Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

1747213977

PHYSICS **5054/41**

Paper 4 Alternative to Practical **May/June 2014**

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 an HB 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.

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.

DC (NH/CGW) 75152/4
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1 A student uses a voltmeter.

(a) State the quantity measured with a voltmeter.

.....[1]

(b) Fig. 1.1 shows an analogue voltmeter.

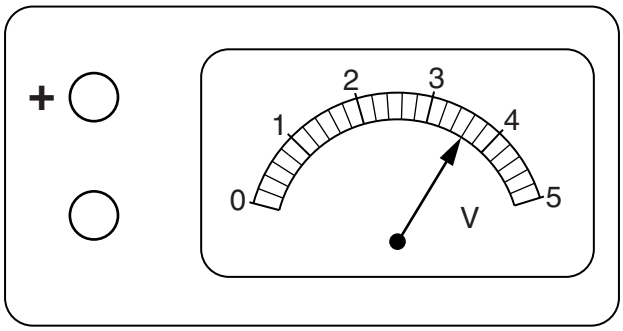


Fig. 1.1

State the reading on the voltmeter.

reading = ...[1]

(c) A school has both digital and analogue voltmeters.
Suggest one advantage of using a digital voltmeter rather than an analogue voltmeter.

.....[1]

(d) The student is asked to connect three 2.0 V cells in series with a resistor R of resistance 100 Ω. The student sets up the circuit as shown in Fig. 1.2.

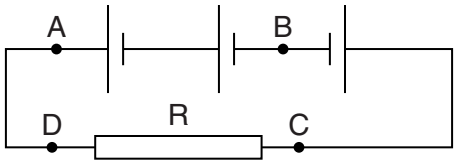


Fig. 1.2

(i) State the reading on the voltmeter when it is connected across

1. AD, reading = ...[1]

2. AB, reading = ...[1]

3. DC. reading = ...[1]

(ii) R is replaced by a resistor of resistance 1000 Ω. There is no change in the reading on the voltmeter across DC. Explain this.

.....

.....[1]

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2 A student investigates the mixing of water.

The student places a beaker A of warm water on a bench.

He places a laboratory thermometer in the water, as shown in Fig. 2.1a.

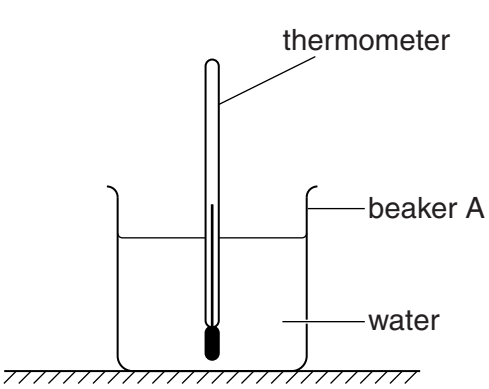


Fig. 2.1a

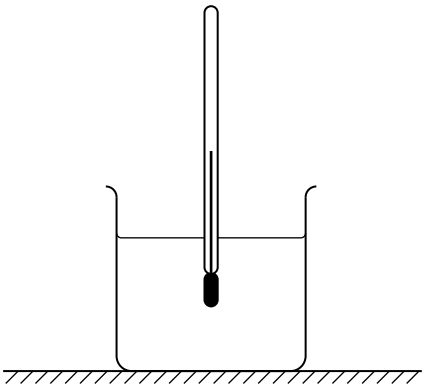


Fig. 2.1b

To take the reading of the thermometer, the student lifts the thermometer to the position shown in Fig. 2.1b.

(a) (i) On Fig. 2.1b, mark the position of the student's eye when taking the reading. [1]

(ii) Explain why the student lifts the thermometer.

.....

.....[1]

(iii) Explain why the thermometer is not removed from the water to take the reading.

.....

.....[1]

(iv) Fig. 2.2 shows the scale on the thermometer.

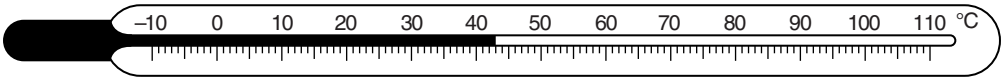


Fig. 2.2

State the temperature shown on the thermometer.

temperature = ...[1]

(b) The student leaves the water in beaker A until it reaches room temperature of 25 °C.

He then takes a large beaker B containing 150 cm^3 of hot water at 86 °C, as shown in Fig. 2.3.

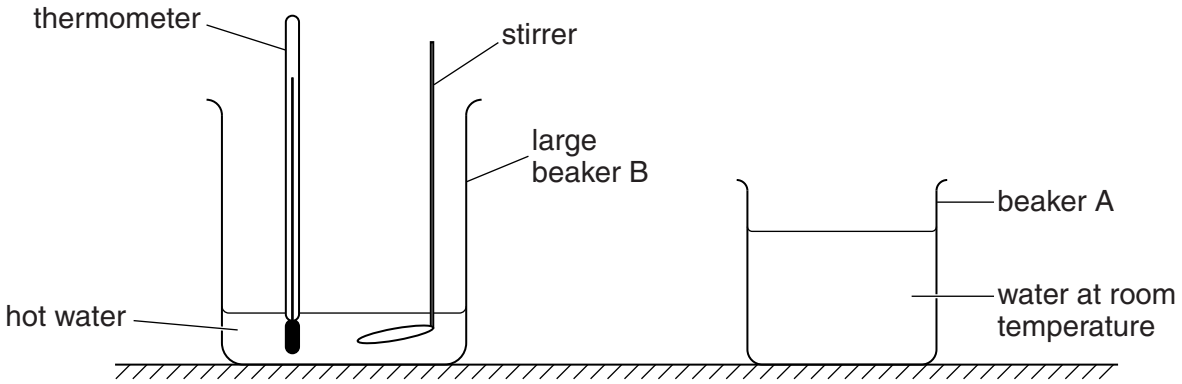


Fig. 2.3

He transfers 60 cm^3 of water from beaker A to beaker B, and measures the new temperature of the water in beaker B.

The student repeats this several times to obtain the results shown in Fig. 2.4.

0	86
60	62
120	51
180	46
240	42
300	40

Fig. 2.4

The student did not include the column headings in the table.

(i) On Fig. 2.4, add the correct headings. [2]

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(ii) On Fig. 2.5, plot a graph of the student's results with temperature on the *y*-axis. Start your axes from the values given on Fig. 2.5. Draw the smooth curve of best fit.

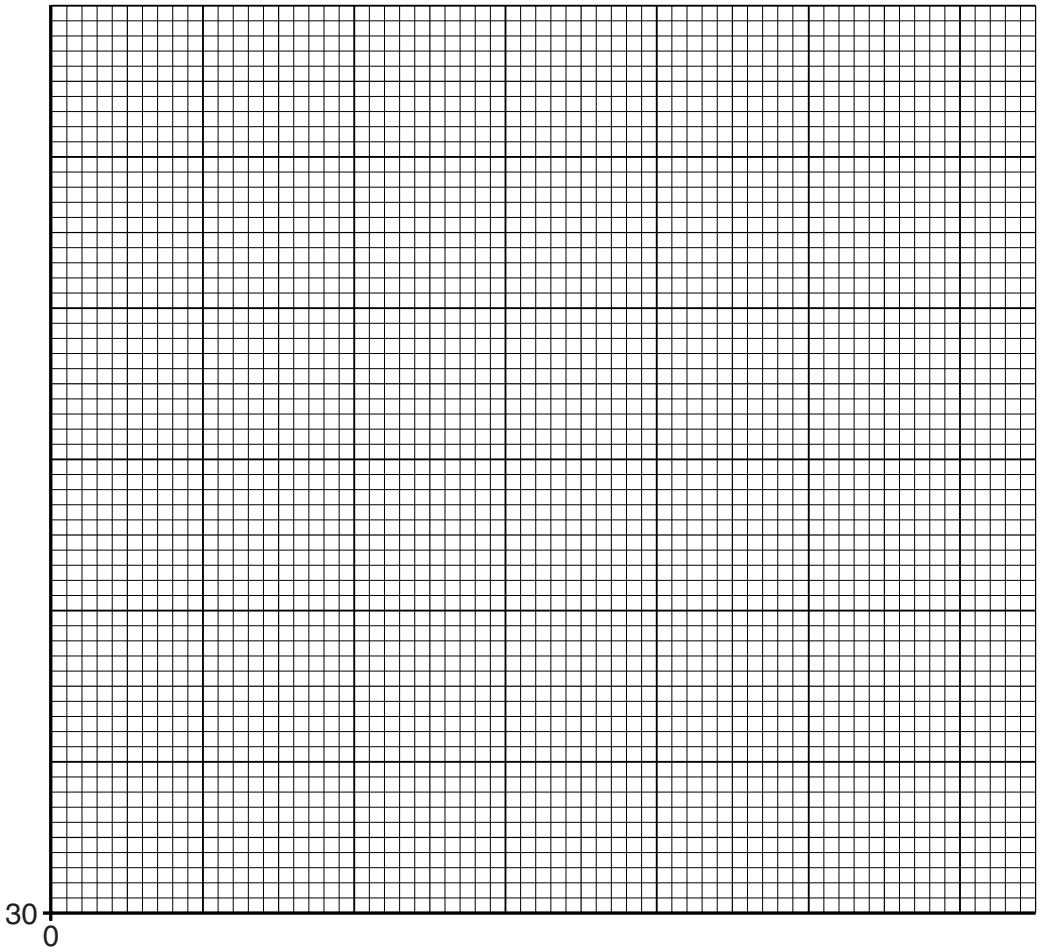


Fig. 2.5

[4]

(iii) The student repeats the experiment with the same initial conditions. He transfers 40 cm^3 of water to beaker B each time. Use Fig. 2.5 to find the temperature when a total of 80 cm^3 is transferred.

temperature = ...[1]

(iv) Explain why beaker B needs to be large.

.....

.....[1]

(v) Use your graph to explain why it is not possible to continue the experiment to the point when the water in beaker B reaches room temperature of 25 °C.

.....

.....[1]

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3 A student has five measuring cylinders.
Fig. 3.1 gives information about the measuring cylinders.

cylinder	volume / cm^3	smallest division / cm^3	diameter / cm	height / cm
A	5	0.1	0.7	12
B	10	0.2	1.3	14
C	50	1	2.6	20
D	100	1	3.1	25
E	250	2	4.2	32

Fig. 3.1

(a) The student uses a measuring cylinder to measure the volume of a marble of diameter 1.0 cm.

(i) Estimate the volume of the marble.

volume = ...[1]

(ii) State and explain which measuring cylinder is the best to use.

.....

.....

.....

.....[2]

(iii) The student half-fills the measuring cylinder with water. Describe how the measuring cylinder is then used to find the volume of the marble.

.....

.....

.....[1]

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(b) Fig. 3.2 shows the water surface in two measuring cylinders. One cylinder is made of glass and the other is made of plastic.

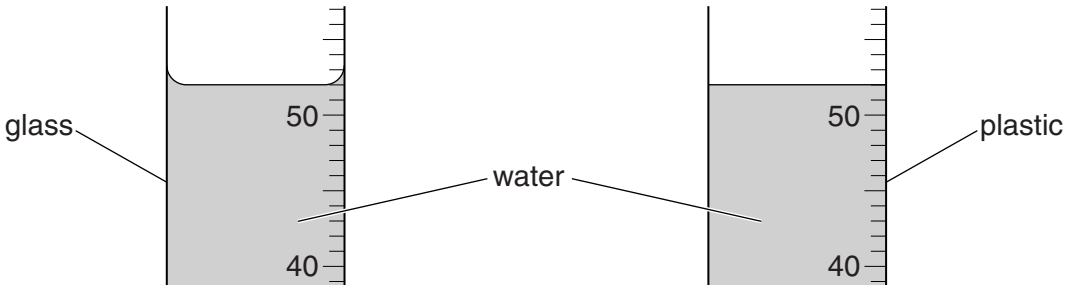


Fig. 3.2

Suggest two reasons why plastic measuring cylinders are often preferred to glass ones.

1. .....

2. .....

[2]

Please turn over for Question 4.

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4 A student is given a plano-convex lens.

Fig. 4.1 shows the plano-convex lens. It has one curved face and one flat face. The lens is a converging lens.

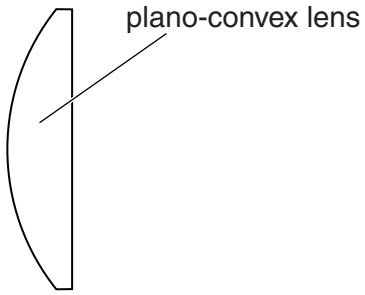


Fig. 4.1

The student predicts that the lens has two **different** focal lengths, one on each side of the lens.

Describe an experiment the student can perform to test this prediction.

In your account you should:

- state any equipment used,
- draw a labelled diagram of the equipment used,
- describe how the equipment is used,
- explain how the student checks his prediction.

.....

.....

.....

.....

.....

.....

.....

.....[4]

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