.

**Section A** consists of short-answer questions designed to assess students' ability to respond to knowledge and adequately understand application items. This section is worth sixty (60) marks.

**Section B** is a section which evaluates candidates' ability to plot a graph and demonstrate experimental and investigative skills. This section of structured question is worth twenty (20) marks.

The science assessment syllabus contains vital information on the three broad skill areas of assessment, including the assessment grid, grade descriptors, and data presentation. Centres are also advised to adhere to the conventions and standards outlined on pages 16 and 17.

### SUGGESTED CONSIDERATIONS BY CENTRES

Candidates were neither disadvantaged nor benefited in any way because marking standards were maintained. Centers should never assume that major events, such as the covid-19 pandemic, will result in candidates receiving special treatment during the marking process. The marking procedure follows a set of instruments, a mark scheme, and marking guidelines in order to ensure consistency and reliability. The following are some of the considerations suggested by examiners to Centres:

**a) Language deficiencies**

Though marks are never assigned based on candidates' sentence construction skills, candidates' quality in this area is extremely disappointing. It is expected that candidates should be able to construct basic and readable sentences after ten years of basic education but there were times when candidates' responses were misunderstood due to lack of communication skills. Questions 7 d), 8 a), and 11 a) all assessed the same skill of defining scientific concepts of recalling what was stated during the learning process. However, it was disheartening to come across responses that were poorly constructed or unreadable, resulting in a loss of marks on questions deemed too easy.

**b) Experimental skills**

Not to imply that candidates completely failed to meet the related assessment objective, they demonstrated insignificant knowledge of how to use apparatus and materials to complete experimental tasks. Such attributes were assessed in questions 6, 8, 12, and 14. Furthermore, the majority of the candidates demonstrated poor skills in interpreting and evaluating data, as well as making observations and drawing conclusions. Centres are therefore advised to avail more time and opportunities for candidates to practice experimental activities.

**c) Using line of best fit**

Candidates are expected to demonstrate appropriate skill in joining points using a line of best fit after transferring data from a table to a grid. The vast majority of them lacked this ability. Despite the fact that candidates made an admirable effort to translate data from the results table to the grid. Like the previous cohort, the majority of them failed to notice anomalous points, which frequently caused them to fail to draw a smooth curve.

## **d) Reading of scales**

Candidates were required to demonstrate their ability to read scales in questions 1 c) and 13 a). The majority of the average candidates performed admirably in reading the scale on a thermometer, but there was a slight stumbling block at Q.13 a), where plotting of points using a given scale was concerned. Some candidates still require more practice in order to master this skill.

## **e) Computation skills**

Few candidates performed well in doing some calculations as required in Q.1(c)(ii) and Q.11(c)(i). Candidates must be advised to always clearly show the formula they used to solve a given problem. They must also present their work in the appropriate space. It is recommended that Centres consider increasing the time spent on calculations for continual improvement.

## OVERALL PERFORMANCE BY CANDIDATES

### SECTION A

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| 1 (a) | <p><b>Fairly done</b><br/>Candidates frequently made the mistake of stating human temperature when the question did not ask for a specific body temperature.</p> <p><i>Answer: Temperature</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                |
| (b)   | <p><b>Poorly done.</b><br/>Most candidates appeared not to have studied the diagram in order to complete the task. The common responses given were about constriction, capillary tube, and bulb, though the question was on the scales of the thermometers.</p> <p>The majority just stated W starts at 35 °C and ends at 42 °C while X starts at -10 °C and ends at 100 °C. Centres to help candidates practice interpretation instead of stating what is already shown on the diagram</p> <p><i>Answer: Thermometer W has a shorter range than Thermometer X<br/>Thermometer W has a higher accuracy than Thermometer X</i></p> |
| (c)   | <p><b>i) Well done</b><br/>Candidates showed a good grasp of reading the scale with sub-division of 1°C. However, the common wrong response was 30.3 °C.</p> <p><i>Answer: 33 °C</i></p> <p><b>ii) Poorly done</b><br/>The majority of candidates did not know the formula for converting from the Celsius scale to Kelvins. More practice needs to be made available to candidates so that they master the skill of converting from one temperature scale to another.</p> <p><i>Answer: <math>T^{\circ}\text{C} + 273</math> / <math>33+273</math> or <i>ecf</i></i></p> <p><i>306 K</i></p>                                     |

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| 2 (a) | <p><b>Fairly done</b></p> <p>Though considered fairly done, the majority of the candidates did not state the scientific name of the joint. Despite the fact that it was acceptable, the most common response was the elbow joint. Some candidates mentioned the group under which it is classified.</p> <p><i>Answer: Hinge</i></p>                                                                                                                                                                                                                                                                                                 |
| (b)   | <p><b>Poorly done</b></p> <p>Candidates showed poor grasp of how antagonistic muscles work to bring about movement. Furthermore, there was evidence of language deficiency with students using words such as constructs, contrast and expand in an attempt to complete the task. One common response was that muscle <b>Y</b> gets thicker and muscle <b>Z</b> gets thinner.</p> <p>In some Centres, candidates decided to describe movement in terms of biceps and triceps instead of using muscles <b>Y</b> and <b>Z</b> as stated in the question.</p> <p><i>Answer: Contraction of Muscle Y and relaxation of Muscle Z.</i></p> |

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| <p>3 (a)</p> | <p><b>Fairly done</b><br/>There were some Centres that named the process as period/bleeding. There is need to help candidates differentiate between <i>naming a process</i> and <i>describing a process</i>. The common wrong spellings of the process were mentrustation and mensuration.</p> <p><i>Answer: Menstruation</i></p> <p>(b) <b>(i) Poorly done</b><br/>There was too much guesswork as they did not use the given key to help them complete the task. Candidates picked any day from the calendar given. Some did not write the specific date, but simply stated "Day 7" or "7<sup>th</sup> day".</p> <p><i>Answer: 7<sup>th</sup> (April)</i></p> <p><b>(ii) Poorly done</b><br/>Candidates lack understanding of the phases of the menstrual cycle. Most of them did not understand the process, so they gave implausible responses like avoiding pregnancy, disease prevention, and preparing for the next menstruation.</p> <p><i>Answer: In preparation for implantation/ to receive fertilized egg</i></p> <p>(c) <b>Poorly done</b><br/>Almost all the candidates failed this item. It is either the concept is not adequately discussed or taught, as evidenced by responses from top-performing candidates. Centres are therefore advised to put emphasis on when and how each phase occurs. The closest candidates to the correct answer were those that only counted the correct number of days after ovulation and failed to consider the same number of days <b>before</b> ovulation.</p> <p><i>Answer: 12<sup>th</sup> – 18<sup>th</sup> (3 days before and 3 days after ovulation)</i></p> <p>(d) <b>Poorly done</b><br/>Candidates failed to link the phase to the menstrual cycle. Just like the responses given in the preceding questions, the candidates lack understanding of the menstrual cycle. The common response was being <i>free from pregnancy</i> or <i>not getting pregnant</i>.</p> <p><i>Answer: Time when fertilization is unlikely</i></p> |
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| 4 (a) | <p><b>Fairly done</b></p> <p>It is very clear that candidates confuse the names of the stages in the life cycle of a mosquito, especially the last two. Some Centres named the stage <i>nymph</i>. The nymph usually looks just like the adult insect but is much smaller, hence not applicable to the cycle given in the question. So, there is a need to clear this misconception by the Centres.</p> <p><i>Answer: Pupa</i></p>                                                                               |
| (b)   | <p><b>Well done</b></p> <p>Most candidates were able to name the disease expected for the given question.</p> <p><i>Answer: Malaria</i></p>                                                                                                                                                                                                                                                                                                                                                                      |
| (c)   | <p><b>Poorly done</b></p> <p>Most candidates were not specific to <b>Stage 2</b> but rather stated ways of controlling or eliminating adult mosquitoes. Common responses were <i>using doom, cutting grass, or applying mosquito repellents when sleeping</i>. Centres are advised to encourage candidates to use generic names (e.g. insecticide) instead of brand names (e.g. doom).</p> <p><i>Answer: killing the larvae/ draining containers where water could collect/ adding oil to stagnant water</i></p> |



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| 5(a) | <p><b>Poorly done</b></p> <p>Candidates failed to place the arrows along the paths of the sensory and motor neurons. Some candidates drew the two arrows on the same side of the spinal cord. There were instances where arrows were haphazardly placed beyond the diagram. Centres are advised to assist learners with conventional ways of labelling or showing direction on a diagram.</p> <p>Answer: <b>Two</b> arrows drawn:<br/> First arrow <u>towards</u> CNS (spinal cord) from sensors<br/> Second arrow towards effector organ <u>from</u> CNS (spinal cord)</p>                                                                                                                                         |
| (b)  | <p><b>(i) Fairly done</b></p> <p>However, the most common incorrect responses were hand and sensory neuron. This could mean candidates have not grasped the concept of an <i>effector organ</i>.</p> <p>Answer: Muscle</p> <p><b>(ii) Poorly done</b></p> <p>The responses validate the above, that candidates are weak in understanding the concept. Some gave general functions of effectors and glands. The task at hand required candidates to relate the function of the effector organ to the illustration shown. A common response was, <i>respond to messages from the brain</i>.</p> <p>Answer: Contract to move the hand away from heat/ move parts to cause action after receiving messages from CNS</p> |
| (c)  | <p><b>Poorly done</b></p> <p>Few candidates managed to complete the task successfully. The majority of the candidates listed the two systems of communication as the <i>peripheral nervous system</i> and the <i>central nervous system</i>. This could imply that candidates are not aware that the two are parts of a system.</p> <p>Answer: Endocrine System; Nervous System</p>                                                                                                                                                                                                                                                                                                                                 |

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| <p>6 (a)</p> | <p><b>(i) Fairly done</b><br/>Some candidates were able to choose the jar in which the bicarbonate indicator changed from red to yellow. The other common response was jar 2.</p> <p><i>Answer: Jar 3</i></p> <p><b>(ii) Poorly done</b><br/>Because many of the candidates failed to explain their answers, it's likely that they assumed it was just jar 3. It's also clear that the candidates didn't understand the purpose of the investigation, which could have helped them explain their response. <i>Carbon dioxide levels rose</i>, was a common response. The rubrics already stated this point.</p> <p><i>Answer: Respiration by snail (producing carbon dioxide)</i><br/><i>No photosynthesis occurring (to use carbon dioxide)</i></p> <p><b>(b) Fairly done</b><br/>Candidates either selected jar 2 or jar 3, depending on the response given earlier at 6 (a) (i). There were only a handful that selected jar 1.</p> <p><i>Answer: Jar 2</i></p> <p><b>(c) Poorly done</b><br/>Candidates have a poor understanding of the process because they provided incorrect substances as the ones used during respiration. Starch is not a reactant during respiration, contrary to popular claim by candidates.</p> <p><i>Answer: Oxygen / glucose</i></p> |
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| 7 (a) | <p><b>Poorly done</b></p> <p>The candidates either did not study the table or did not understand what the concept "state of matter" meant. Some candidates subtracted the temperature difference between the melting and boiling points. Those who were familiar with the three states of matter misplaced them. The majority of candidates did not attempt the question in some Centres.</p> <p><i>Answer:    Substance X – gas<br/>                 Substance Y – solid<br/>                 Substance Z – liquid</i></p> |
| (b)   | <p><b>Fairly done</b></p> <p>Candidates were unable to demonstrate that the difference in boiling points between the two could be used to determine the separation technique to use. Filtration and evaporation were the most frequently mentioned responses.</p> <p><i>Answer: (Simple) Distillation</i></p>                                                                                                                                                                                                               |
| (c)   | <p><b>Fairly done</b></p> <p>Some candidates were able to describe the effect of impurities on the boiling point of water. However, some attached the higher boiling point of <b>Z</b> (118 °C) as the reason for the increase in the boiling point of water. They failed to describe the principle.</p> <p><i>Answer:    Boiling point increases<br/>                 Presence of impurities in water</i></p>                                                                                                              |
| (d)   | <p><b>Poorly done</b></p> <p>Candidates defined melting but did not refer to the change occurring at a specific or particular temperature. Some candidates failed to demonstrate that melting is a change of state by simply stating that the melting point is the point at which a substance melts.</p> <p><i>Answer: <u>Temperature</u> at which a solid changes into a liquid</i></p>                                                                                                                                    |

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| 8 (a) | <p><b>Well done</b></p> <p>Though majority demonstrated a good understanding of the concept, some confused reflection to refraction.</p> <p><i>Answer: Bouncing back of light from a surface</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| (b)   | <p><b>(i) Poorly done</b></p> <p>The candidates failed to show a good grasp of the concept of showing angles. Some labelled along the rays, while others just placed <i>i</i> and <i>r</i> without indicating the start and end of the sector representing the angles.</p> <p><i>Answer: i correctly labelled between the normal and incident ray<br/>r correctly labelled between the normal and reflected ray</i></p> <p><b>(ii) Fairly done</b></p> <p>The main issue was a lack of language skills when attempting to describe the characteristics of the image formed. The most common responses were that the image is equal, the image is identical to the object, and the image appears to be an object. Centres must assist candidates in developing appropriate scientific vocabulary and statements.</p> <p><i>Answer: Same size as the object/ upright/ laterally inverted/ virtual/ same distance behind the mirror as object is in front of the mirror</i></p> |
| (c)   | <p><b>(i) Poorly done</b></p> <p>Almost all the Centres handled the question poorly, as candidates failed the task. The most common response was that the image's size changed or that the image had an irregular shape. Either the candidates did not understand the concept, or they were hampered by a language barrier.</p> <p><i>Answer: Image is distorted/ blurred/ appears multiple</i></p> <p><b>(ii) Poorly done</b></p> <p>Because the previous question is linked to this one, candidates also failed the item. More practical activities on such concepts should be allowed in Centres, followed by extensive discussion to aid in the retention of what was observed.</p> <p><i>Answer: Diffuse reflection of light rays/ incident ray scattered at different directions rather than the same.</i></p>                                                                                                                                                         |

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| 9     | <p><b>Fairly done</b></p> <p>Candidates performed admirably on the function of the ear flap. The second part of the task was poorly done. Three small bones, hearing nerves, and the cochlea were the most common responses. Instead of what happens to the eardrum when sound reaches it, the candidates indicated what happens to it. Where candidates were expected to describe the function, their language skills let them down.</p> <p><i>Answer: <b>Ear Flap</b> - receives sound from the environment</i><br/> <i>Auditory nerve – <b>Transfer electrical impulses from cochlea to the brain</b></i><br/> <b>Ear Drum</b> - Transmits vibration to the middle ear/ change sound waves<br/> <i>Into vibration</i></p> |
| 10(a) | <p><b>Poorly done</b></p> <p>Candidates exhibited a lack of understanding of sound characteristics and the factors that influence them. They incorrectly associated frequency with loudness and amplitude with pitch. It is suggested that Centres consider stepping up their practical work on this particular topic.</p> <p><i>Answer: <b>Frequency of sound wave increases</b> - Pitch of the sound increases/ Pitch becomes higher than before</i><br/> <b>The amplitude of the sound wave decreases</b> - The loudness of the decreases/ Sound becomes softer than before.</p>                                                                                                                                          |
| (b)   | <p><b>i) Well done</b></p> <p>Most candidates were able to make the right choice between the two children.</p> <p><i>Answer: Child X</i></p> <p><b>ii) Poorly done</b></p> <p>The majority of the reasons given were not scientific and did not address the speed of sound principle. Candidates made no connection between the speed of sound and the medium through which it is transmitted. Despite the fact that the rubric stated that the two children, X and Y, were the same distance from the builder, the majority of candidates stated that child X was closer.</p> <p><i>Answer: Sound travels faster in solids</i></p>                                                                                          |

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| 11(a) | <p><b>Poorly done</b><br/>Candidates failed to connect time and distance travelled by an object in order to define speed. Some candidates provided insufficient definitions, such as how quickly or slowly an object moves, as well as the amount of time and distance an object travels. Despite the fact that it appeared to be a simple recall item, the task proved to be too difficult. As a result, Centres should ensure that candidates are aware of such concepts and that they are not presumed easy.</p> <p><i>Answer: Distance travelled in a unit time/ rate of change of distance</i></p>                                                                                                                                                                                                                                                                                                                                                          |
| (b)   | <p><b>Poorly done</b><br/>The majority of candidates answered as if the question was about a speed-time graph instead of a distance-time graph. This demonstrates that candidates do not devote enough time to studying diagrams prior to responding. Some candidates' responses reveal that they struggle to use words interchangeably without taking context into account. The word "constant" was used in place of "non-moving." Some candidates incorrectly assumed that the object would remain at the same distance.</p> <p><i>Answer: Vehicle at rest/ vehicle not moving/ stationary</i></p>                                                                                                                                                                                                                                                                                                                                                             |
| (c)   | <p><b>(i) Fairly done</b><br/>Despite the fact that the task required candidates to calculate speed using the formula for finding a gradient, the formula for speed = distance÷time yielded the same result. As a result, candidates obtained their scores incorrectly. It is recommended that Centres provide candidates with more practice time manipulating distance-time graphs.</p> <p><i>Answer: Speed = <math>\frac{\text{Change in y-axis}}{\text{Change in x-axis}}</math><br/>= <math>(200 - 0) / (2 - 0)</math><br/>= 100 km/h</i></p> <p><b>(ii) Poorly done</b><br/>Almost all of the candidates were unable to complete the task. Candidates clearly do not understand the relationship between resultant force and constant speed. The most common responses were that there is a lot of driving force and no air resistance on the road.</p> <p><i>Answer: The two forces are equal/ air resistance and driving force balance each other</i></p> |
| (d)   | <p><b>Fairly done</b><br/>Candidates, as previously stated, misunderstand motion graphs. Some of them attempted the task as if it were a displacement–time graph, resulting in the</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

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|  | <p>vehicle heading in the wrong direction after resting (4,300) to (6,0). Most, however, could demonstrate the time it takes to travel the last two hours.</p> <p><i>Answer: Straight line going upwards from (4, 300) to (6, 600)</i></p> |
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| 12(a) | <p><b>Poorly done</b></p> <p>Almost every candidate in the cohort failed the task. The two types of electric current, alternating current (AC) and direct current (DC), were clearly unfamiliar to the candidates. "Battery and series circuit" were the most common responses. It is recommended that Centres provide additional explanations whenever possible. Electromagnets are required of candidates, and it would be beneficial for them to understand that they cannot be made using any form of current.</p> <p><i>Answer: Direct Current / DC</i></p>                                                                                                                                                                                      |
| (b)   | <p><b>i) Fairly done</b></p> <p>Candidates' responses were plausible. The main issue was a language barrier, which caused some responses to be distorted. The most common responses were "electrical magnet" and "bar magnet." Some candidates muddled the question by stating the type of magnetization.</p> <p><i>Answer: Electromagnet/ Temporary magnet</i></p> <p><b>ii) Fairly done</b></p> <p>The responses given were mostly congruent with their choices at 12(b)(i). However, there were misconceptions as some thought iron was the only magnetic material, hence responses such as <i>iron being the only one used to make magnets</i>.</p> <p><i>Answer: It is a soft magnetic material/ it is easy to magnetize and demagnetize</i></p> |
| (c)   | <p><b>Fairly done</b></p> <p>In some cases, candidates named the entire body as containing magnetic material rather than a specific part. They might, for example, use a computer instead of a monitor. The goal was to find parts that functioned because of their magnetism.</p> <p><i>Answer: Electric doors/ speakers and microphones/ cranes to lift heavy objects/ doors of refrigerators/ TV and computer screens/ scrap yards to separate materials/ etc.</i></p>                                                                                                                                                                                                                                                                             |

SECTION B

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| 13(a) | <p><b>Fairly done</b></p> <p>The majority of candidates were successful in transferring data from the table to the graph grid provided. However, connecting the majority of the points to form a smooth curve proved difficult. Learners should have more opportunities to practice drawing a line of best fit to connect points, which should be encouraged by Centres.</p> <p><i>Answer: All eight points correctly plotted on the graph and a smooth curve;<br/>8 Points are: (0, 12.0), (2, 7.2), (4, 4.0), (6, 3.8), (8, 2.4), (10, 2.2), (12, 2.2) and (14, 2.2).</i></p>                              |
| (b)   | <p><b>Fairly done</b></p> <p>Some candidates were able to extrapolate the required mass from their graphs. Some did not show their work by having dotted lines intersecting on the smooth curve from both the y-axis and x-axis. Failure to show the work can lead to an unnecessary loss of marks. Hence, Centres need to enforce this requirement on learners.</p> <p><i>Answer: Working on candidates graph (extrapolation)<br/>Depending on which co-ordinates candidate considered to be an error, any mass between 3.4g and 4.8g was accepted</i></p>                                                  |
| (c)   | <p><b>Fairly done</b></p> <p>Though candidates gave a range of 4–6 minutes instead of 4 minutes or 6 minutes, it can be inferred that they understand that there is always an element of human error during experiments. Though there was no unit penalty, candidates should be encouraged to always express quantities in their correct units.</p> <p><i>Answer: At 4 minutes/ 6 minutes</i></p>                                                                                                                                                                                                            |
| (d)   | <p><b>Poorly done</b></p> <p>The majority of candidates failed to draw the graph according to the instructions given in the task. This poor performance could indicate that candidates are unfamiliar with factors that influence reaction rates, or that they are unable to interpret how graphs representing faster reactions should be drawn in relation to graphs representing slower reactions. They also failed to demonstrate that the mass loss at the end of a reaction, whether slow or fast, should be the same.</p> <p><i>Answer: Steeper graph starting at (0,12)<br/>Levelling at 2.2g</i></p> |



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| (e)   | <p><b>Poorly done</b></p> <p>Candidates were unfamiliar with the concept of the law of mass conservation and thus failed to recognise that cotton wool provided an opportunity for some gas to escape. The mass of the reaction mixture changed as a result of the gas produced escaping; otherwise, the mass would remain constant. Some above average candidates generally responded that reactants had been used or that calcium had disappeared completely which was not the correct answer.</p> <p><i>Answer: Loss of hydrogen/ gas produced escaped</i></p> |
| 14(a) | <p><b>Well done</b></p> <p>The majority of candidates did well in stating the colour of the leaf at the stages in question. A common response was that the leaves would be pale yellow at stage 3. This could mean the candidates did not carry the stage to the end, hence the wrong colour was observed.</p> <p><i>Answer: Stage 1 – green<br/>Stage 3 – white</i></p>                                                                                                                                                                                          |
| (b)   | <p><b>Well done</b></p> <p>The majority of candidates were stating the correct reason, though some were hampered by language barriers. The most frequently given incorrect answers were to break and soften a leaf. These are, however, plausible responses because they are reasons for carrying out some of the experiment's steps.</p> <p><i>Answer: Dissolve out chlorophyll</i></p>                                                                                                                                                                          |
| (c)   | <p><b>Well done</b></p> <p>The majority of candidates were stating the correct answer, though some were hindered by language deficiencies. Centres encouraged to emphasis on the remembering of correct scientific words by candidates to avoid jeopardizing an opportunity to score marks, even though spellings were not penalized. Some even confused the required solution for benedict solution.</p> <p><i>Answer: Iodine (Solution)</i></p>                                                                                                                 |
| (d)   | <p><b>Fairly done</b></p> <p>The majority of candidates were successful in completing the task, though candidates must correctly state colours as provided in the assessment syllabus. Some candidates described the colour as navy blue, bluish black, or blue black. One common misunderstanding is that the leaf, rather than the reagent, is the one that changes colour.</p>                                                                                                                                                                                 |

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|       | <i>Answer: Iodine solution turns blue-black</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 15(a) | <p><b>Well done</b><br/>Candidates managed to identify the circuit component correctly. Spelling errors were minimal. A common wrong response was "<i>voltmeter</i>." In some Centres, candidates named the component as an "<i>amp-meter</i>." Centres are encouraged to use conventional names to minimise the confusion of candidates.</p> <p><i>Answer: Ammeter</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| (b)   | <p><b>Poorly done</b><br/>It appears most candidates did not know the formula to use. Some multiplied the quantities given, while others added them. For those that understood Ohm's law, they failed to calculate the potential difference using one bulb instead of two.</p> <p><i>Answer: <math>V = IR / (0.02 \times \frac{600}{2})</math><br/>=6V</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| (c)   | <p><b>(i) Poorly done</b><br/>The majority of candidates' responses were about the bulb's brightness, which resulted in them failing the task. <i>The bulb lights up brighter and the current flows faster</i>, which were two common responses.</p> <p><i>Answer: Current will increase</i></p> <p><b>(ii) Poorly done</b><br/>Because the two parts, <b>(i)</b> and <b>(ii)</b>, were intertwined, the majority of candidates who had failed the previous part automatically got this part wrong. Those who got the first part right, on the other hand, were unable to provide a reasonable explanation for why current flow increases. The most common response was that the bulb uses less energy. This question demonstrates that the candidates do not understand the relationship between voltage, current, and resistance.</p> <p><i>Answer: Resistance has decreased</i></p> |

## CONCLUSION

The candidates' overall performance fell short of expectations. In terms of the assessment objectives, Centres must put in a lot of effort to ensure that candidates have a basic understanding of science vocabulary, procedures, and problem-solving techniques. For teaching and learning science, Centres must increase their use of contemporary pedagogies. This report is intended to help the Centres improve their performance as such Centres must do extensive introspection to improve their results.