



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

CANDIDATE
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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.

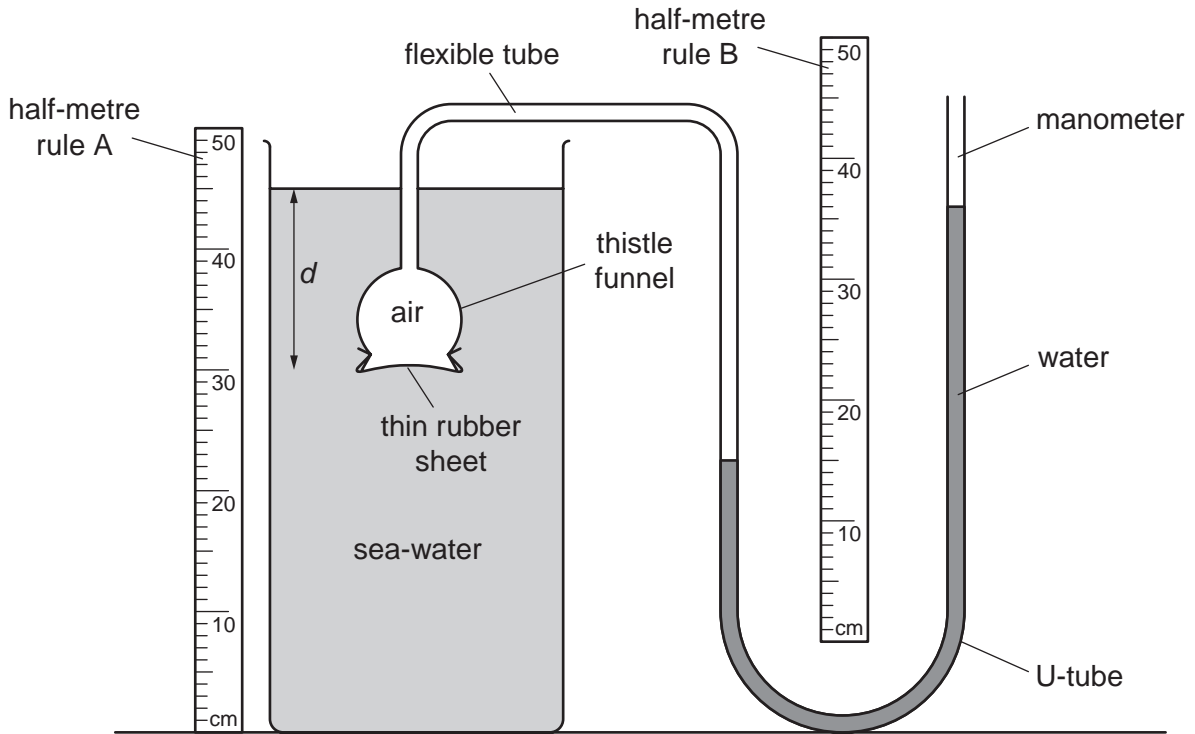


Fig. 1.1

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.

$p = \dots\dots\dots$ 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 / 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.

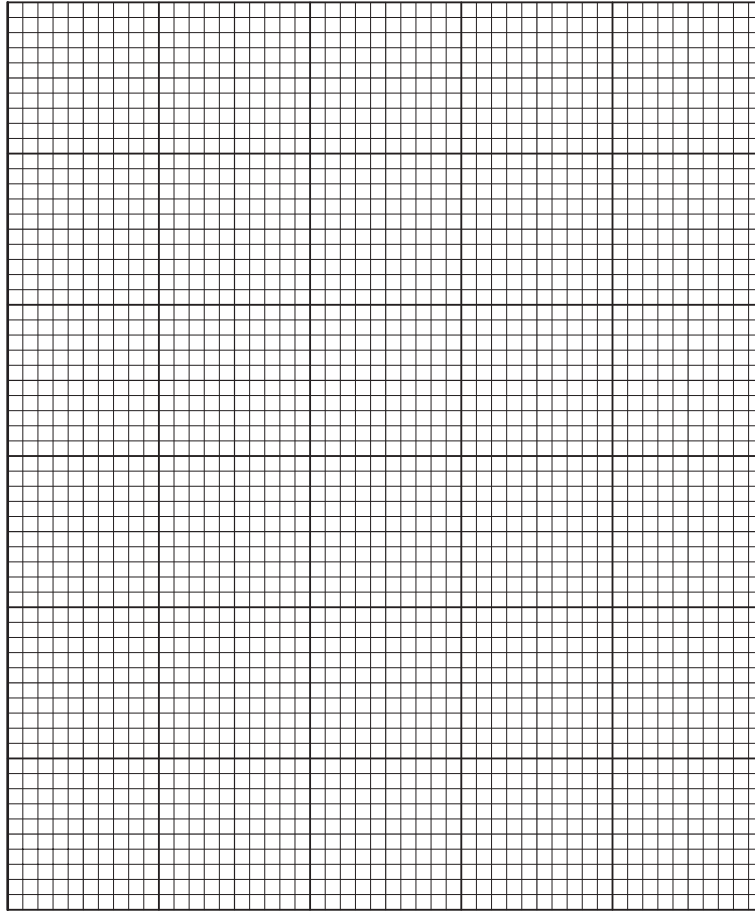


Fig. 1.3

[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]

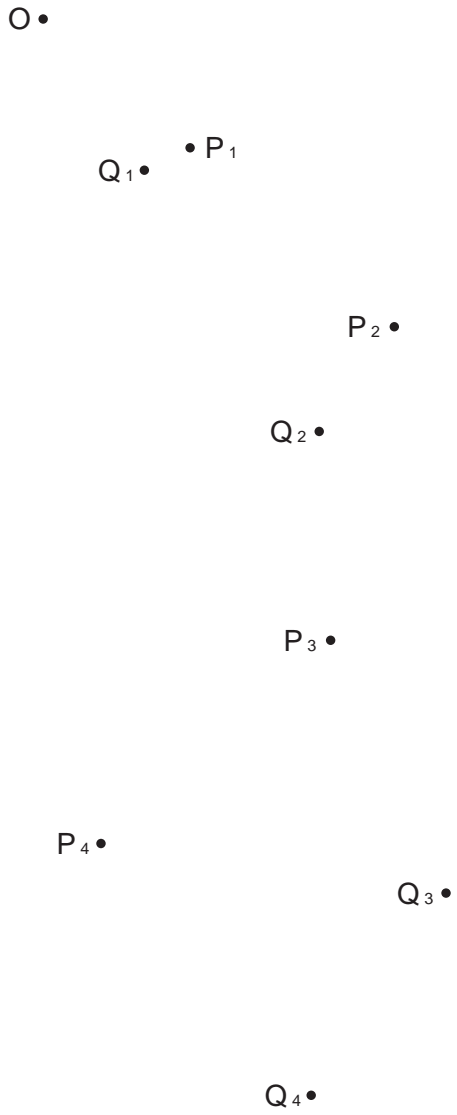


Fig. 2.1

3 Fig. 3.1 shows a micrometer screw gauge.

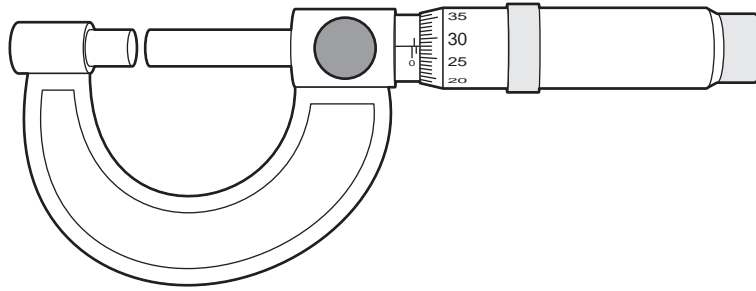


Fig. 3.1

(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.

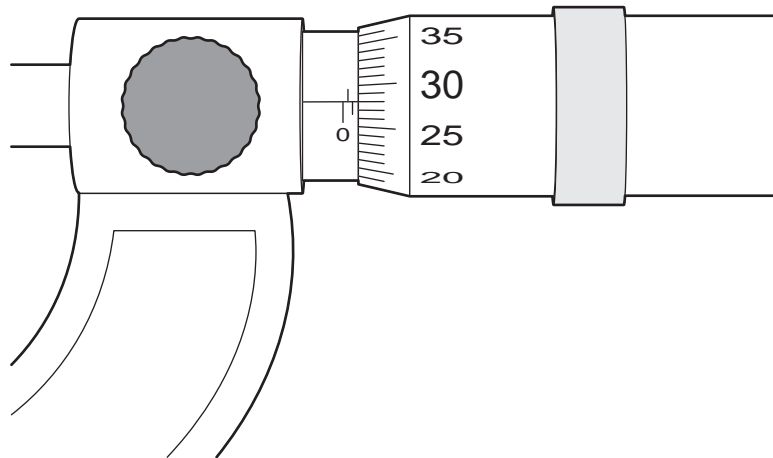


Fig. 3.2

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.

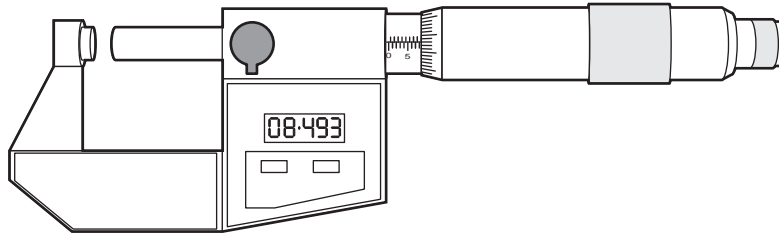


Fig. 3.3

(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.

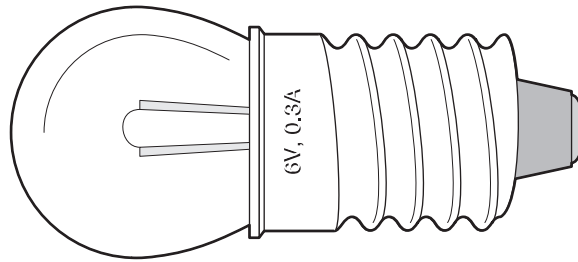


Fig. 4.1

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

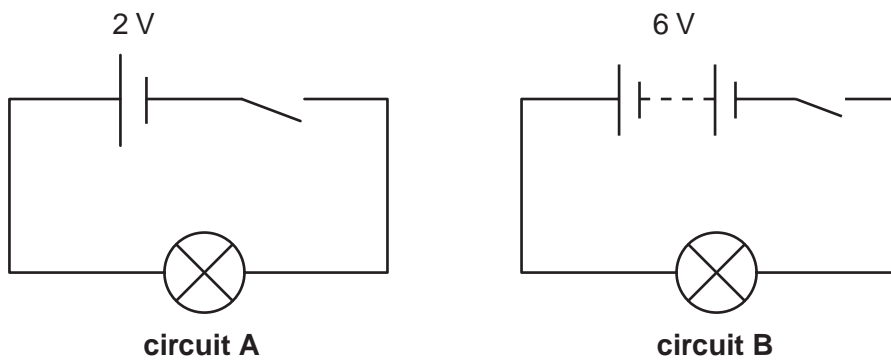


Fig. 4.2

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.

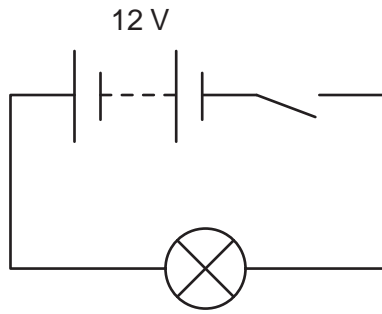


Fig. 4.3

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.

.....

.....

.....

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..... [3]

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