Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

6182796061

COMBINED SCIENCE **0653/62**

Paper 6 Alternative to Practical **May/June 2023**

1 hour

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

INFORMATION

- The total mark for this paper is 40.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **12** pages.

DC (CE/SG) 316018/3

1 Fig. 1.1 is a section through okra, a fruit which contains five seeds.

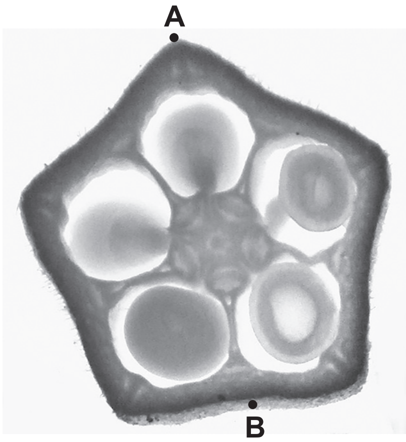

Fig. 1.1

(a) In the box provided, draw a large, clear pencil drawing of the section of okra.

[3]

(b) **(i)** The distance between point **A** and point **B** on Fig. 1.1 represents a diameter of the okra.

Measure the distance between point **A** and point **B** on Fig. 1.1.

distance on Fig. 1.1 = ... mm [1]

(ii) Suggest why the distance between point **A** and point **B** is only an estimate of the diameter of the okra in Fig. 1.1.

....

.... [1]

(iii) Measure the distance between the same two points on your drawing as in **(b)(i)**.

Mark **A** and **B** on your drawing to show where you have measured.

distance on your drawing = ... mm [1]

(iv) Calculate the magnification of your drawing.

Use the equation shown.

$$\text{magnification} = \frac{\text{distance on your drawing}}{\text{distance on Fig. 1.1}}$$

magnification = ... [1]

[Total: 7]

2 The enzyme amylase breaks down starch to form a reducing sugar.
Iodine is a brown solution that turns blue/black in the presence of starch.

Plan an investigation to determine the relationship between temperature and the time taken to completely break down starch by amylase.

You are provided with:

- 1% amylase solution
- 1% starch solution
- iodine solution.

You may also use any other common laboratory apparatus.

In your plan include:

- the additional apparatus needed
- a brief description of the method and an explanation of any safety precautions you will take
- what you will measure
- which variables you will keep constant
- how you will process your results to draw a conclusion.

You may include a labelled diagram if you wish.

You may include a table that can be used to record the results if you wish.

You do **not** need to include any results in your table.

[7]

3 A student investigates a white solid **H**.

(a) Procedure

The student:

- measures the mass of an empty test-tube and records this mass in Table 3.1
- places some solid **H** into the test-tube
- measures the mass of the test-tube and solid **H** and records this mass in Table 3.1
- heats solid **H** for one minute using the blue flame of a Bunsen burner
- lets the test-tube cool down
- measures the mass of the test-tube and the solid after heating and records this mass in Table 3.1.

Table 3.1

	mass /g
empty test-tube	16.23
test-tube and solid **H** before heating	
test-tube and the solid after heating	

(i) Suggest why the student lets the test-tube and the solid cool down before measuring its mass.

....

.... [1]

(ii) Fig. 3.1 shows two of the balance readings.

18.731 g	17.846 g
test-tube and solid **H** before heating	test-tube and the solid after heating

Fig. 3.1

Record in Table 3.1 these readings to **two** decimal places. [2]

(iii) Calculate the mass of solid **H** in the test-tube before heating.

Use the equation shown.

mass of solid **H** before heating	=	mass of test-tube and solid **H** before heating	–	mass of empty test-tube

mass of solid **H** before heating = ... g [1]

(iv) Calculate the mass of the solid in the test-tube after heating.

Use the equation shown.

mass of the solid after heating	=	mass of test-tube and the solid after heating	–	mass of empty test-tube

mass of the solid after heating = ... g [1]

(v) There is a loss in mass when solid **H** is heated.

Suggest **one** reason for this loss in mass.

.... [1]

(vi) Calculate the percentage loss in mass.

Use the equation shown.

$$\text{percentage loss in mass} = \frac{\text{mass of solid } \mathbf{H} \text{ before heating} - \text{mass of the solid after heating}}{\text{mass of solid } \mathbf{H} \text{ before heating}} \times 100$$

Give your answer to **two** significant figures.

percentage loss in mass = ... [2]

(vii) Explain why it is better to heat solid **H** for at least five minutes rather than one minute.

....

.... [1]

(viii) State **one** reason why the test-tube must be heated with a blue Bunsen burner flame rather than a yellow Bunsen burner flame.

....

.... [1]

(b) The student puts some solid **H** into dilute hydrochloric acid.

The mixture forms a colourless solution and bubbles of carbon dioxide gas are seen.

(i) Describe the test to confirm that the gas made is carbon dioxide.

Include the observation for a positive result.

test ....

observation ....
[1]

(ii) Identify the anion (negative ion) present in solid **H**.

.... [1]

(iii) The student adds aqueous sodium hydroxide to the colourless solution.

A white precipitate forms which is soluble in excess aqueous sodium hydroxide.

Tick (✓) the name of the cation present in the colourless solution.

ammonium	☐	calcium	☐
copper(II)	☐	iron(III)	☐
zinc	☐		

[1]

[Total: 13]

4 A student does an experiment to determine the focal length *F* of a convex lens.

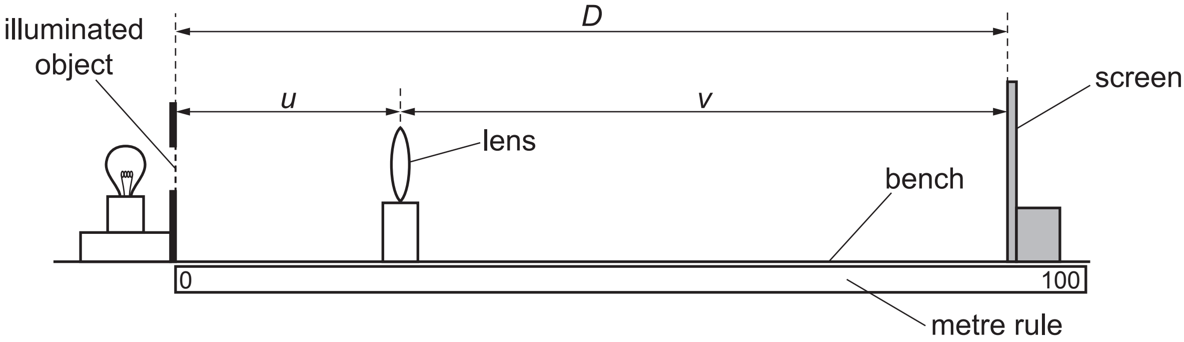

Fig. 4.1

(a) Procedure

The student:

- arranges the equipment as shown in Fig. 4.1
- switches on the lamp
- places the illuminated object (a triangle) at the 0 cm mark on the metre rule
- places the lens at a distance u = 10.0 cm from the illuminated object
- places the screen at a distance D = 95.0 cm from the illuminated object.

An out of focus fuzzy image appears on the screen.

- moves the lens slowly towards the screen until the image formed is in focus, and as sharp as possible
- measures u and v and records the values in Table 4.1.

(i) The illuminated object is 1.5 cm high. Fig. 4.2 shows the actual size of the image on the screen.

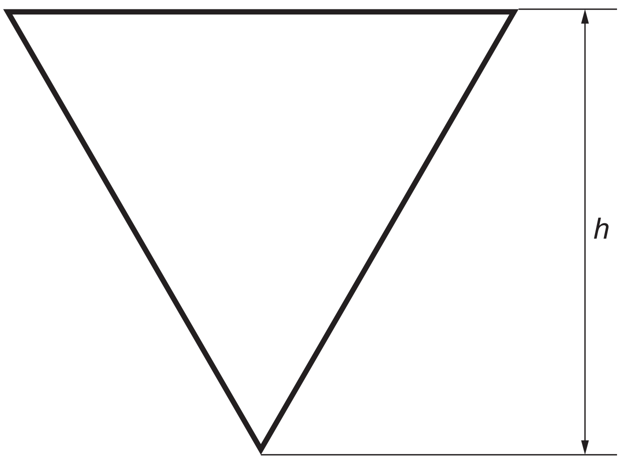

Fig. 4.2

Measure and record the height h of the image.

h = ... cm [1]

(ii) The student repeats the procedure for values of D = 85.0 cm, 75.0 cm, 70.0 cm and 65.0 cm.

Fig. 4.3 shows the lens and part of the metre rule when the image is in focus for D = 75.0 cm.

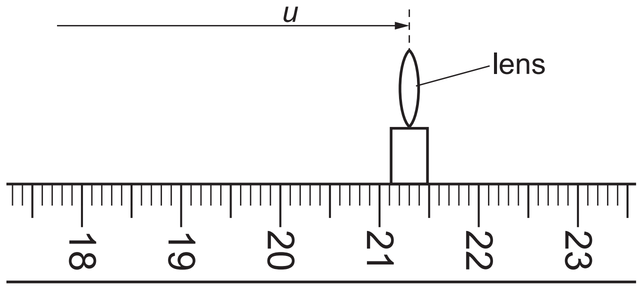

Fig. 4.3

Record the value of u shown on the metre rule in Table 4.1 in the row for D = 75.0 cm.

Table 4.1

D / cm	u / cm	v / cm	uv / ....
95.0	19.2	75.8	1460
85.0	20.5	64.5	1320
75.0			
70.0	22.2	47.8	1060
65.0	24.8	40.2	997

[1]

(iii) Calculate the distance v for D = 75.0 cm and record the value in Table 4.1. [1]

(iv) Calculate the product uv and record it for D = 75.0 cm in the final column of Table 4.1.

Use the equation shown.

$$uv = u \times v$$

[1]

(v) Add the unit to the column heading for uv in Table 4.1. [1]

(b) **(i)** On the grid, plot a graph of *uv* (vertical axis) against *D*.

Do **not** start your graph from the origin (0, 0).

[3]

(ii) Draw the best-fit straight line. [1]

(c) The focal length *F* of the lens is equal to the gradient of your line.

Calculate the gradient of your line.

Indicate on your graph the values you choose to calculate the gradient.

F = ... [2]

(d) **(i)** *F* can also be calculated without plotting a graph, by using the results for one value of *D*.

Suggest why plotting a graph and calculating a gradient to find the value of *F* gives a more accurate answer than calculating *F* for one value of *D*.

....

.... [1]

(ii) State **one** precaution that makes the readings as accurate as possible.

....

.... [1]

[Total: 13]