UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

4572480587

PHYSICAL SCIENCE **0652/51**

Paper 5 Practical Test **October/November 2013**

1 hour 30 minutes

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 8.

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	
Total	

This document consists of **7** printed pages and **1** blank page.

UNIVERSITY of CAMBRIDGE International Examinations

1 You will investigate the formation of an image by a converging lens using the experi
set-up shown in Fig. 1.1.

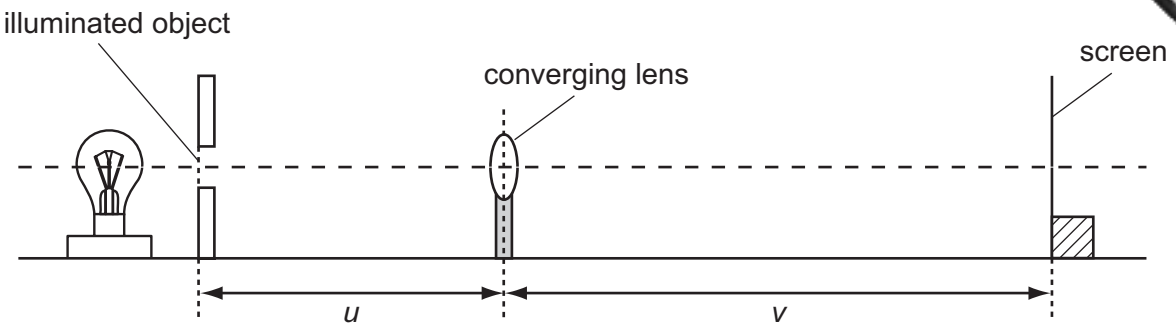


Fig. 1.1

(a) (i)

- Place the lens a distance u = 45.0 cm from the illuminated object (the triangular hole in the card).
- Switch on the lamp so that an image of the illuminated object can be seen on the screen.
- Adjust the position of the screen by moving it backwards and forwards along the bench, until a sharp image of the illuminated object is formed on the screen.
- Measure, to the nearest 0.1 cm, the image distance v from the screen to the lens.
- Record the distance v in Table 1.1. [1]

Table 1.1

object distance u / cm	image distance v / cm	image distance / object distance = v/u
45.0		
35.0		
30.0		
25.0		
20.0		

(ii) Repeat the procedure described in **(i)** for values of u = 35.0 cm, 30.0 cm, 25.0 cm, and 20.0 cm. [3]

(iii) Complete the remaining boxes in the table by filling in the values of the ratio v/u, the ratio of image distance to object distance. [1]

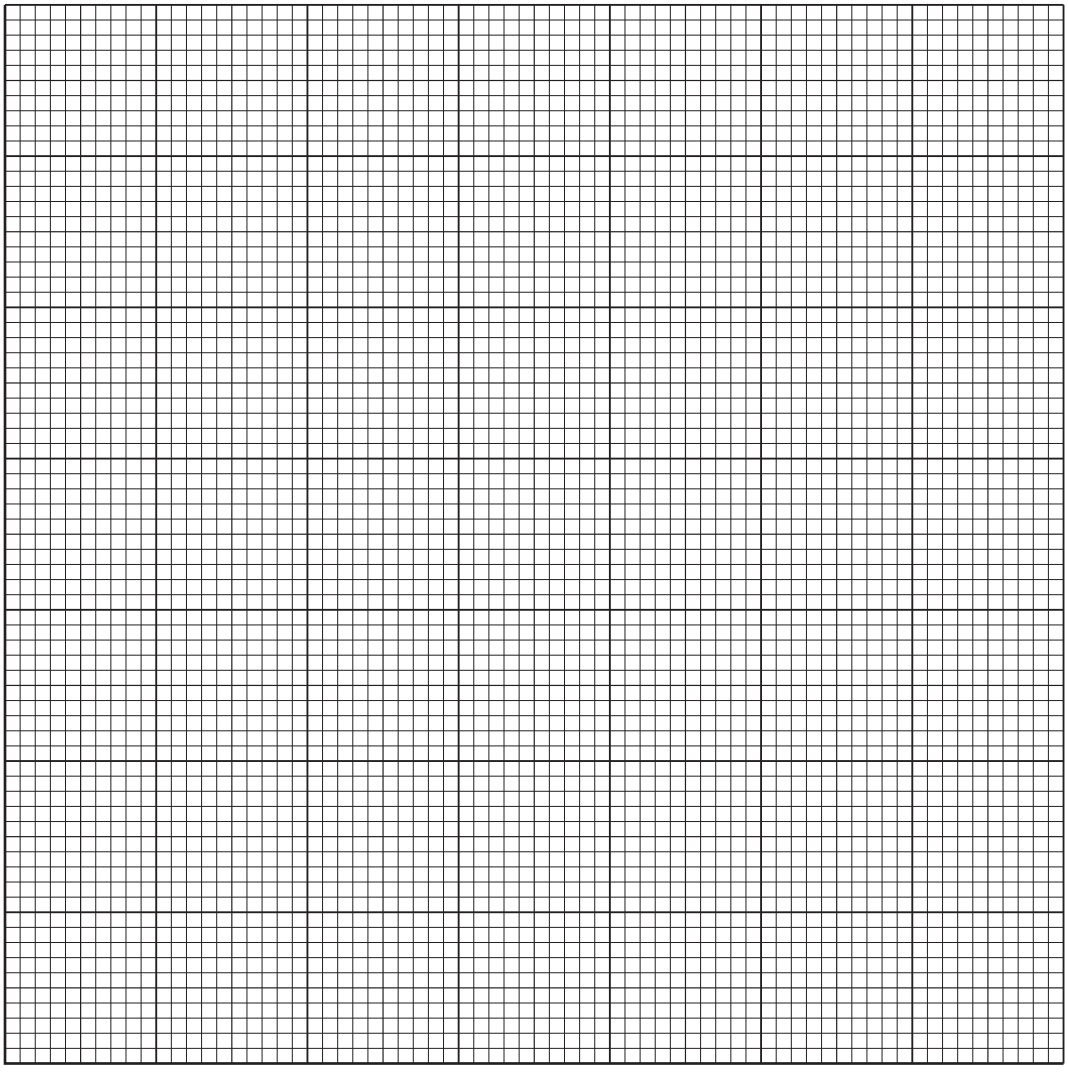
(b) State **one** precaution that you took whilst carrying out the experiment to ensure t… readings you obtained were reliable.

precaution .....

..... [1]

(c) **(i)** On the grid provided, plot a graph of v/u (vertical axis) against v (horizontal axis).

Draw the best fit straight line. [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 = ... [2]

(iii) The focal length, f, of the lens is given by the formula

$$f = \frac{1}{\text{gradient}}$$

Determine the focal length of the lens.

f = ... cm [2]

(d) This experiment is unsuitable for values of u close to the value of f.

Use your observations from the experiment to explain this.

.....

..... [1]

2 You are going to carry out a series of tests to identify compound **X**.

(a) Heat the hard glass test-tube containing **X** until there is no further visible change.

Record your observation below and leave this test-tube to cool. You will be using the contents of this test-tube in **(c)(i)**.

observation .....

..... [1]

(b) (i) Place two spatula loads of **X** into a test-tube and add about 4 cm^3 of dilute hydrochloric acid. Pass the gas produced through limewater in another test-tube. Keep the mixture of **X** and acid for **(b)(ii)**.

Record your observations, identify the gas produced, and the anion in **X**.

observations .....

.....

.....

name of gas .....

name of anion ..... [4]

(ii) Transfer the contents of the test-tube from **(b)(i)** to the small beaker and add excess dilute sodium hydroxide.

Record your observations and suggest the name of the metal cation in **X**.

observations .....

.....

name of metal cation ..... [2]

(c) (i) The hard glass test-tube and its contents from **(a)** should now have cooled. Add about 8 cm^3 dilute nitric acid, stir and wait for 2 minutes. Then filter the mixture into two test-tubes for use in **(c)(ii)** and **(c)(iii)**.

State the colour of the filtrate.

..... [1]

(ii) To one of the test-tubes containing the filtrate, slowly add ammonia solutio
there is no further change.

Record your observations and suggest the **formula** of the cation in **X**.

observations .....

.....

.....

formula of cation ..... [3]

(iii) Carefully pour off some of the filtrate from the other test-tube from **(c)(i)**, leaving behind about 1 cm depth of filtrate. Add a piece of magnesium ribbon which is about 1 cm in length.

Record your observations.

observations .....

.....

..... [2]

(iv) Suggest what type of reaction has taken place in **(c)(iii)**.

.....

..... [1]

(d) Using your observations for **(a)**, **(b)** and **(c)**, identify compound **X**.

compound **X** is ..... [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