UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

CO-ORDINATED SCIENCES **0654/52**

Paper 5 Practical Test **May/June 2013**

2 hours

Candidates answer on the Question Paper.

Additional Materials: As listed in the Confidential Instructions.

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 or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.
Chemistry practical notes for this paper are printed on page 16.

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 **13** printed pages and **3** blank pages.

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International Examinations

[Turn over

2

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1 You are provided with two plants, **A** and **B**, each of which has been enclosed transparent polythene bag for a period of two days. In the bag around plant **A** there chemical that absorbs carbon dioxide. Both plants have had parts of some of their leave covered with black paper.

*For
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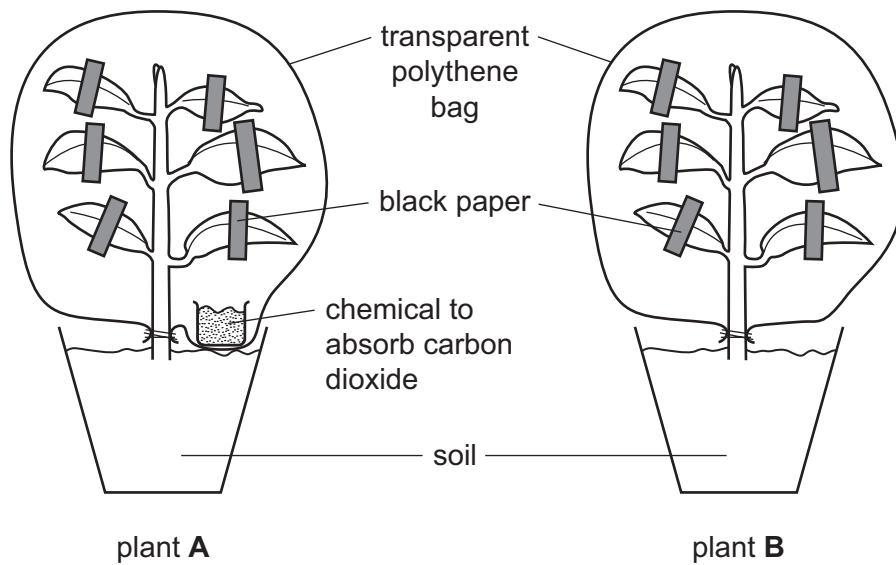
Fig. 1.1

(a) Remove one leaf from each plant, choosing leaves that have been partly covered with black paper. Take care to remember which leaf came from which plant. In the space below, make clear labelled drawings of the two leaves to show which parts are covered with the black paper.

leaf from plant **A**

leaf from plant **B**

[4]

[Turn over

(b) Now test both leaves for starch. You can carry out the test on both leaves at the same time, but it is important to remember which leaf is which.

- Half fill a beaker with water, and bring it to the boil (you may have a water bath instead).

- Remove the black paper from the leaf.

- Place the leaf in the hot water, and let it stay there for 1 to 2 minutes.

- **Turn off any Bunsen burner or other naked flame. This is important for safety.**

- Use tweezers to remove the leaf from the hot water, and place the leaf in a clean test-tube.

- Add alcohol to the test-tube, so it covers the leaf, and place this test-tube into the beaker or water bath that contains the hot water.

- Leave the tube in the hot water for five minutes (during this time the alcohol may boil).

- After five minutes, remove the tube from the hot water, and carefully pour away the alcohol into the waste container provided.

- Pick up the leaf with tweezers, and dip it briefly back into the hot water.

- Spread the leaf out on a white tile, and cover it with iodine solution.

- Wait about one minute. Then, in the space below, make two clear pencil drawings of the two leaves. Label them to show the colours of the different parts.

leaf from plant **A**

leaf from plant **B**

[3]

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iner's

(c) Look at your drawings for parts **(a)** and **(b)**. Summarise your results in Table 1.1.

Table 1.1

		colour obtained with iodine	starch is present (yes or no)
leaf from plant **A**	area covered by black paper		
	area not covered by black paper		
leaf from plant **B**	area covered by black paper		
	area not covered by black paper		

[2]

(d) (i) Compare the results that you have recorded in Table 1.1 for the uncovered parts of the leaves from plant **A** and plant **B**.
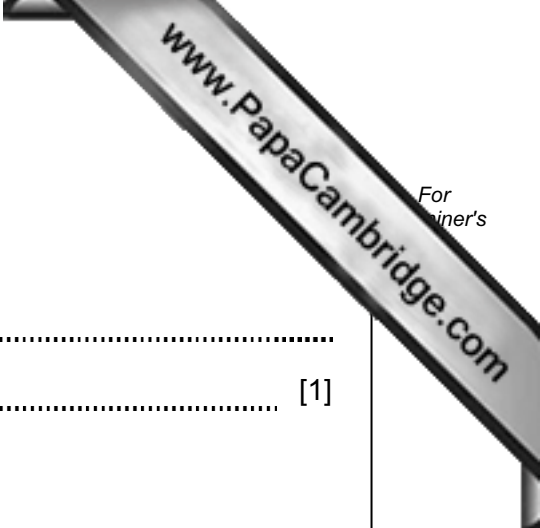
Use these results to write a conclusion about a condition necessary for photosynthesis.

....

.... [1]

(ii) Compare the results that you have recorded in Table 1.1 for the covered and uncovered parts of the leaf from plant **B**.

Use these results to write a conclusion about another condition necessary for photosynthesis.

....

.... [1]

[Turn over

For
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(e) For the tests that you carried out, explain the reasons for

   (i) placing the leaf in the hot water at the beginning,

   ....
   .... [1]

   (ii) placing the leaf in hot alcohol,

   ....
   .... [1]

   (iii) dipping the leaf back in the hot water.

   ....
   .... [1]

(f) A modification of the experiment would be to use just one plant, and enclose different part-covered leaves on this plant with and without the chemical that absorbs carbon dioxide.

   Explain why this might be considered to be a better experiment.

   ....
   .... [1]

2   In this experiment, you will be investigating the period of a simple pendulum. The p̶ ̶ ̶ ̶
    the time for one complete to-and-fro swing (oscillation) of the pendulum.

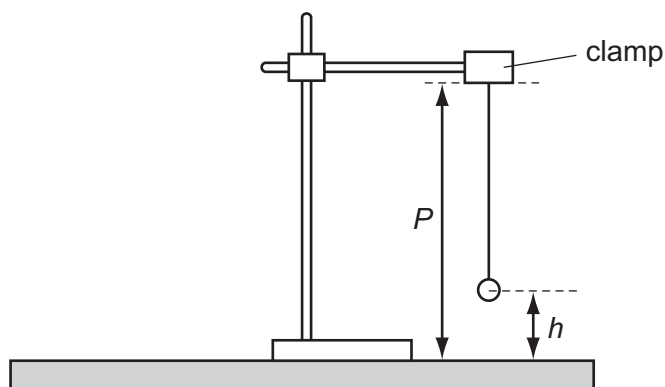point of support

pendulum bob

A ⊙◡⟶⊙ B
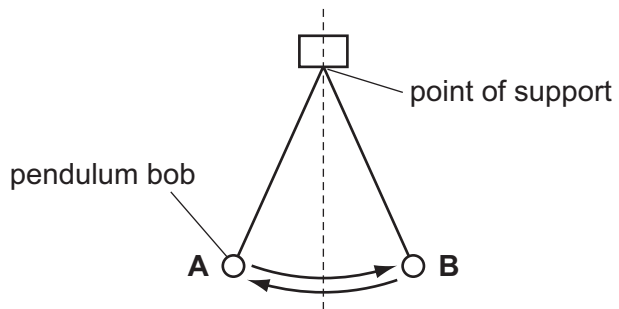
1 complete oscillation
is the time taken for the
bob to swing from **A** to
B and back to **A** again.

Fig. 2.1

The pendulum has been set up for you with its point of support at a fixed height above the
bench.

Do not adjust this height, or the position of the clamp.

clamp

P

h

Fig. 2.2

(a) Measure the distance P, the height of the point of support of the pendulum above the
bench, shown in Fig. 2.2, to the nearest millimetre.

Record your result. $P =$ .... cm   [1]

[Turn over

(b) Without altering the height of the clamp above the bench, adjust the length thread until the height, h, of the centre of the bob above the bench is 10.0 cm.

Give the bob a small sideways displacement and release it so that it oscillates.

Record in Table 2.1 the time taken for 20 complete oscillations. Record your times to the nearest second.

Table 2.1

h/cm	time for 20 oscillations/s	period T/s	T^2/s^2
10.0			
20.0			
25.0			
30.0			
40.0			

Repeat the procedure for heights h of 20.0 cm, 25.0 cm, 30.0 cm and 40.0 cm.

Record the times for 20 oscillations for each height, in Table 2.1.   [4]

(c) (i) Use your results in Table 2.1 to calculate the period T of the pendulum for each set of readings. Remember that the period is the time for one complete oscillation.

Record your values in Table 2.1.   [1]

(ii) Calculate the value of T^2 for each set of readings and enter your values in Table 2.1 to **2 decimal places**.   [1]
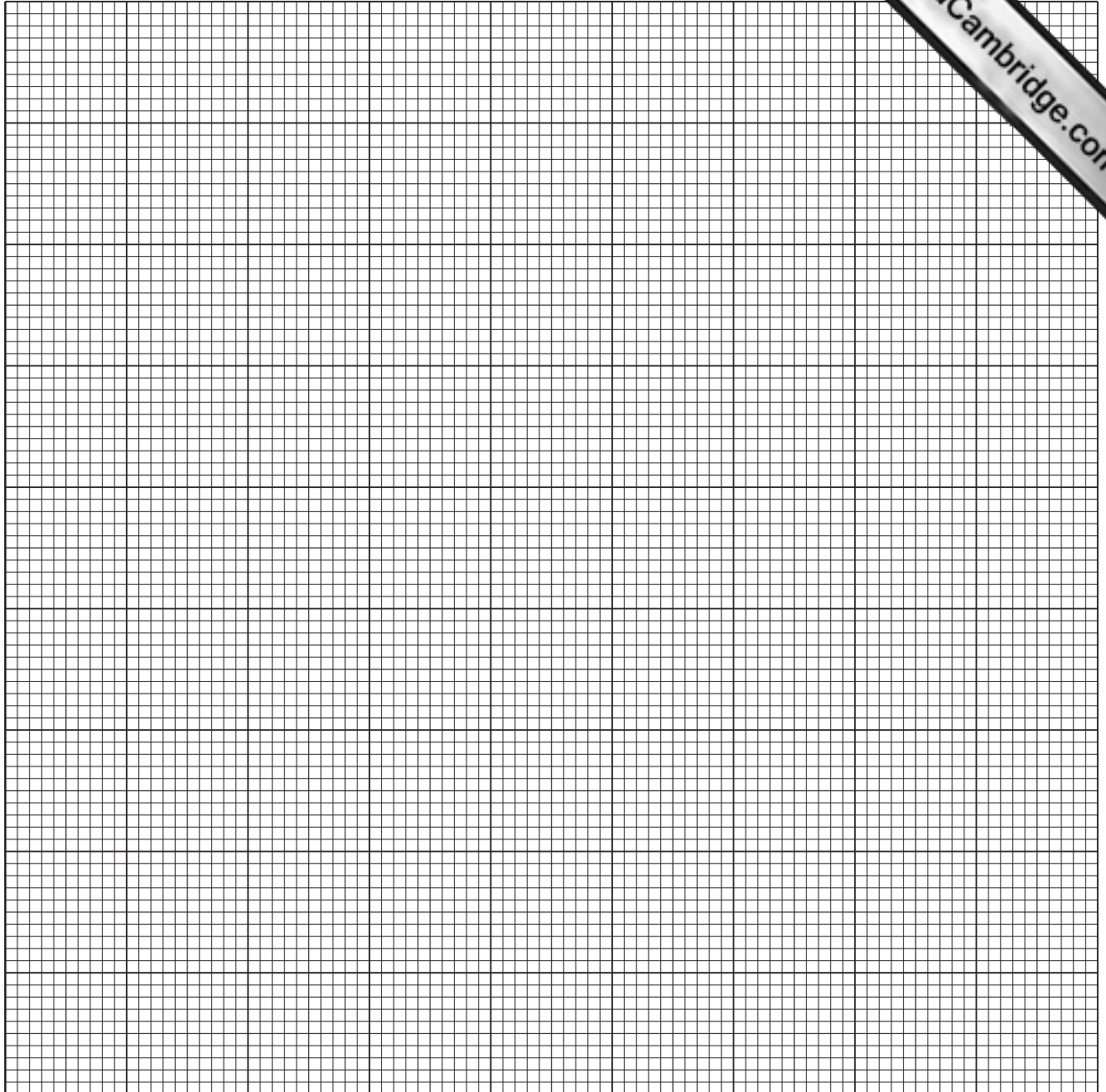
(d) (i) On the grid provided, plot a graph of T^2/s^2 (vertical axis) against h/cm (horizontal axis).

Start both axes of your graph from the origin (0,0).

Draw the best fit straight line.

Extend your line so that it cuts the vertical axis. This is the intercept value.

[4]

(ii) Calculate the gradient of your line.

Show all working and indicate on your graph the values you chose to enable the gradient to be calculated.

gradient of line = ... [2]

[Turn over

(e) The actual height of the point of support above the bench, *P*, is given by the equa

$$P = \frac{\text{intercept value}}{\text{gradient}}$$

Calculate the value of *P* using this equation.

P = ... cm   [1]

(f) Compare your measured value of *P* from part **(a)** with your result from part **(e)**.

Do your answers agree?

Justify your answer.

....

....   [1]

Please turn over for Question 3.

3 Four solutions **A**, **B**, **C** and **D** are ammonia solution, dilute hydrochloric acid, ~~s~~ hydroxide solution and dilute sulfuric acid. It is not known which solution is which.

You are going to carry out the following tests on solutions **A**, **B**, **C** and **D** to identify them.

Place about 1 cm³ of each solution **A**, **B**, **C** and **D** into separate test-tubes. Label your test-tubes so that you know which solution is in which test-tube.

(a) Add 3 drops of Universal Indicator to the separate portions of the solutions **A**, **B**, **C** and **D** in the test-tubes and record the final colours in the row of Table 3.1 marked **(i)**.

Pour each solution into the waste beaker. Wash out the test-tubes between each test.

Carry out the tests **(ii)**, **(iii)** and **(iv)** as described in Table 3.1. Use separate portions of about 1 cm³ of solutions **A**, **B**, **C** and **D** in test-tubes and record the observations in the rows of Table 3.1 marked **(ii)**, **(iii)** and **(iv)** respectively.

Table 3.1

	test	solution A	solution B	solution C	solution D
(i)	add 3 drops of Universal Indicator				
(ii)	add an equal volume of silver nitrate solution				
(iii)	add an equal volume of barium chloride solution				
(iv)	add a few drops of copper sulfate solution				

[1] (row i)

[3] (row ii)

[2] (row iii)

[3] (row iv)

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(b) Use your observations in Table 3.1 to make the following conclusions.

(i) State which solutions are shown to be acidic by test **(a)(i)**.

.... [1]

(ii) State which solution is sulfuric acid **and** state which test, other than **(a)(i)**, confirms this.

sulfuric acid is solution ....

confirmed by ....

.... [1]

(iii) State which solution is hydrochloric acid **and** state which test, other than **(a)(i)**, confirms this.

hydrochloric acid is solution ....

confirmed by ....

.... [1]

(iv) State which solution is sodium hydroxide **and** state which test, other than **(a)(i)**, confirms this.

sodium hydroxide is solution ....

confirmed by ....

.... [1]

(v) State which solution is ammonia solution **and** state which test, other than **(a)(i)**, confirms this.

ammonia solution is solution ....

confirmed by ....

.... [1]

(vi) Describe another test that could be used instead of the indicator in **(a)(i)** to distinguish between acids and alkalis.

....

.... [1]

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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
sulfate (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 red 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