

EXAMINATIONS COUNCIL OF ESWATINI

JC

EXAMINATION REPORT

FOR

SCIENCE

YEAR

2020

JC EXAMINATION REPORT

FOR 2020

JC SCIENCE

Paper 414/02

General Comments

The paper proved to be more challenging than the previous year's. The overall performance of the candidates was not good, most of them scored below 40% of the available marks and only a few scored above 60% of the marks available.

The time allocated seemed sufficient as most of the candidates attempted all the questions.

Questions 2 (c) (i), 9(b) (ii) and 10(d) (e) (f) were most challenging since a majority of the candidates scored very few marks of the available total marks.

Questions 1 and 3(a) were easily accessible to the candidates as a majority of them were able to access the marks available in the questions.

Comments on specific questions

SECTION A

Question 1

(a) Well done by most candidates:

(i) Expected answer: switch
Common error was writing 'closed switch'.


(ii) It was well answered by many.

Expected answer: to measure the current flowing in the circuit.

Common errors included: to calculate electricity, to measure currency, to measure amperes.

(b) Fairly done by majority of the candidates. Marks were scored for the correct symbol and for the correct position i.e. across the bulb.

Most candidates were able to access the first mark for the correct symbol of a voltmeter.

Common error: —  —

Many lost the mark for the position of the voltmeter. They were placing it anywhere in the circuit and not across the bulb.

(c) Fairly done.

Most candidates scored the first mark for flow of electricity, but failed to mention that the material contains free electrons.

Expected answer: - material that allows flow of electricity and contains free electrons.

Common errors were: absorbs electricity, stops electricity and conducts electricity.

Question 2

It was a fairly done question

(a) Most candidates were able to give the expected answer which was malleable. A few wrong spelling of malleable, others wrote a correct and a wrong response e.g. ductile and malleable or shiny and malleable and marks were not awarded for that.

(b) (i) For the three marks, it was expected that the candidates should state that: water and oxygen; react with the iron; to produce iron oxide.

A majority of the candidates were able to mention water and oxygen, but failed to state the reaction with iron, instead they wrote metal. Very few were able to state the product of the reaction as iron oxide in stead they mentioned that a brown substance was formed.

Common errors:

- Iron mixes with oxygen and water.
- Iron in contact with rain and sunlight.
- A metal reacts with oxygen and water.
- A metal corroded to a brownish layer.

(ii) Most candidates were able to write the correct properties of a chemical change: irreversible, new substance formed and colour change.

(b) (i) This part was not well done. Very few candidates wrote the expected response which was: adding oxygen to remove impurities; adding additives (like carbon, nickel, chromium) to make steel/an alloy.

Apparently most candidates did not understand the question. They were mentioning what happened in the blast furnace to purify iron instead of mentioning how to improve iron from the blast furnace. The candidates incorrectly mentioned the reaction with coke and limestone and others described coating with zinc and galvanising.

(ii) Very few candidates were able to write the expected response which was,

iron(III) oxide + carbon monoxide → iron + carbon dioxide

Some were writing the products as the reactants and vice versa.

Question 3

(a) Well done. A number of candidates were incorrectly using arrows instead of label lines.

Expected answer;

- C – oviduct
- D – uterus
- E – ovary

(b) Very few candidates wrote the correct response. Many were writing either ovum or sperm, and lost the mark.

The expected answer was gametes.

(c) (i) This proved difficult for most of the candidates. Most of them just mentioned that it was the bleeding of a woman and that did not earn the mark.

Expected answer: shedding or breaking down of the inner lining of the uterus (uterine wall) and blood comes out of the vagina.

(ii) The expected answer was: delivery / release of an egg from the ovary'

Common mistakes were: - egg is produced in the ovary, ovum ready for fertilisation, production of egg in the ovary.

(d) Many of the candidates failed to mention lymphocytes or white blood cells but wrote soldiers of the body hence lost the mark.

Expected answer: HIV attacks and destroys lymphocytes, lowering the immune system

Question 4

This question was challenging; hence the performance was not good.

(a) The expected answer was: a construction showing an equal distance behind the mirror as girl is in front of the mirror.

(b) Very few candidates were able to make this construction. Majority of them placed the x on the girl's nose and not on the other side of the mirror. A sizable number did not attempt this question at all.

The correct answer were:

- showing the normal
- drawing the reflected ray and showing the correct direction
- equal angles from the normal ($i = r$)

Many candidates did not draw the normal. Those that attempted the reflected ray did not show the direction.

(c) A majority of the candidates did not realise that the comparison must be between a mirror image and a real image. They were comparing the mirror image with the object i.e. the girl. The main error was to consider the girl (object) as the image.

The expected answers were:

real image	mirror image
may be smaller /same size / large than object	same size as the object
upside down	upright
inverted	laterally inverted
variable distance from lens compared to object	same distance from mirror as object
can be formed on a screen	cannot be formed on a screen

Question 5

This question was fairly done.

(a) A majority of candidates were able to score the mark.
Expected response was fried chicken.

(b) Expected response:

spinach: provides roughage/provides calcium.

oranges: provide vitamin C/essential to heal wounds / keep blood vessels strong / build new skin

Some candidates lost marks because of giving general answers like, it protects against diseases or it gives mineral salts /vitamins.

- (c) (i) It was accessible to a large number of candidates

Expected response: glucose.

Common errors were starch and atoms.

- (ii) Expected response was: add iodine solution to the rice; a blue- black colour will indicate the presence of starch.

- Some candidates stated that you wash the rice and the white in the water shows that starch is present.
- Others mentioned colours like violet, blue or black and lost the marks

- (iii) This was not well done by a majority of the candidates. However, some candidates described mechanical digestion of the rice i.e. chewing and mixing with saliva for easy swallowing, they stated. Others stated that the rice tastes sweet in the mouth.

The expected answer was: digested by salivary amylase; into maltose.

- (d) Many of the candidates scored the first mark. They were able to mention proteins as the source of amino acids. The second mark was inaccessible to many candidates. Most gave fatty acids and left out glycerol, so lost the mark.

Question 6

A generally well answered question.

- (a) Expected response was downward displacement of water.

Common errors were not mentioning the water; others wrote distillation as the method.

- (b) Expected responses were, slightly soluble in water /denser than air.

Common error was giving chemical properties instead of the physical properties.

- (c) Expected answer:

test: bubble gas through lime water

result: limewater turns milky

A common mistake was to write a lighted splint for the test and splint goes off for the result and this was not in the syllabus. Reference to the syllabus is very important for the teachers. Another error was just to only state limewater without any description for the test and this led to loss of the mark since the question required candidates to describe. Other candidates stated that you add lime to the gas.

- (d) The majority of the candidates scored half the available marks here. They correctly stated that carbon dioxide contains two elements (carbon and oxygen) but failed to state that the elements are chemically combined.

- (e) This was an accessible mark to many of the candidates. They correctly stated that carbon dioxide does not support combustion.

Question 7

This question was generally not well done.

- (a) The expected response was:

Transverse waves are waves whose direction of motion is perpendicular / right angles to the direction of the vibration or disturbance.

Longitudinal waves are waves whose direction of motion is parallel to / same direction as/along vibration / disturbance.

Most of the candidates were not able to compare wave motion with vibration. They were stated that the waves were perpendicular or parallel to each other.

- (b) (i) This was accessible question to a reasonable number of the candidates. They were able to give **3cm** as expected. Some, however, lost the mark because they left out the units or wrote wrong units e.g. **Hz** instead of the **cm**.
- (ii) This was done well by most candidates: They were able to give 3/5 or 0.6 Hz, the few that missed it were those who did not know what a complete wave was, so they came up with different numbers to divide by the time.

Question 8

The performance was generally not good.

- (a) The candidates failed to remember that particles in a solid vibrate about a fixed position.
Common error: they move very slowly because they are tightly packed.
- (b) This question very challenging to candidates as some of them seemed to have thought that the straw was meant to show refraction.

Expected response:

observation: purple colour spreads throughout the water.

explanation: potassium permanganate particles moved from the region of their higher concentration to the region of their lower concentration.

A number of candidates incorrectly stated that the straw changed to purple and for the explanation they referred to the process as osmosis, stating that the particles moved through a semi-permeable membrane. Other candidates stated that the potassium permanganate melted in water.

Question 9

It was generally challenging to a sizable number of the candidates.

- (a) The expected response was: light energy.
Quite a number of the candidates gave heat energy as the answer and still scored the mark.
- (b) (i) potential energy \longrightarrow kinetic energy
- Quite a number of the candidates failed to score these marks since they simply wrote one form of energy i.e. either potential or kinetic energy. Others just wrote 'potential energy and kinetic energy' and failed to score the mark. Candidates were not showing the change from one form of energy to the next either by an arrow or 'changes into'.
- (ii) Many candidates failed to state the law of energy conservation. The expected response was; energy is neither created nor destroyed but converted or transferred from one form to another; **or** loss in potential energy is equal to gain in kinetic energy.

Common error: pressure in pipe as they are equal.

SECTION B

Question 10

This was a fairly done question.

- (a) This question was well done. The expected response was: **K** – condenser; **L** – evaporating dish
- (b) Most candidates lost marks as they gave the function of the equipment not the apparatus. Others saw **J** as a **Y**- tube and therefore gave a function completely different from the expected.

The expected response was; **J** – Separates insoluble solid from liquid.

M – Provides energy that drives the electric current.

(c) A majority of the candidates were able to state that it separates immiscible liquids as expected. A common error was giving examples like ‘water and oil’ without stating the properties of the liquids that cause them to separate.

(d) The candidates were expected to state that:

- Tie a small mass with string and suspend on the pin
- Mark the position of the string on the card with a line
- Suspend card with a different hole / position and repeat steps above
- Where the two lines cross, it’s the centre of mass of the card.

Most candidates were able to score at least a mark in this question. The most accessible mark was the one stating that centre of mass is represented where the lines meet. A Large number of candidates missed the point of tying a string with a small mass and hang it on the pin.

A common error was to state that you draw lines on the card from different directions and where the lines meet is the card’s centre of mass.

(e) This part was not well done. Candidates seemed not to understand what stability meant.

The expected response was: reduce the height of the car / widen the base of the car; to lower its centre of mass.

Common error was to state a change in the design in order for the car to appeal in the market or to look nicer.

(f) This part was fairly done by most candidates.

The expected response was:

- Identify flowers of the same size/ age / species
- Reference to different colours
- Expose the flowers to the same environment where insects can easily identify them
- Count the number of insects visiting each flower
- Record the number of insects visiting each flower
- Reference to specified time / duration of observation
- Repeat to get average /reliability
- Flower with the higher number of insects visiting it attracts insect more /or reverse argument.

(g) (i)

Initial temperature / °C	Final temperature / °C	Change in temperature / °C
47 ± 0.5	28 ± 0.5	19

A large number of the candidates erroneously took the readings either from where the liquid crosses the thermometer or where the thermometer passes the edge of the beaker, so they had **10°C** or **21°C** for initial temperature and **10.1 / 11 / 22°C** for final temperature.

(ii) Very few candidates got this part right.

Expected responses: bulb must not touch the sides and base of the container; eyes must be level with the bottom of the meniscus.

Common errors were:

- Look the thermometer straight
- Read below the meniscus

- Put on a flat surface