UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

CO-ORDINATED SCIENCES **0654/05**

Paper 5 Practical Test **October/November 2008**

2 hours

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 **10** printed pages and **2** blank pages.

UNIVERSITY of CAMBRIDGE International Examinations

1 The experiment has been set up to investigate the effect of light on the growth of seeds. 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.

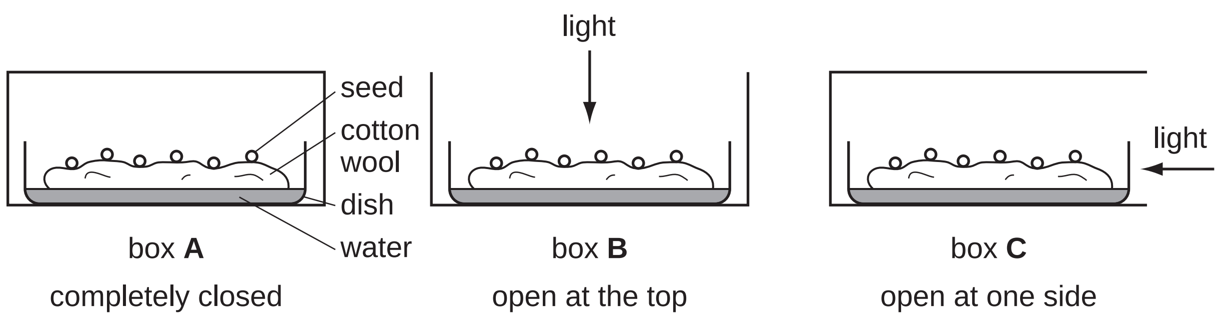

Fig. 1.1

(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 gr[oup] shown in Fig. 1.3. Enter the measurements in Fig. 1.2.

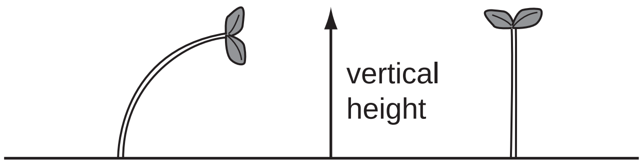

Fig. 1.3

(v) For seedling **B** only, measure the height of the drawing and use the vertical height measurement from Fig. 1.2 to calculate the magnification of your drawing.

height of drawing = ... mm

magnification = ... mm [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]

(c) Suggest a modification of the apparatus to compare the growth of seedlings in red and green light.

....

....

....

.... [2]

For Examiner's Use

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.

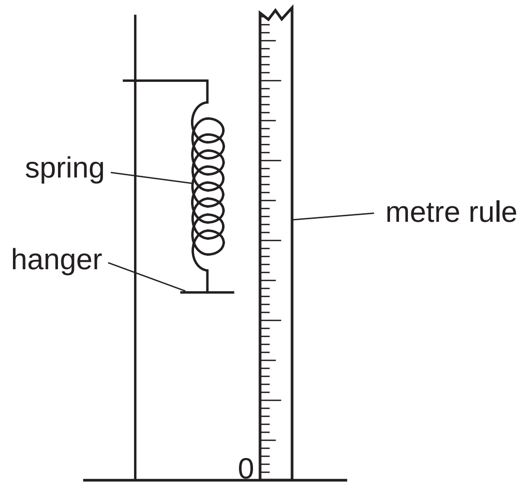

Fig. 2.1

(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]

BLANK PAGE

For
iner's

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.*

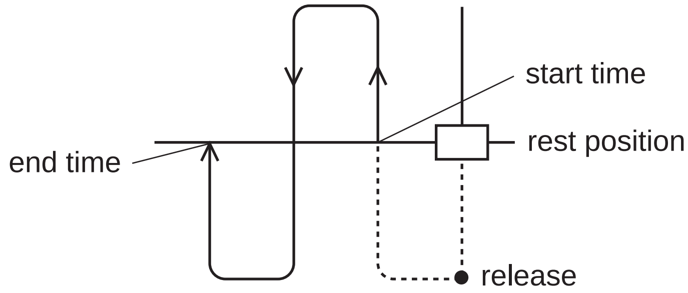

Fig. 2.2

(c) You are now going to repeat the timing of 20 oscillations three more times using different masses. Choose a range of masses in the region 150 g to 300 g.

Record the times in Fig. 2.3.

mass / g	time for 20 oscillations / s	**T** / s time for 1 oscillation	$\mathbf{T}^2$ / s^2
150			

Fig. 2.3 [4]

(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 $\mathbf{T}^2$ to two decimal places.

(e) Plot a graph of $\mathbf{T}^2$ (vertical axis) against the mass.
Draw the best straight line through your points.

(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,

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

[2]

For Examiner's Use

(h) How could you improve the accuracy of this experiment? Suggest at least **two** ways in which this could be achieved.

....

....

....

.... [2]

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

(a) Dissolve about three quarters of solid **A** in 20 cm^3 of water. Use about 2 cm^3 portions for each of the following tests.

(i) To about 2 cm^3 of the solution of **A**, add aqueous barium chloride followed by dilute hydrochloric acid.

observation .... [1]

(ii) To about 2 cm^3 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 cm^3 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.

Describe your test and observations, clearly stating which compound of iron is present. Keep a 1 cm^3 portion of solution **B** for use in **(c)(iii)**.

test ....

....

observation ....

....

result .... [3]

For Examiner's

(c) Dissolve solid **C** in about 10 cm^3 of warm water. Use about 2 cm^3 portions of this solution for each of the following tests.

(i) Dip a piece of filter paper into solution **X** and then into a 2 cm^3 portion of solution **C**.

observation .... [1]

(ii) To about 2 cm^3 of the solution of **C**, add aqueous barium chloride, followed by dilute hydrochloric acid

observation ....

.... [2]

(iii) Place about 1 cm^3 of solution **B** in a large test-tube. Add a 2 cm^3 portion of solution **C** and about 3 cm^3 dilute hydrochloric acid and bring to the boil. After cooling, add aqueous sodium hydroxide until no further change is seen.

observation .... [1]

(d) What chemical change has taken place in solution **B**?

.... [1]

BLANK PAGE

CHEMISTRY PRACTICAL NOTES

Test for anions

anion	*test*	*test result*
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 *or* aqueous barium nitrate	white ppt.

Test for aqueous cations

cation	*effect of aqueous sodium hydroxide*	*effect of aqueous ammonia*
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

gas	*test and test results*
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