Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

4702369006

COMBINED SCIENCE **0653/63**

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 **16** pages. Any blank pages are indicated.

DC (DE/SG) 316020/2

[Turn over

1 A student investigates the effect of temperature on the growth of mushrooms.

Fig. 1.1 shows a section through a mushroom.

Fig. 1.1

(a) In the box provided, make a large, clear pencil drawing of this section through a mushroom.

[3]

(b) The student investigates how changing the temperature affects the growth of the cap of mushrooms.

Procedure

The student:

- grows 5 mushrooms at 5 °C for 2 days
- grows 5 mushrooms at 20 °C for 2 days
- measures the diameter of the cap of each mushroom
- records their results in Table 1.1.

Fig. 1.2 shows the cap of the 5th mushroom grown at 5 °C.

actual size

Fig. 1.2

(i) The distance between point **A** and point **B** on Fig. 1.2 represents a diameter of the mushroom cap.

Measure the distance between point **A** and point **B** on Fig. 1.2 and record your value in Table 1.1.

Table 1.1

mushroom	diameter of mushroom cap grown at 5 °C / mm	diameter of mushroom cap grown at 20 °C / mm
1	42	78
2	37	40
3	40	82
4	38	84
5		79
average diameter / mm		81

[1]

(ii) Identify the anomalous result in Table 1.1 by circling the value. [1]

(iii) Complete Table 1.1 by calculating the average diameter of the mushroom caps grown at 5 °C.

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

[2]

(iv) The student concludes that:

"As the temperature increases to 30°C, the mushroom caps will get larger."

Suggest why this conclusion is **not** correct.

.....

..... [1]

(v) Identify **one** possible source of error when measuring the diameter of an actual mushroom cap.

Suggest a method that reduces this error.

error .....

.....

improvement .....

.....

[2]

(vi) Describe one **other** way the investigation can be improved.

.....

..... [1]

(c) Mushrooms grow best in slightly acidic soils.

The student is given a sample of dry soil.

Suggest how the pH of the soil sample is tested.

.....

.....

..... [2]

[Total: 13]

2 A student investigates a green solid **H**.

(a) Procedure

The student:

- adds some dilute hydrochloric acid to solid **H** in a test-tube
- observes that the mixture forms a blue solution
- does a flame test on the blue solution.

(i) Describe how to do a flame test on the blue solution.

.....

..... [1]

(ii) The blue solution gives a blue-green flame in the flame test.

Tick(✓) the box to identify the cation present in the blue solution.

lithium	☐	**sodium**	☐
copper(II)	☐	**potassium**	☐

[1]

(b) Solid **H** decomposes when heated to make a solid and a gas.

The student investigates the loss in mass when solid **H** is heated.

Procedure

The student:

Step 1 puts some solid **H** into a test-tube
Step 2 heats the test-tube for 1 minute
Step 3 lets the test-tube cool down
Step 4 measures the mass of the test-tube and contents
Step 5 records the mass in Table 2.1.

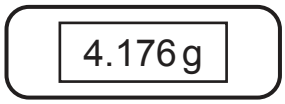
The student repeats **Steps 2**, **3**, **4** and **5** on the same test-tube six more times.

Table 2.1

time of heating / minutes	mass after heating / g	mass lost during heating / g
1	4.59	0.41
2		
3	3.79	1.21
4	3.48	1.52
5	3.62	1.38
6	3.60	1.40
7		

(i) Fig. 2.1 shows the readings on the balance after heating for 2 minutes and 7 minutes.

mass after heating for 2 minutes



mass after heating for 7 minutes

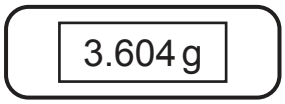


Fig. 2.1

Record in Table 2.1 these values to **two** decimal places. [2]

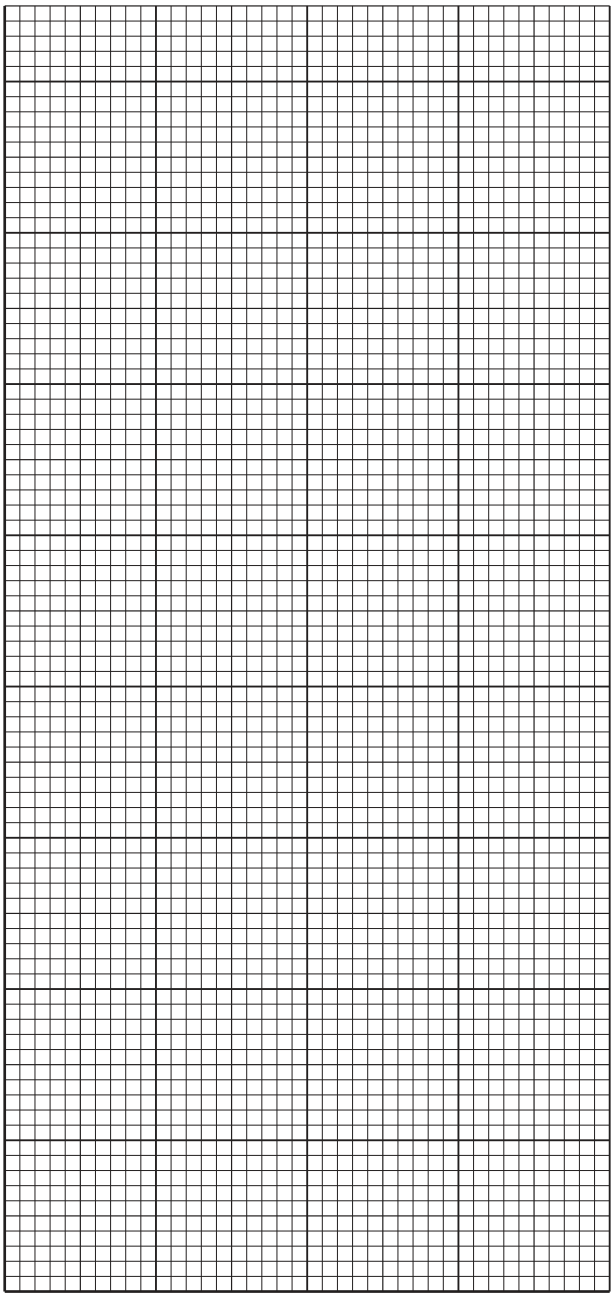
(ii) Calculate the mass lost during heating for 2 minutes and for 7 minutes.

Use the equation shown.

$$\text{mass lost during heating} = 5.00 - \text{mass after heating}$$

Record your values in Table 2.1. [1]

(iii) On the grid, plot the mass lost during heating (vertical axis) against the time of heating.



[3]

(iv) One of the results is anomalous.

Circle the anomalous result on the grid. [1]

(v) Draw the curve of best-fit. [1]

(vi) Describe the relationship between the mass lost during heating and the time of heating.

.....

.....

..... [2]

(vii) In **Step 2** the student heats solid **H** using a Bunsen burner.

Explain why the student uses a blue flame.

.....

..... [1]

[Total: 13]

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3 A student investigates the period of oscillation of a spring when different loads are suspended from the spring.

The period is the time taken for the spring to complete **one** oscillation.

The period is measured by giving the spring a small downwards displacement, releasing it, and timing the oscillations.

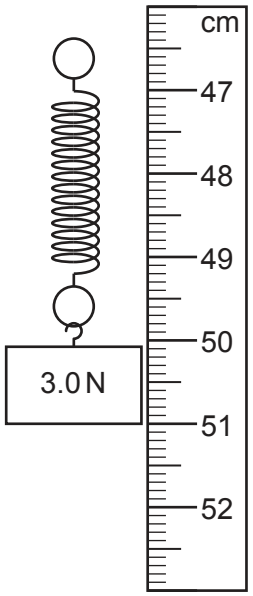

Fig. 3.1

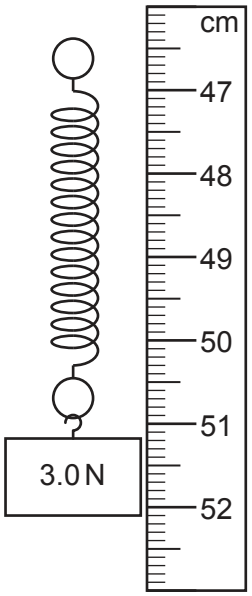

Fig. 3.2

(a) Fig. 3.1 shows the spring with a load of 3.0 N suspended from it.

Fig. 3.2 shows the same spring with the load displaced a short distance downwards before being released.

(i) Record the reading on the ruler at the bottom of the load as shown in Fig. 3.1 and Fig. 3.2.

reading in Fig. 3.1 ..... cm

reading in Fig. 3.2 ..... cm
[1]

(ii) Use the readings from **(a)(i)** to calculate the displacement of the load.

Use the equation shown. Give your answer in mm.

displacement = reading in Fig. 3.2 – reading in Fig. 3.1

displacement = ... mm [1]

(b) (i) Fig. 3.3 shows the stop-watch used to measure the period for the load of 3.0 N. Record in Table 3.1 the period to one decimal place.

Fig. 3.3

Table 3.1

load / N	period / s
3.0	
4.0	1.8
5.0	2.0
6.0	2.2
7.0	2.4
8.0	2.6

[1]

(ii) The student also measures the period for five other loads.

Describe the relationship between load and period shown in Table 3.1.

.....

..... [1]

(c) The student suggests that the period is proportional to the load.

State if the student is correct. Use values from Table 3.1 to justify your answer.

statement .....

.....

justification .....

.....

.....

..... [2]

(d) State **one** improvement to the method for accurate results when measuring the period of the spring.

.....

..... [1]

[Total: 7]

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4 A student rolls a toy car down a ramp of height *h*.

At the bottom of the ramp, the car rolls a distance *d* along the horizontal floor until it stops.

Plan an investigation to determine the relationship between the height of the ramp *h* and the stopping distance *d*.

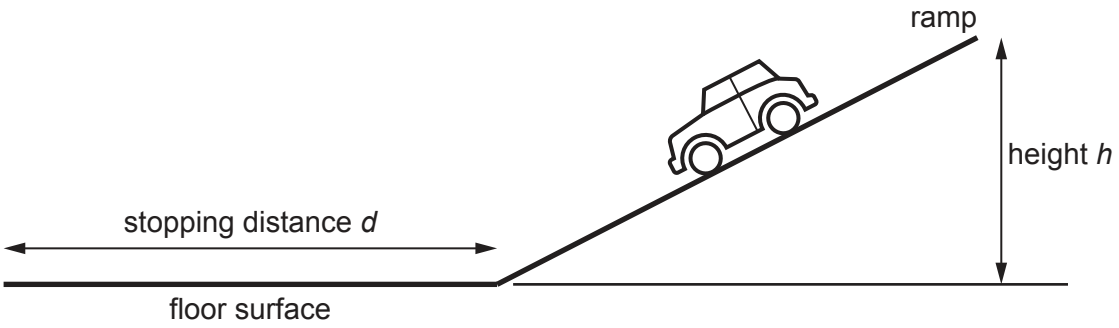

Fig. 4.1

You are provided with:

- a ramp that can be adjusted to different heights
- toy cars.

You may use any common laboratory apparatus in your plan.

In your plan include:

- any other apparatus needed
- a brief description of the method, including what you will measure and how you will make sure your measurements are accurate
- the variables you will control
- a results table to record your measurements (you do **not** need to enter any readings in the table)
- how you will process your results to draw a conclusion.

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..... [7]

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