



BOTSWANA EXAMINATIONS COUNCIL
Botswana General Certificate of Secondary Education

CANDIDATE
NAME

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CENTRE
NUMBER

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CANDIDATE
NUMBER

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SCIENCE: DOUBLE AWARD

0569/04

Paper 4

October/November 2017

1 hour 30 minutes

Candidates answer on the Question Paper.
Additional Materials: 300 mm ruler.

READ THESE INSTRUCTIONS FIRST

Write your candidate name, Centre number and candidate number in the spaces provided at the top of this page.

Write in dark blue or black pen.

You may use a soft pencil for any diagrams, graphs or rough working.

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

DO NOT WRITE IN ANY BARCODES.

Answer **all** questions.

Write your answers in the spaces provided on the Question Paper.

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

You may lose marks if you do not show your working or if you do not use appropriate units.

You may use a calculator.

A copy of the Periodic Table is printed on page 16.

For Examiner's Use	
1	
2	
3	
4	
5	
6	
Total	

This document consists of **16** printed pages .

[Turn over

(ii) Determine the refractive index n of water. Use the equation

$$n = \frac{h_d}{h_a}$$

$n = \dots\dots\dots$ [1]

(iii) Suggest **one** source of inaccuracy when doing this experiment.

.....
.....[1]

(iv) The experiment was repeated using the same water with a smaller real depth h_d .
The student suggests that the refractive index will be smaller since h_d is smaller.

State whether the suggestion of the student is **correct** or **wrong**. Explain your answer.

statement.....

explanation.....

..... [1]



Question 2 begins on page 5.



- 2 An experiment is performed to find the relationship between the length l of a wire and its resistance R . The total length of the wire is 100 cm.

Fig. 2.1 shows the set-up that is used, with the wire connected between points P and Q. The connection near Q is a sliding contact which can be moved.

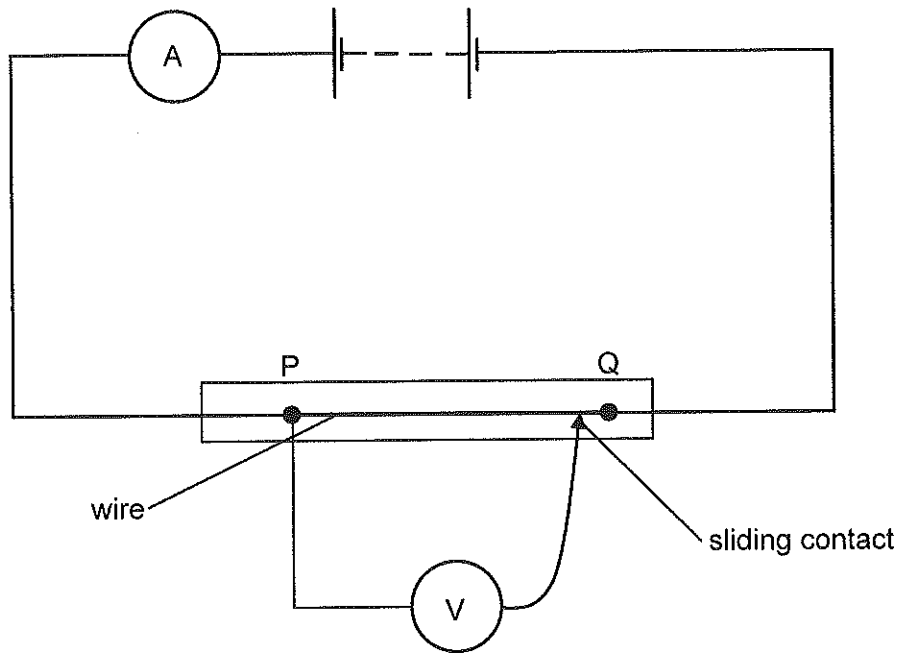


Fig. 2.1

Fig. 2.2(a) and Fig. 2.2(b) show the readings of an ammeter and a voltmeter when the sliding contact is placed at $l = 20$ cm from P.

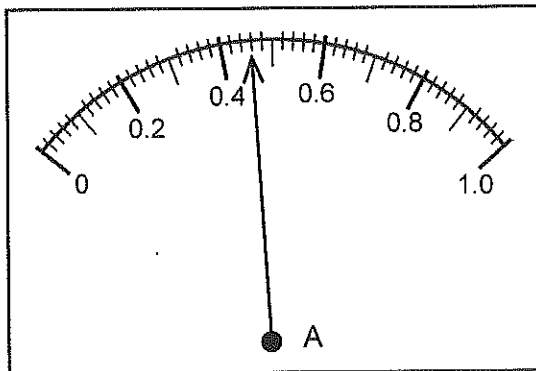


Fig. 2.2 (a)

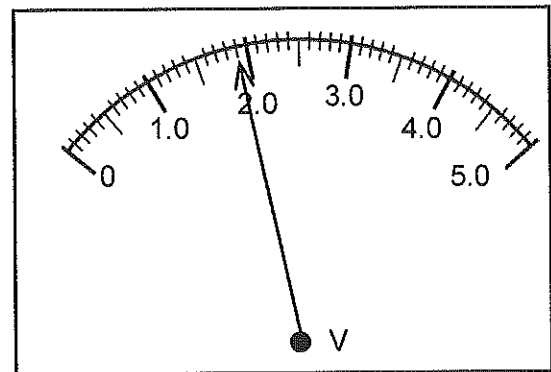


Fig. 2.2 (b)



(a) Table 2.1 shows some of the results of the experiment.

Table 2.1

l/cm	$I/\text{.....}$	V/V	$R/\text{.....}$
0	0.00	0.0	
10	0.45	0.9	
20			
30	0.44	2.8	
40	0.45	3.7	
50	0.43	4.4	

Complete Table 2.1 by

(i) writing the SI units of I and R at the headings, [1]

(ii) recording the ammeter and voltmeter readings for $l = 20\text{ cm}$ as shown in Fig. 2.2(a) and Fig. 2.2(b), [1]

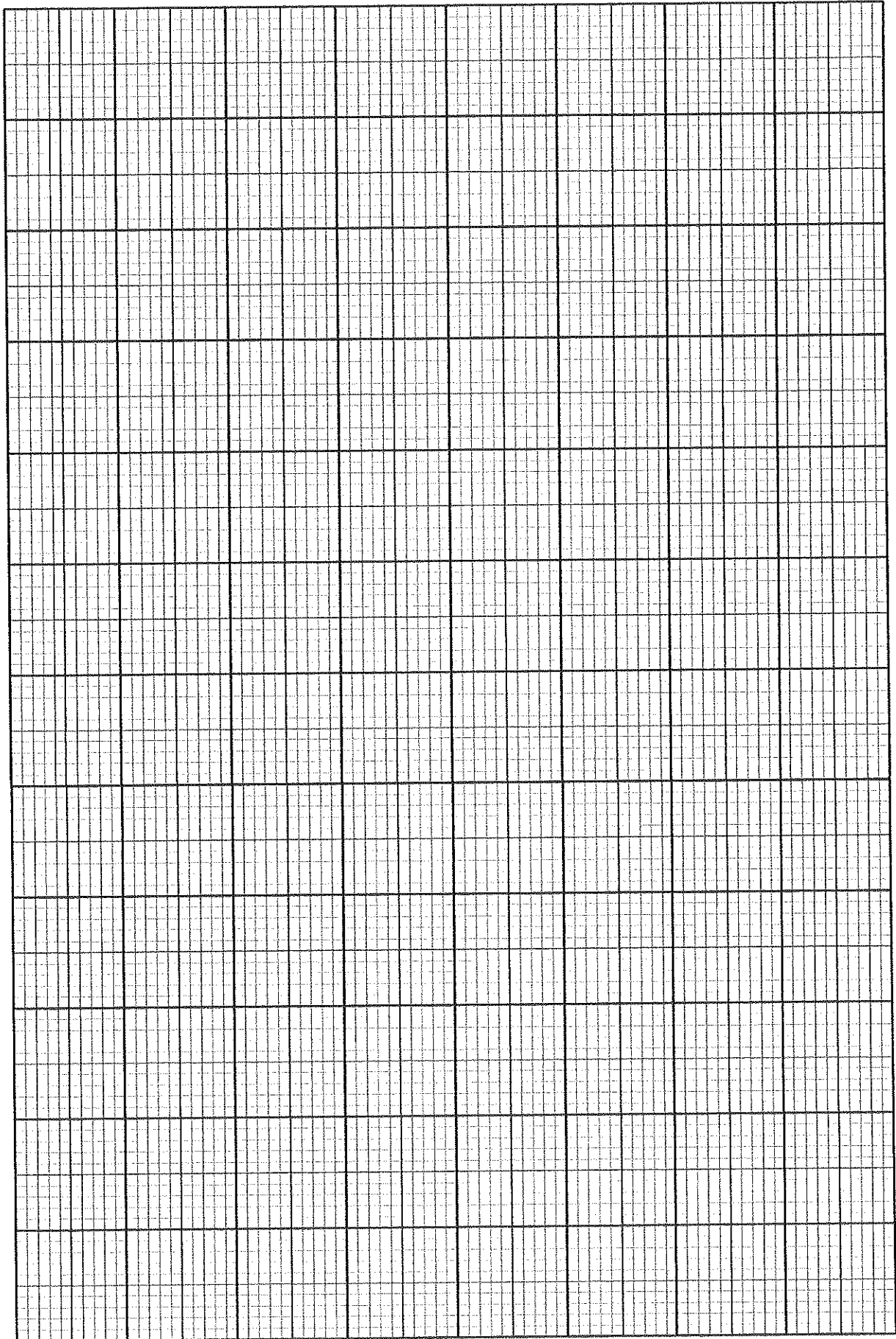
(iii) calculating R , of each length of wire. Use the equation

$$R = \frac{V}{I}. \quad [2]$$



(b) Plot a graph of R (y-axis) against l (x-axis).

[4]



(c) What is the conclusion that can be made from this experiment?

.....
.....[1]

(d) State **one** precaution which should be taken when doing this experiment.

.....
.....[1]

(e) The average ammeter reading for the experiment is 0.45 A.

Use your graph to determine the voltmeter reading when the length of the wire is 45 cm from P. Use the equation

$$V = IR.$$

voltmeter reading = [2]



- 3 Some tests are made on solid P and solution Q.
Table 3.1 shows the tests, observations and conclusions.

Complete Table 3.1.

Table 3.1

tests	observations	conclusions
<p>(a) Solution Q is divided into two portions.</p> <p>A blue litmus paper is dipped into one portion of solution Q.</p>	<p>blue litmus paper turns red</p>	<p>.....</p> <p>.....[1]</p>
<p>(b) A few drops of acidified barium nitrate solution are added to another portion of solution Q.</p>	<p>.....</p> <p>.....[2]</p>	<p>sulphate ion, SO_4^{2-} present in solution Q.</p>
<p>(c) Solid P is dissolved in solution Q.</p> <p>The gas produced is tested with lime water.</p>	<p>production of bubbles</p> <p>lime water turns milky</p>	<p>solid P contains</p> <p>..... [1]</p>
<p>(d) To a portion of a mixture from (c) add</p> <p>(i).....</p> <p>.....[1]</p> <p>(ii).....</p> <p>.....</p> <p>.....[1]</p>	<p>.....</p> <p>.....[1]</p> <p>.....</p> <p>.....</p> <p>.....[1]</p>	<p>Zn^{2+} or Ca^{2+} are suspected.</p> <p>Ca^{2+} present.</p>

- (e) Identify solid P and solution Q.

solid P

solution Q.....

[2]



- 4 Fig. 4.1 shows the set-up of an experiment used to determine the concentration of hydrochloric acid by titration with sodium hydroxide solution.

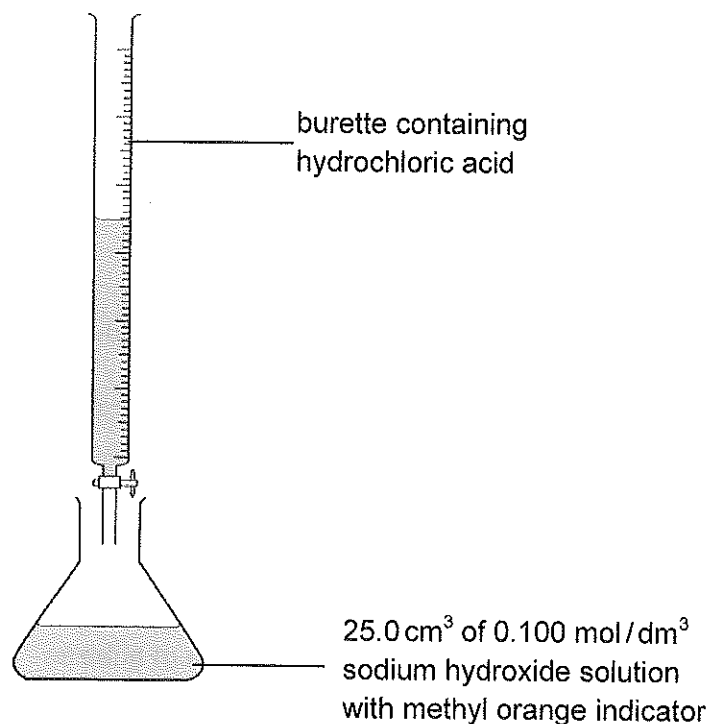


Fig. 4.1

- (a) Name the apparatus used to measure accurately 25.0 cm³ of sodium hydroxide solution.

.....[1]

- (b) Fig. 4.2 shows the burette readings before and after each titration.

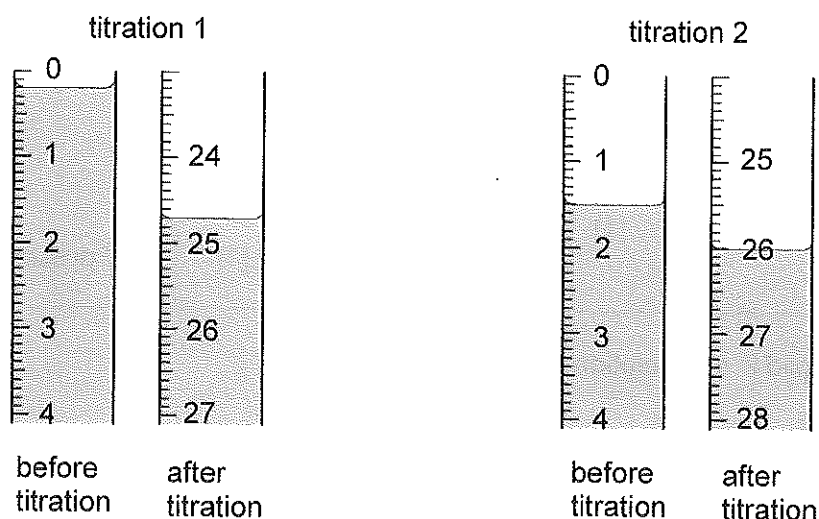


Fig. 4.2

5 Fig. 5.1(a) and Fig. 5.1(b) show photographs of leaves of two plants.

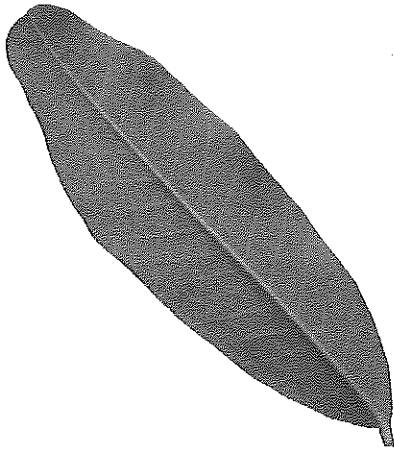


Fig. 5.1(a)

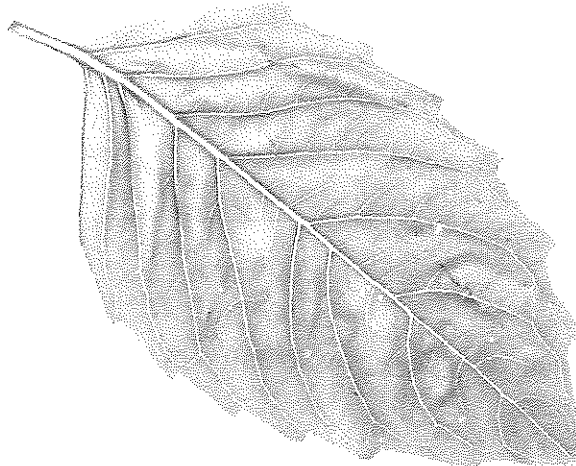


Fig. 5.1(b)

(a) State **two** visible differences between the leaves in Fig. 5.1(a) and Fig. 5.1(b).

1

2

[2]

(b) Make a large drawing of the leaf in Fig. 5.1(b).

[3]



(c) Measure and record:

- the length of the longest side of the leaf in the photograph in Fig. 5.1(b).
- the length of the same side of the leaf in your drawing.

Draw lines on Fig. 5.1(b) and on your drawing to indicate where the measurements were taken.

longest of photograph =

longest of drawing =

[2]

(d) Calculate the magnification of your drawing. Use the equation

$$\text{magnification} = \frac{\text{longest length of drawing}}{\text{longest length of photograph}}$$

magnification =[1]



6 A student cuts a potato strip and tests it for starch by adding iodine solution to it.

(a) State the result of a positive test for starch.

.....[1]

(b) A student investigates the action of amylase solution on starch. She uses the set-up shown in Fig. 6.1.

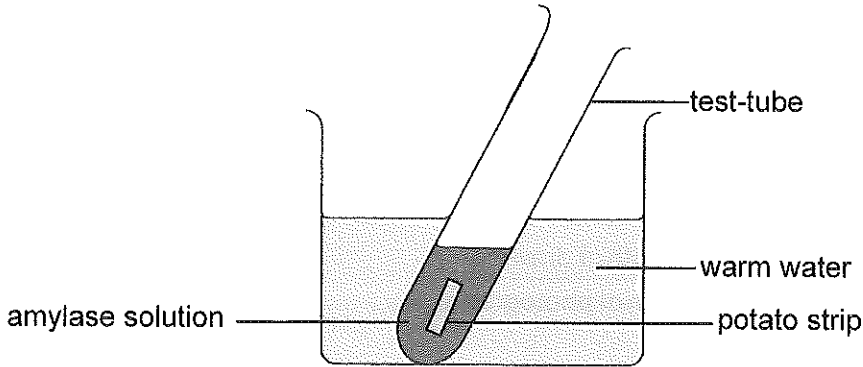


Fig. 6.1

(i) Suggest a control for the experiment.

.....[1]

(ii) After 30 minutes, the student used iodine solution to test the contents of the test-tube for starch.

Predict and explain the result that she would obtain.

result.....

explanation.....

[1]

(iii) Explain why the potato strip and amylase solution should be placed in warm water.

.....

.....[1]

(c) The student suggests that a potato strip contains less sugar than a pumpkin strip.

Describe an experiment which can be carried out to find out whether the suggestion is correct.

.....

.....

.....

.....

.....[4]



- (d) A student cuts strips from stem tubers of plants E and F.
She places the strips in a sugar solution.
Fig. 6.2 shows the strips before they were placed in the sugar solution.

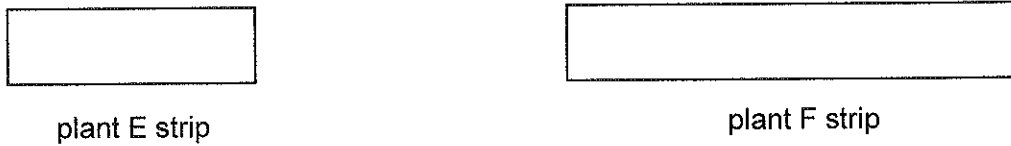


Fig. 6.2

- (i) Measure and record the lengths of the strips.

plant E length of strip =

plant F length of strip =

[1]

- (ii) Fig. 6.3 shows the strips after they have been left in the sugar solution for 30 minutes.

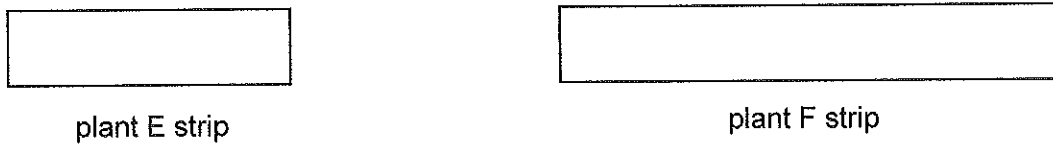


Fig. 6.3

Measure and record the new lengths of the strips.

plant E length of strip =

plant F length of strip =

[1]

- (iii) The student suggests that the cell sap of plant F has more sugar than the cell sap of plant E, since it has a greater increase in length.

Do the results of the experiment support the suggestion? Justify your answer.

results.....

justification.....

..... [2]





DATA SHEET

The Periodic Table of the Elements

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