



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
General Certificate of Education Ordinary Level

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**PHYSICS**

**5054/04**

Paper 4 Alternative to Practical

**October/November 2008**

**1 hour**

Candidates answer on the Question Paper.

No Additional Materials are required.

**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 soft 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.

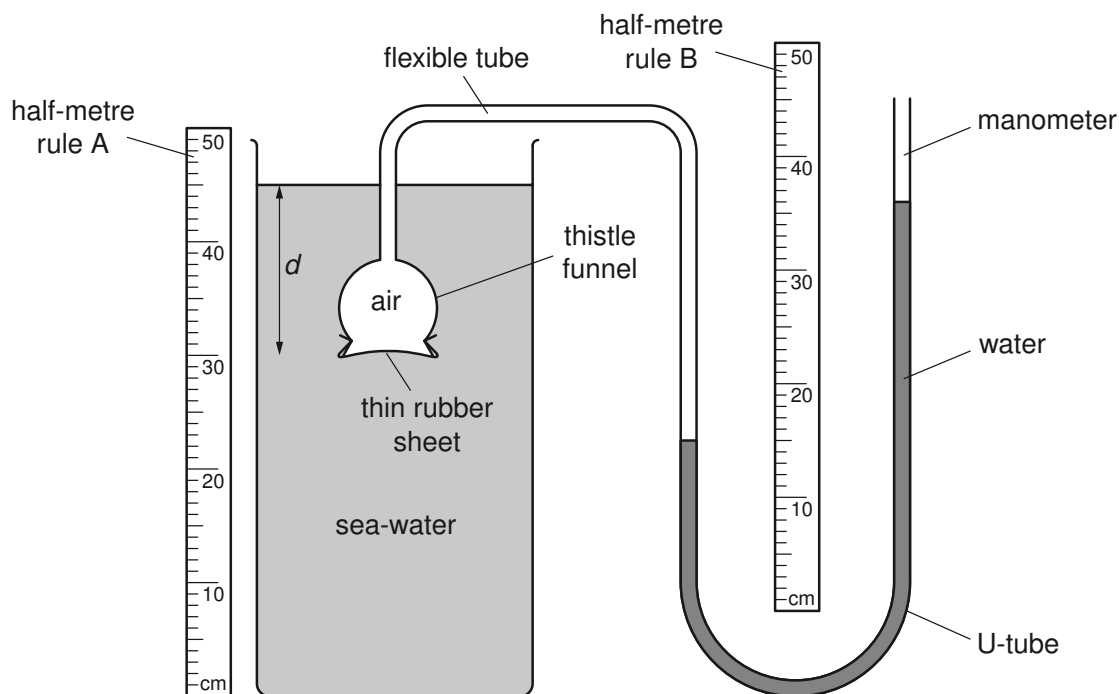
At the end of the examination, fasten all your work securely together.

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

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



- 1 The variation with depth  $d$  of pressure  $p$  in sea-water is investigated using the apparatus shown in Fig. 1.1.



**Fig. 1.1**

The pressure of the air in the thistle funnel is measured with the water manometer.

The thistle funnel is lowered in the water.

- (a) On Fig. 1.1, use rule B to measure the pressure shown on the manometer.

$$p = \dots\dots\dots \text{ cm of water [1]}$$

- (b) Readings for  $p$  at different values of  $d$  are taken and recorded in the table of Fig.1.2.

$d / \text{cm}$	$p / \text{cm of water}$
10	14
20	24
25	31
30	34
35	39
40	45

**Fig. 1.2**

Explain how parallax errors may be reduced when taking the readings.

.....

..... [1]

(c) On Fig. 1.3, plot a graph of  $p$  on the  $y$ -axis against  $d$  on the  $x$ -axis.

Draw the line of best fit.

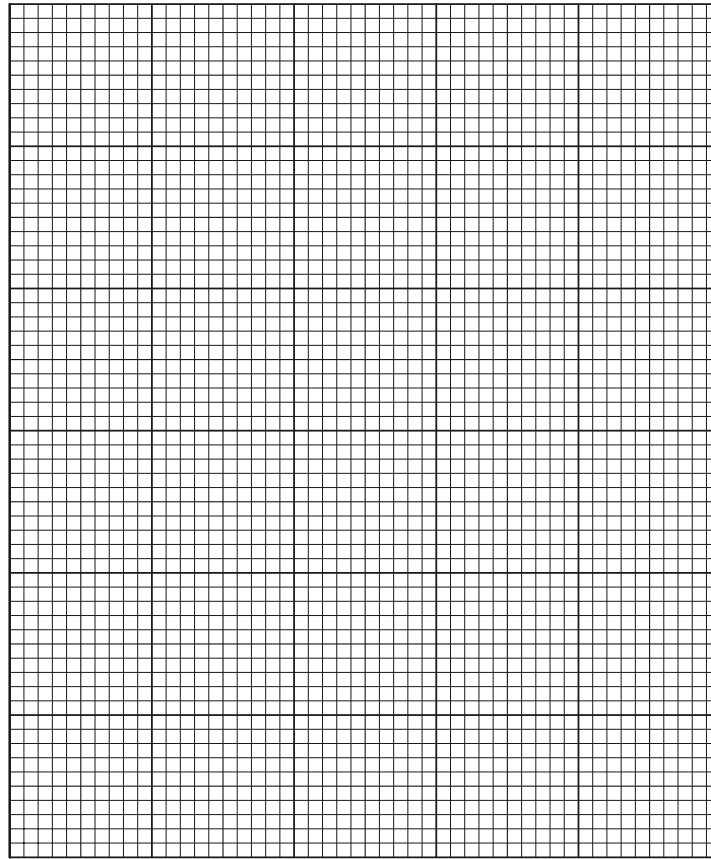


Fig. 1.3

[4]

(d) Suggest why your graph does **not** go through the origin.

.....  
..... [1]

(e) Describe the relationship between the measured values of  $d$  and  $p$ .

.....  
..... [1]

(f) Use your graph to find the value of  $p$  when  $d = 15$  cm.

$p = \dots\dots\dots$  cm of water [1]

- 2** A student performs an experiment to find the position of the image of an object in a plane mirror. The student forgets to draw the line of the mirror on the paper he uses. The paper with the positions of object O and the pins is shown in Fig. 2.1.

The student places two pins  $P_1$  and  $P_2$  on an incident ray from O to the mirror. He places two pins  $P_3$  and  $P_4$  on the reflected ray.

This is repeated with pins  $Q_1$  and  $Q_2$  on a different incident ray and  $Q_3$  and  $Q_4$  on the reflected ray.

**(a)** On Fig. 2.1,

**(i)** draw the incident ray from the object through pins  $P_1$  and  $P_2$ ,

**(ii)** draw the reflected ray through pins  $P_3$  and  $P_4$ ,

**(iii)** continue these two rays and find where they meet. [3]

**(b)** Repeat **(a)** using pins  $Q_1$ ,  $Q_2$ ,  $Q_3$  and  $Q_4$ . [1]

**(c)** On Fig. 2.1, draw a line to show the position of the mirror. Label this line M. [1]

**(d)** On Fig. 2.1, use the reflected rays to find the position of the image in the plane mirror. Label the image position I. [1]

**(e)** Measure the distance between O and I.

distance = ..... [1]

**(f)** Explain why the student should observe the bottom of the pins when performing the experiment.

.....  
 ..... [1]

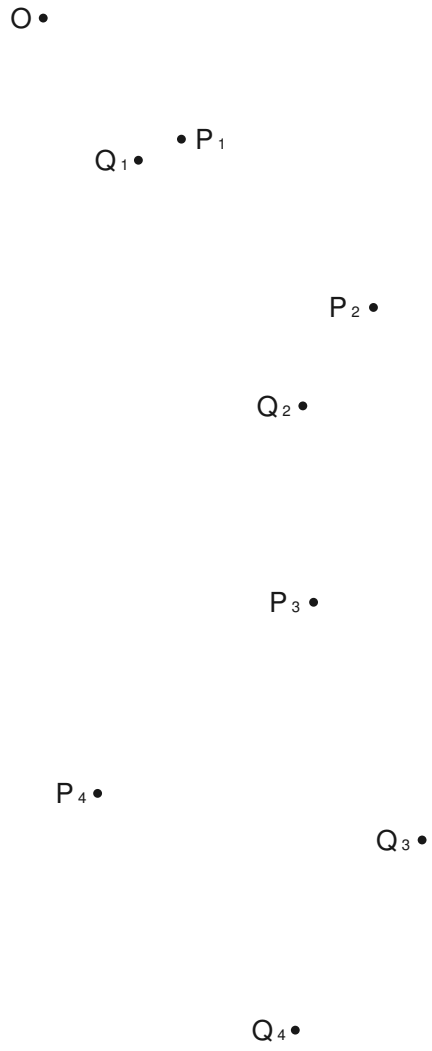
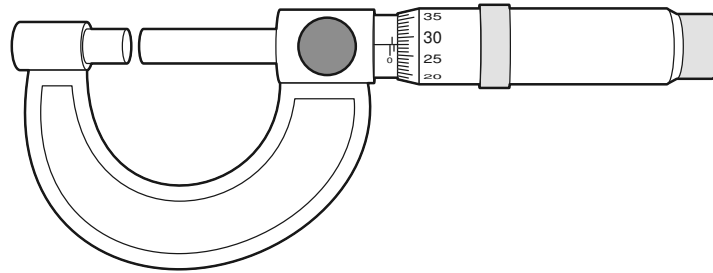


Fig. 2.1

3 Fig. 3.1 shows a micrometer screw gauge.



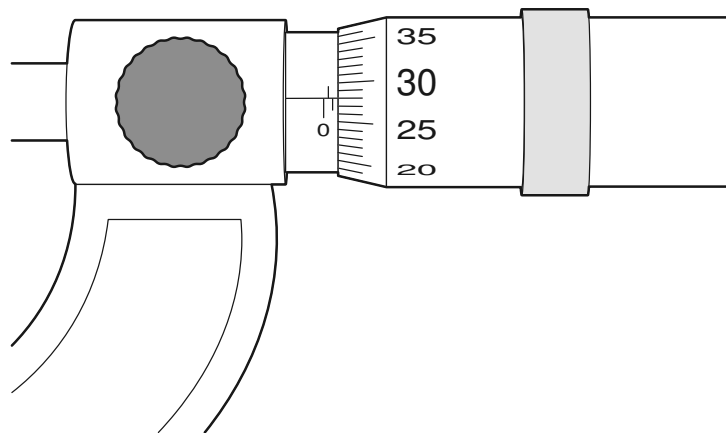
**Fig. 3.1**

(a) A student checks that there is no zero error on this micrometer.

Explain what is meant by a *zero error* on a micrometer.

.....  
 ..... [1]

(b) The student uses the micrometer to determine the thickness  $t$  of a sheet of paper. The student folds the paper in half three times and measures the total thickness of the folded paper. The micrometer is shown in Fig. 3.2.

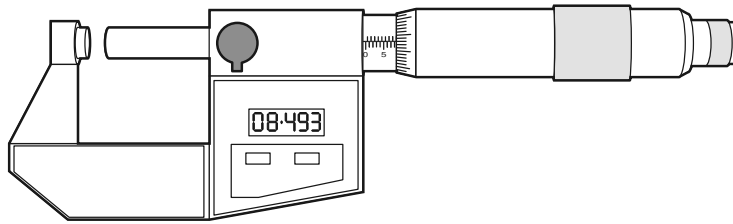


**Fig. 3.2**

Use Fig. 3.2 to find  $t$ . Show your working.

$t = \dots\dots\dots$  mm [3]

(c) Some modern micrometers are digital, as shown in Fig. 3.3.



**Fig. 3.3**

(i) Suggest one advantage of a digital micrometer.

..... [1]

(ii) Suggest one disadvantage of a digital micrometer.

..... [1]

- 4 (a) A lamp is marked 6 V, 0.3 A. These are the values of voltage and current at which the lamp is normally used. The lamp is shown in Fig. 4.1.

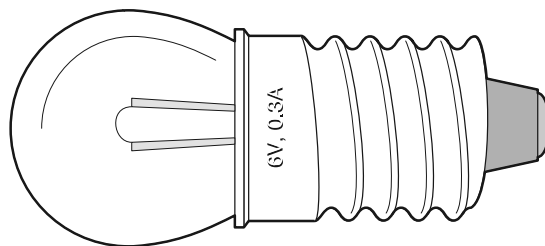


Fig. 4.1

- (i) The lamp is connected in circuit A and then in circuit B, as shown in Fig. 4.2.

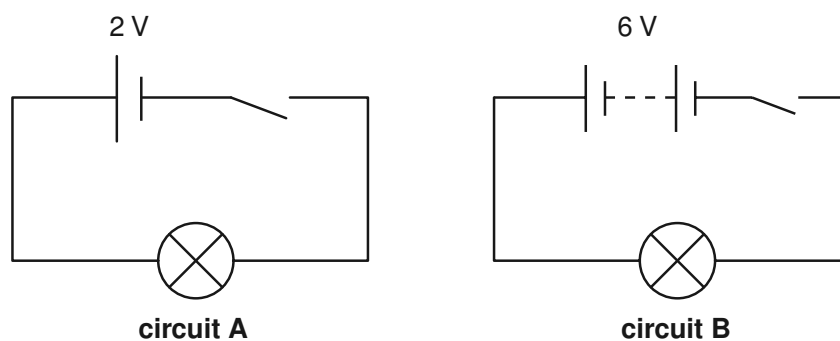


Fig. 4.2

State what the student observes when the switch is closed in each circuit.

circuit A .....

.....

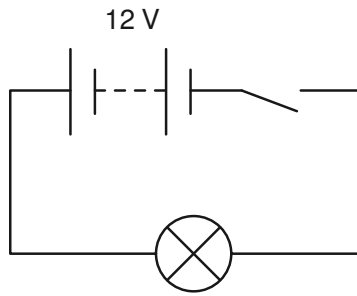
circuit B .....

.....

[2]



(ii) The lamp is then connected in the circuit shown in Fig. 4.3.



**Fig. 4.3**

State and explain what is observed as the switch is closed in Fig. 4.3.

.....  
.....  
..... [2]

(b) A lamp has no voltage marking.

Describe an experiment to find the voltage at which the lamp blows. Include a circuit diagram in your answer.

.....  
.....  
.....  
.....  
.....  
..... [3]





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