EXAMINATIONS COUNCIL OF ESWATINI
Junior Certificate Examination

CANDIDATE NAME								
CENTRE NUMBER					CANDIDATE NUMBER			

SCIENCE **414/02**

Paper 2 **October/November 2024**

1 hour 30 minutes

Additional Materials: Calculators may be used

READ THESE INSTRUCTIONS FIRST

Write your name, centre number, candidate number and name in the spaces provided.

Write in dark blue or black ink pen in the spaces provided on the Question Paper.

You may use an HB pencil for any diagrams, graphs, tables or rough working.

Do **not** use staples, paper clips, highlighters or correction fluid.

This paper consists of two sections (Section **A** and **B**).

Answer **all** questions.

The number of marks is given in brackets [ ] at the end of each question or part question.

The total of the marks for this paper is 80.

For Examiner's use	
SECTION A	
1	
2	
3	
4	
5	
6	
7	
8	
9	
SECTION B	
10	
11	
12	
Total	

This document consists of **15** printed pages and **1** blank page.

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For examiners use

SECTION A

Answer **all** questions

1 **(a)** Fig. 1.1 shows a flowering plant.

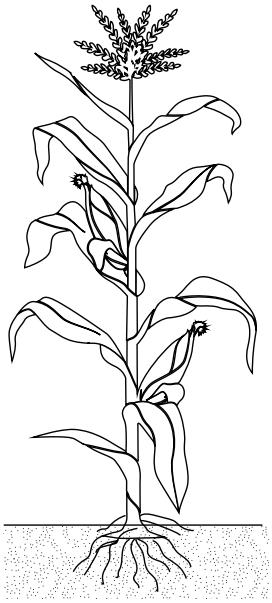


Fig. 1.1

(i) State the class to which the flowering plant in Fig. 1.1 belongs.

……..... [1]

(ii) State **one** visible characteristic you used to classify the plant.

……..... [1]

(b) Maize is a common source of the nutrient called carbohydrate.

(i) Describe the term *nutrient*.

……

……

……..... [2]

(ii) State the basic unit of carbohydrates.

……..... [1]

For examiners use

(c) Oranges contain vitamins.

Name the vitamin found in oranges and state its function.

vitamin……

function……

[2]

[Total:7]

2 A student accidentally spills vinegar, which is a weak acid, on floor tiles made of calcium carbonate.

(a) Complete the following equation for the reaction that occurs between the vinegar and the floor tiles.

vinegar + calcium carbonate ⟶ salt + …….. + ……..…. [2]

(b) State **one** physical property of vinegar that shows it is an acid.

……..... [1]

(c) Describe how you can use a named indicator to find the pH of vinegar.

……

……..... [2]

(d) Farmers often add bases like calcium carbonate to the soil.

Explain why farmers add a base to the soil.

……

……..... [1]

[Total:6]

[Turn over

For examiners use

3 Fig. 3.1 shows a set-up used to measure the temperature of water in a beaker.

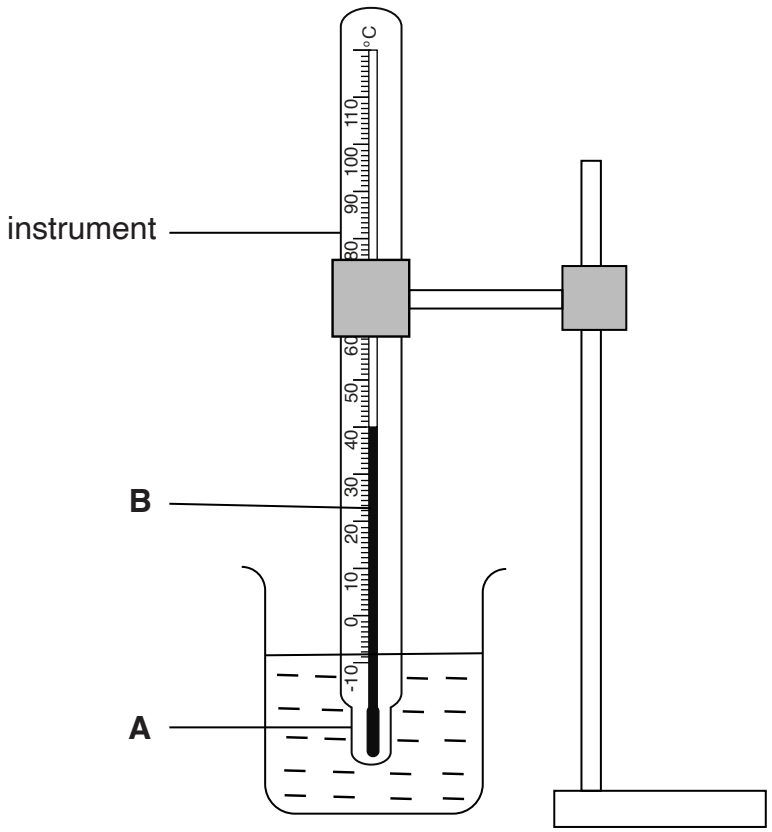


Fig. 3.1

(a) State the name of the instrument shown in Fig. 3.1.

……[1]

(b) Name the parts labelled **A** and **B** in the instrument in Fig. 3.1.

A……

B ……

[2]

(c) The water in the beaker in Fig. 3.1 is then heated using a Bunsen burner.

State and explain the observation made in the instrument.

observation .....……

……

explanation .....……

……

[2]

[Total:5]

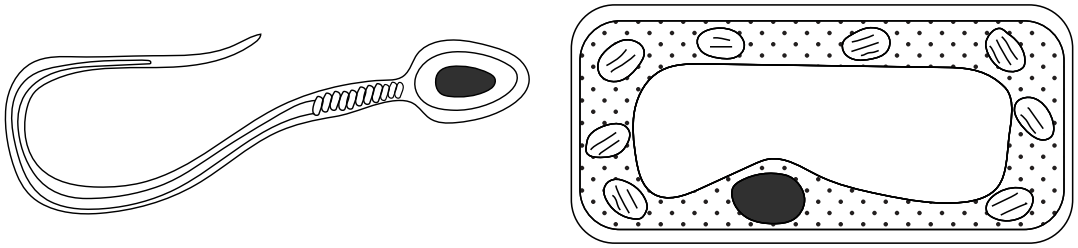
For examiners use

4 A cell is the basic unit of life. It is so small that it cannot be seen with the naked eye.

(a) Name an instrument that is used by scientists to magnify a cell.

…… [1]

(b) Fig. 4.1 shows an animal cell and a plant cell.



animal cell plant cell

Fig. 4.1

(i) State the name of the plant cell shown in Fig. 4.1.

…… [1]

(ii) Label, using a label line, the nucleus of the plant cell in Fig. 4.1. [1]

(iii) The plant cell in Fig. 4.1 is taken from an organ called a leaf.

Explain why a leaf is an organ.

……

……

……

…… [2]

(iv) The animal cell is placed in a concentrated salt solution for 15 minutes.

Describe and explain the effect of leaving the animal cell in the concentrated salt solution for 15 minutes.

observation: ……

……

explanation: ……

……

……

[2]

[Total:7]

For examiners use

5 Fig. 5.1 shows apparatus that can be used to separate components of copper sulfate solution.

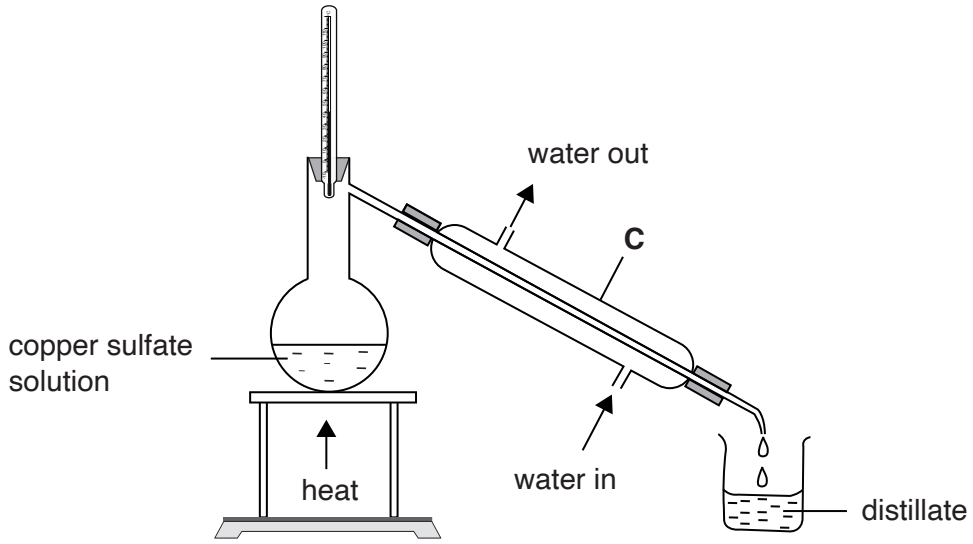


Fig. 5.1

(a) In Fig. 5.1, use a label line to identify and label a tripod stand. [1]

(b) Describe the process that occurs in apparatus **C** in terms of the kinetic particle theory.

……

……

……

…… [2]

(c) Name the part where solid copper sulfate is formed.

……

…… [1]

(d) When the copper sulfate solution is heated, a physical change called evaporation occurs.

Explain why evaporation is a physical change.

……

…… [1]

(e) State **two** physical properties of the distillate formed in Fig. 5.1.

1……

2……

[2]

[Total:7]

For examiners use

6 Fig. 6.1 shows an elephant.

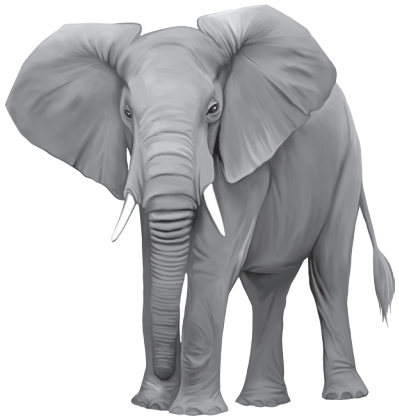


Fig. 6.1

(a) A student measures the mass and height of the elephant and records the values in Table 6.1.

measurement	value	SI unit
mass of elephant	4000	
height of elephant	3.0	

Complete Table 6.1 by stating the SI unit for each measurement. [2]

(b) The weight of the elephant is 40 000 N.

(i) State what is meant by the term *weight*.

……

…… [1]

(ii) The area covered by the elephant when standing on its four feet is 0.125 m^2

Calculate the pressure exerted by the elephant on the ground.

pressure …… [3]

(c) Fig. 6.2 shows the elephant standing on two feet.

Fig. 6.2

Explain why the elephant in Fig. 6.2 is unstable.

……

…… [2]

[Total:8]

For examiners use

7 Fig. 7.1 shows the human male reproductive system.

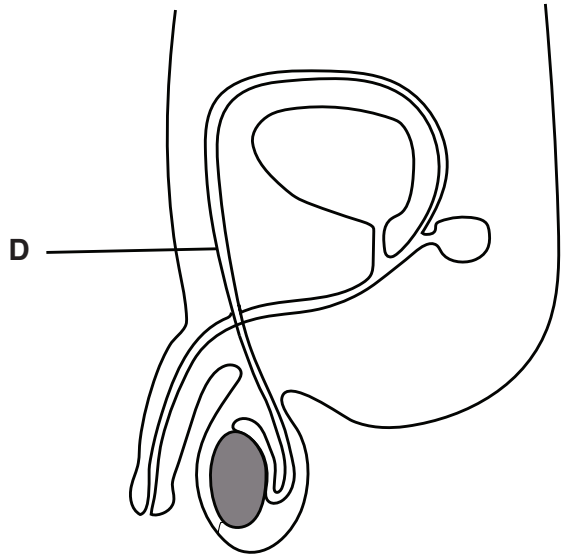


Fig. 7.1

(a) State the function of the part labelled **D** in Fig. 7.1.

……..……..... [1]

(b) A couple engages in unprotected sexual intercourse on the 14th day of the woman's menstrual cycle leading to fertilisation and pregnancy.

(i) Describe the term *fertilisation*.

……

……

…… [2]

(ii) Describe **one** method they could have used to prevent the pregnancy.

…… [1]

(iii) Explain how engaging in unprotected sexual intercourse increases the risk of HIV infection.

……

……

…… [2]

[Total:6]

[Turn over

For examiners use

8 Magnesium ribbon burns in oxygen to form a white solid.

(a) State the chemical name for the white solid.

……..……..... [1]

(b) Explain why oxygen, O_2 is a molecule.

……..……..…….....

……..……..…….....

……..……..……..... [2]

(c) Table 8.1 shows the uses and corresponding properties of aluminium and copper.

Complete Table 8.1 by filling in the missing information.

Table 8.1

name of metal	use of metal	property of metal
aluminium	…….. …….....	low density
copper	electrical wiring	…….. …….....

[2]

(d) Mild steel is an alloy.

State the **two** elements used to make mild steel.

.....……..... [2]

[Total:7]

For examiners use

9 **(a)** The thickness of a conductor is one of the factors that affect its resistance.

(i) Describe the relationship between resistance and the thickness of a conductor

……

…… [1]

(ii) State another factor that affects the resistance of a conductor.

……

…… [1]

(b) Some materials are conductors of electricity.

(i) Describe **one** difference between a conductor and an insulator of electricity.

……

……

…… [1]

(ii) Complete Table 9.1 by stating **one** example of a conductor and an insulator.

	conductor	insulator
example	……	……

[2]

(c) Fig. 9.1 shows **two** bulbs connected in series in a circuit.

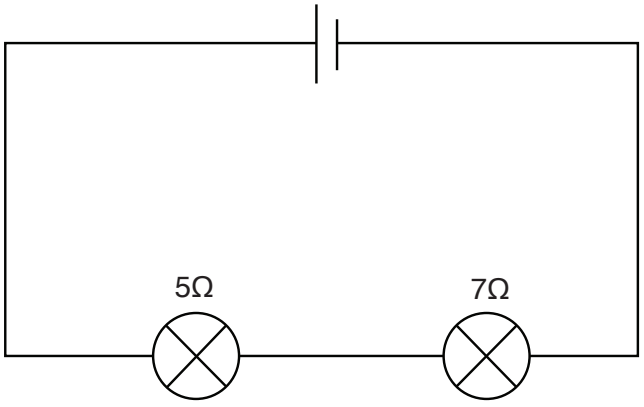


Fig. 9.1

Calculate the combined resistance of the two bulbs in Fig. 9.1.

combined resistance …….. Ω [2]

[Total:7]

For examiners use

SECTION B

Answer **all** questions

10 A student investigates the importance of light in photosynthesis using two potted plants **E** and **F**.

The student:

- de-starches the two potted plants.
- places both potted plants in sunlight for 6 hours, plant **F** covers in a black plastic bag as shown in Fig. 10.1.
- picks a leaf from each plant.
- dip the leaf from plant **E** in boiling water for 1 minute.
- puts the leaf into a test-tube containing alcohol.
- place test-tube in a hot water bath for about 10 minutes as shown in Fig. 10.2.
- repeats the procedure with the leaf taken from plant **F**.
- spreads each leaf on a white tile and adds a few drops of iodine solution on the leaves.

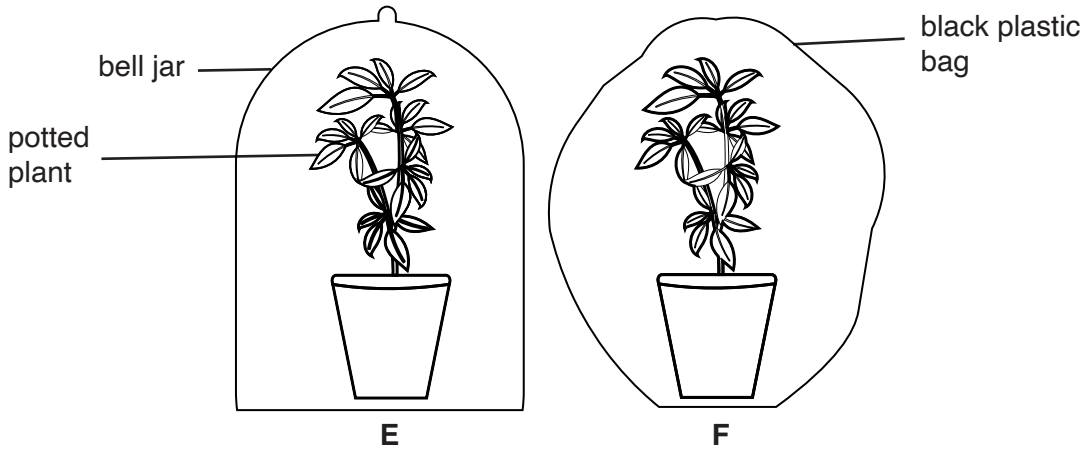


Fig. 10.1

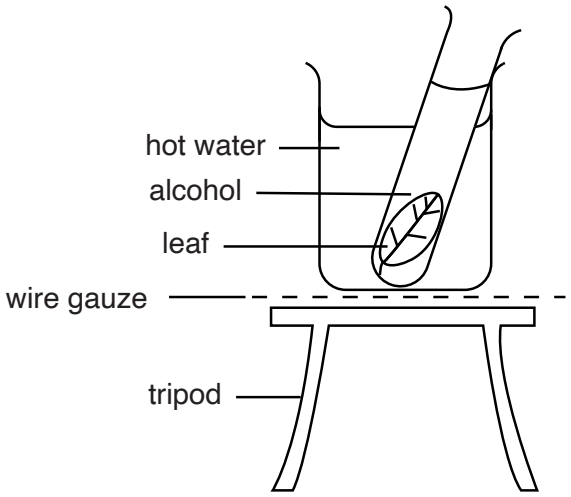


Fig. 10.2

(a) Describe how the student de-starches the plants in this investigation.

.....

..... [1]

(b) **(i)** State the hazard prevented by placing the test-tube in a hot water bath as shown in Fig. 10.2.

.....

..... [1]

(ii) Explain the importance of boiling the leaf in alcohol in Fig. 10.2.

.....

.....

..... [2]

(c) Complete Table 10.1 to describe and explain what the student observes

	leaf from potted plant **E**	leaf from potted-plant **F**
observation	....	....
explanation	....	....

[3]

[Total:7]

For examiners use

11 A student investigates the density of a small guava.

The student measures the volume and mass of the guava.

The student is provided with a measuring cylinder, a small guava, a balance and a beaker filled with water.

The student:

- measures the volume of the guava.
- finds that the volume of the guava is 15 cm^3.
- measures the mass of the guava as shown in Fig. 11.2.

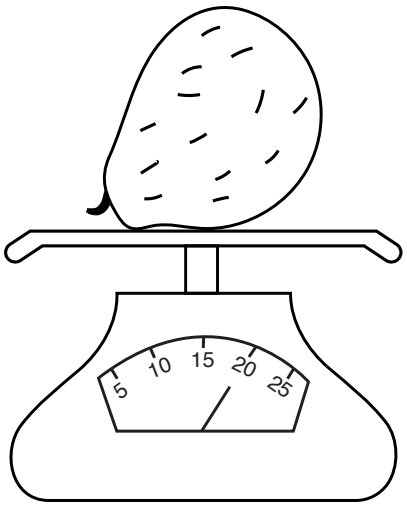


Fig.11.2

(a) Describe how the student use the provided material to measure the volume of the guava.

.....

.....

.....

.....

..... [4]

(b) State the mass of the guava in Fig. 11.2.

..... [1]

(c) Calculate the density of the guava.

density ..... g/cm^3 [2]

[Total:7]

For examiners use

12 In an investigation, a student prepares and collects oxygen gas.

The student was provided with substance **G** in a test-tube connected to a delivery tube, water in apparatus **H** and two empty test-tube labelled **J** and **K**.

The student:

- sets-up the apparatus as shown in Fig. 12.1.
- apply heat to the test tube containing substance **G** as shown in Fig. 12.1.
- collects the gas produced into test tube **J** using a method called downward displacement of water. The student closed the test tube and kept it upside down in a test tube rack
- repeats collection of gas now using test tube **K**.
- introduces a small burning coal into test-tube **K**.

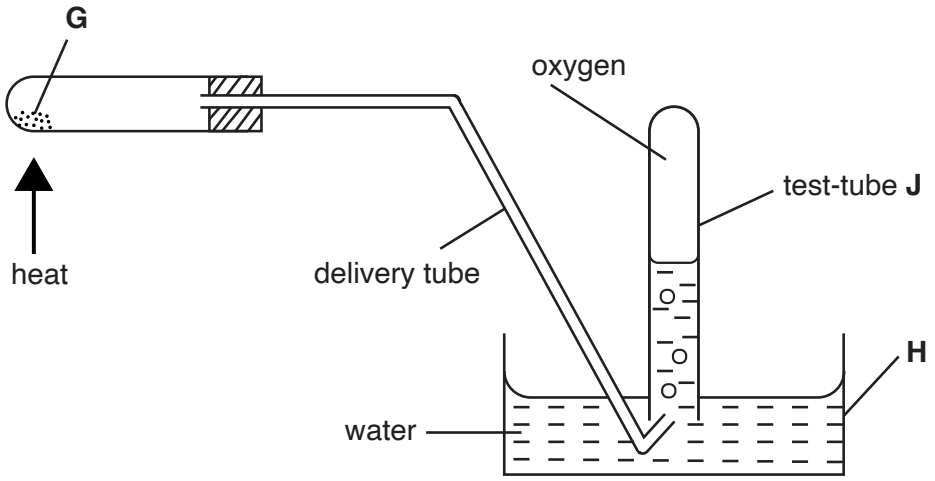


Fig. 12.1

(a) Name substance **G** and apparatus **H**.

substance **G**.....

apparatus **H**.....

[2]

(b) State **one** property of oxygen that makes it possible for it to be collected using the downward displacement method.

..... [1]

(c) Describe how the student tests and proves that the collected gas in test-tube **J** is oxygen.

test.....

result.....

[2]

(d) Describe the observation the student makes in test-tube **K**.

..... [1]

[Total:6]

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