



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE
NAME

CENTRE
NUMBER

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COMBINED SCIENCE

0653/05

Paper 5 Practical Test

October/November 2008

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: As listed in Instructions to Supervisors.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.

Write in dark blue or black pen.

You may use a 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.

Chemistry practical notes for this paper are printed on page 12.

At the end of the examination, fasten all your work securely together.

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

| For Examiner's Use | |
|--------------------|--|
| 1 | |
| 2 | |
| 3 | |
| Total | |

This document consists of **9** printed pages and **3** blank pages.



- 1 The experiment has been set up to investigate the effect of light on the growth of seedlings. The seeds were set up for germination in boxes **A**, **B** and **C** as shown in Fig. 1.1 and left for a few days.

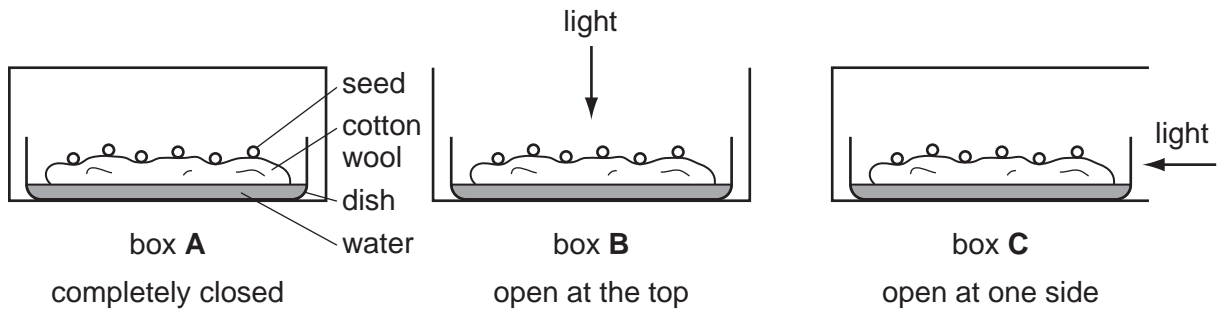


Fig. 1.1

- (a) (i) Name **one** condition that was kept the same to make the test fair.

..... [1]

The labelled specimens **A**, **B** and **C** are groups of seedlings from each box.

- (ii) **Without removing the seedlings from the cotton wool**, draw in Fig. 1.2 **one** seedling from each dish. [3]

| observation | A | B | C |
|----------------------------------|---|---|---|
| drawing of seedling from dish | | | |
| colour of leaves | | | |
| vertical height of seedling / mm | | | |

Fig. 1.2

- (iii) Write the colour of the leaves of each batch of seedlings, **A**, **B** and **C** in Fig. 1.2. [1]

(iv) Measure the **vertical height** in millimetres of the tallest seedling in each group as shown in Fig. 1.3. Enter the measurements in Fig. 1.2. [3]

For
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Use

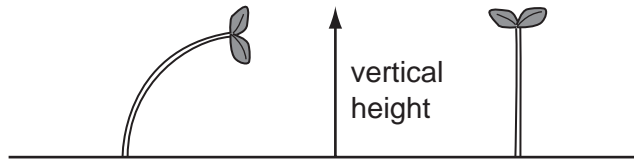


Fig. 1.3

(b) The growth of seedlings is different in all three boxes.

Explain why the seedlings in boxes **A** and **C** grew differently from the seedlings in box **B**.

box **A**

.....
.....

box **C**

.....
.....

[2]

- 2 You are going to make various measurements with a spring that will enable you to determine a value for the acceleration of free fall, g .

Set up the apparatus as shown in Fig. 2.1. Make sure that there is sufficient room below the spring to allow for stretching and that the rule is clamped with the zero at the bottom.

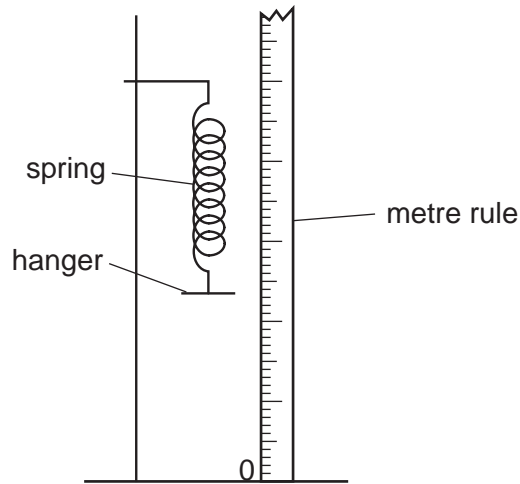


Fig. 2.1

- (a) Read and record the position of the bottom of the hanger.
- Add a 200 g mass to the hanger.
 - Using the metre rule, read and record the new position of the bottom of the hanger.
 - Calculate the extension, E , which is the difference between the **two** values.

position of hanger with no mass added = mm

position of hanger with 200 g mass = mm

extension, E = mm

[1]

Question 2 continues on Page 6.

- (b) Replace the 200 g mass with 150 g.
- Remove the metre rule
 - Pull down the hanger about 20 mm and release it to allow the spring to gently oscillate in a vertical direction.
 - Time 20 oscillations and record this time in Fig. 2.3.

Fig. 2.2 may help you to understand what is meant by *one complete oscillation*.

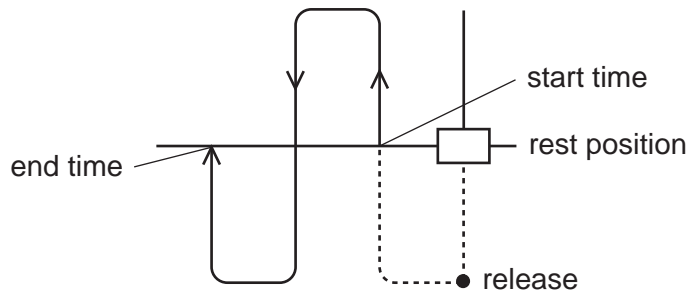


Fig. 2.2

- (c) You are now going to repeat the timing of 20 oscillations, three more times, using the different masses shown in Fig. 2.3.

Record the times in Fig. 2.3.

| mass / g | time for 20 oscillations / s | T / s | T^2 / s^2 |
|----------|------------------------------|------------------------|-------------|
| | | time for 1 oscillation | |
| 150 | | | |
| 200 | | | |
| 250 | | | |
| 300 | | | |

Fig. 2.3

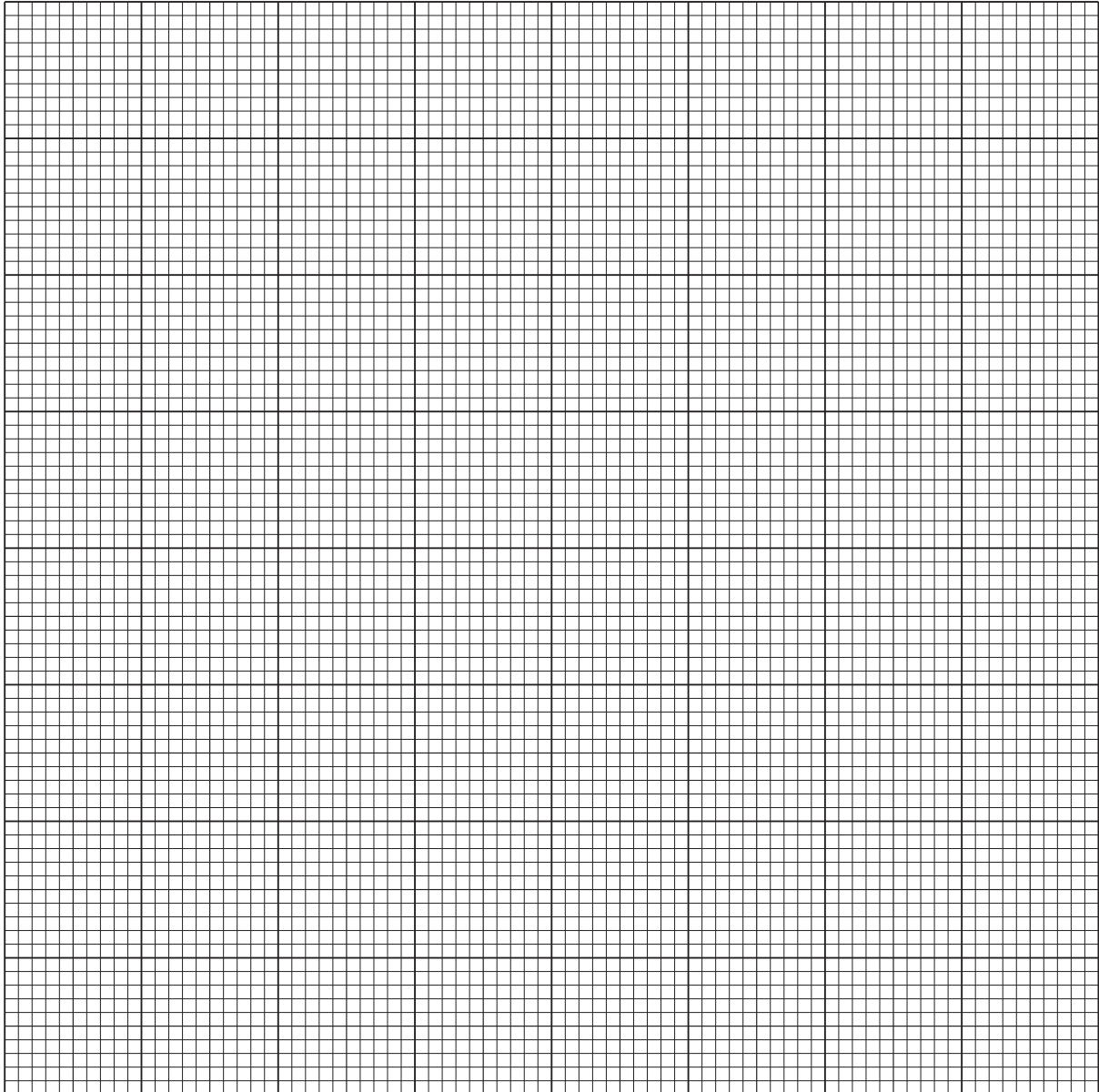
[3]

- (d) Complete Fig. 2.3 by calculating the time, T , for 1 oscillation. This is done by dividing the time for 20 oscillations by 20. Then square each value to calculate T^2 to two decimal places.

- (e) Plot a graph of T^2 (vertical axis) against the mass.
Draw the best straight line through your points.

[3]

For
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 T^2/s^2 

mass/g

- (f) Use the graph to measure the gradient of the line. Show clearly on your graph how you did this. [2]
- (g) Use the gradient from (f) and the extension, E , from (a) to find the value of g , using the formula,

$$g = \frac{E \times 0.0002}{\text{gradient}}$$

[1]

- 3 You are provided with solid **A** and a solution of an iron salt labelled **B**.
Carry out the following tests, recording all your observations in the appropriate spaces.

For
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Use

- (a) Dissolve about three quarters of solid **A** in 20 cm³ of water. Use about 2 cm³ portions for each of the following tests.

- (i) To about 2 cm³ of the solution of **A**, add aqueous barium chloride followed by dilute hydrochloric acid.

observation [1]

- (ii) To about 2 cm³ of the solution of **A**, add the piece of magnesium ribbon and test any gas with a lighted spill.

observation

result of test with lighted spill

name of gas [3]

- (iii) To about 2 cm³ of the solution of **A** add solid sodium carbonate.

observation [1]

- (iv) What **two** facts can you deduce about solid **A**?

.....

..... [2]

- (b) Solution **B** is iron chloride. You are required to carry out an experiment of your own to decide whether it is iron(II) or iron(III) chloride.

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Describe your test and observations, clearly stating which compound of iron is present.

test

.....

observation

.....

result [3]

CHEMISTRY PRACTICAL NOTES

Test for anions

| <i>anion</i> | <i>test</i> | <i>test result</i> |
|--|---|--|
| carbonate (CO_3^{2-}) | add dilute acid | effervescence, carbon dioxide produced |
| chloride (Cl^-) [in solution] | acidify with dilute nitric acid, then add aqueous silver nitrate | white ppt. |
| nitrate (NO_3^-) [in solution] | add aqueous sodium hydroxide then aluminium foil; warm carefully | ammonia produced |
| sulphate (SO_4^{2-}) [in solution] | acidify then add aqueous barium chloride <i>or</i> aqueous barium nitrate | white ppt. |

Test for aqueous cations

| <i>cation</i> | <i>effect of aqueous sodium hydroxide</i> | <i>effect of aqueous ammonia</i> |
|---------------------------------|--|--|
| ammonium (NH_4^+) | ammonia produced on warming | - |
| copper(II) (Cu^{2+}) | light blue ppt., insoluble in excess | light blue ppt., soluble in excess giving a dark blue solution |
| iron(II) (Fe^{2+}) | green ppt., insoluble in excess | green ppt., insoluble in excess |
| iron(III) (Fe^{3+}) | red-brown ppt., insoluble in excess | red-brown ppt., insoluble in excess |
| zinc (Zn^{2+}) | white ppt., soluble in excess giving a colourless solution | white ppt., soluble in excess, giving a colourless solution |

Test for gases

| <i>gas</i> | <i>test and test results</i> |
|----------------------------------|------------------------------|
| ammonia (NH_3) | turns damp litmus paper blue |
| carbon dioxide (CO_2) | turns limewater milky |
| chlorine (Cl_2) | bleaches damp litmus paper |
| hydrogen (H_2) | "pops" with a lighted splint |
| oxygen (O_2) | relights a glowing splint |

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