

\_\_\_\_\_

|  |  |  |  |  |
|--|--|--|--|--|
|  |  |  |  |  |
|--|--|--|--|--|

|  |  |  |  |
|--|--|--|--|
|  |  |  |  |
|--|--|--|--|

**0625/63**

**May/June 2016**

1 hour

No Additional Materials are required.

## READ THESE INSTRUCTIONS FIRST

DO **NOT** WRITE IN ANY BARCODES.

You may lose marks if you do not show your working or if you do not use appropriate units.

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

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **12** printed pages.

- 1 Some students are comparing the rates of cooling of two thermometer bulbs under wet and dry conditions.

They are using the apparatus shown in Fig. 1.1.

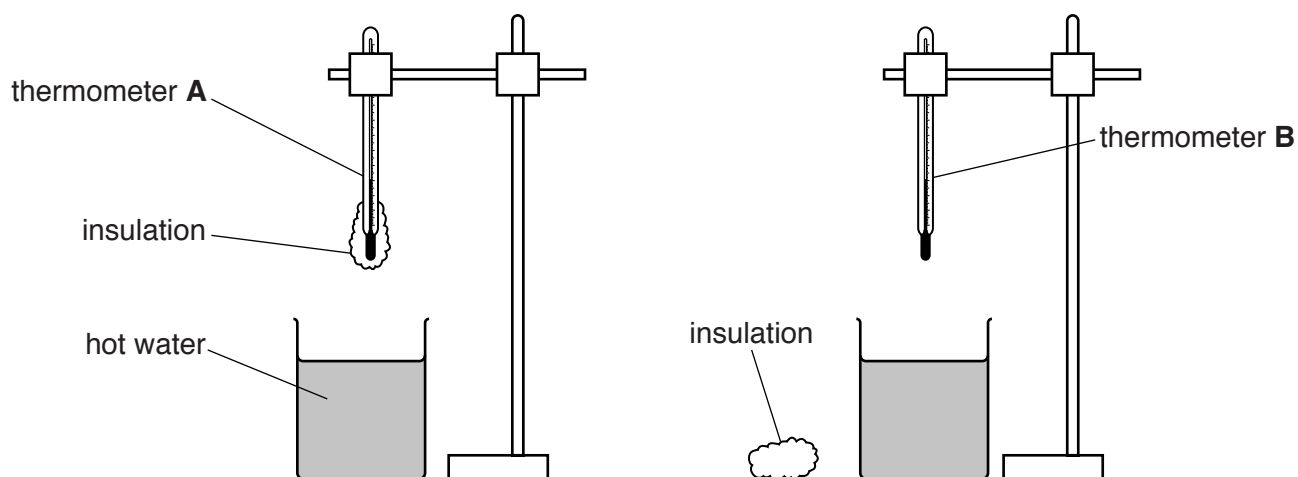


Fig. 1.1

Thermometer **A** has a layer of cotton wool insulation fixed around the bulb.

- (a) Record the room temperature  $\theta_R$ , as shown on the thermometer in Fig. 1.2.

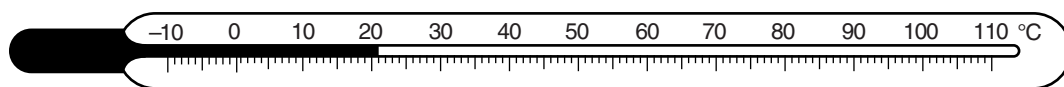


Fig. 1.2

$\theta_R = \dots\dots\dots$ [1]

- (b)
- Thermometer **A** is placed into hot water, at 81.0 °C, for two minutes and then removed.
  - A student records, in Table 1.1, the temperature  $\theta$  of the thermometer bulb every 30 s.
  - Thermometer **B** is placed into hot water, also at 81.0 °C, for two minutes.
  - The student removes thermometer **B** from the water and quickly wraps a layer of dry cotton wool insulation around the bulb.
  - He then records the temperature  $\theta$  of the thermometer bulb every 30 s.

Complete the column headings and time column in Table 1.1.

**Table 1.1**

|       | thermometer <b>A</b><br>with wet insulation | thermometer <b>B</b><br>with dry insulation |
|-------|---------------------------------------------|---------------------------------------------|
| time/ | $\theta/$                                   | $\theta/$                                   |
| 0     | 80.0                                        | 77.5                                        |
|       | 75.0                                        | 70.5                                        |
|       | 67.0                                        | 64.0                                        |
|       | 59.5                                        | 59.0                                        |
|       | 53.5                                        | 54.5                                        |
|       | 48.0                                        | 50.5                                        |
|       | 43.0                                        | 47.5                                        |

[2]

- (c) (i) Write a conclusion to this experiment, stating for which thermometer the cooling is faster. Explain your answer by reference to the results.

.....

.....

.....

.....

.....[2]

- (ii) Describe what is unusual about the pattern of cooling for thermometer **A**.

.....

.....

.....[1]

(d) The student first wrapped dry insulation around the bulb of thermometer **B** before starting the timing.

(i) Suggest why he did this.

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

(ii) Suggest what problem this delay in starting the timing might have caused with the procedure.

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

(e) Suggest two factors which should be kept constant to ensure that the comparison is fair.

1. ....  
.....  
2. ....  
.....  
[2]

[Total: 10]

- 2 A student is using a forcemeter and a set of different loads to determine the weight of a metre rule. She is using the apparatus shown in Fig. 2.1.

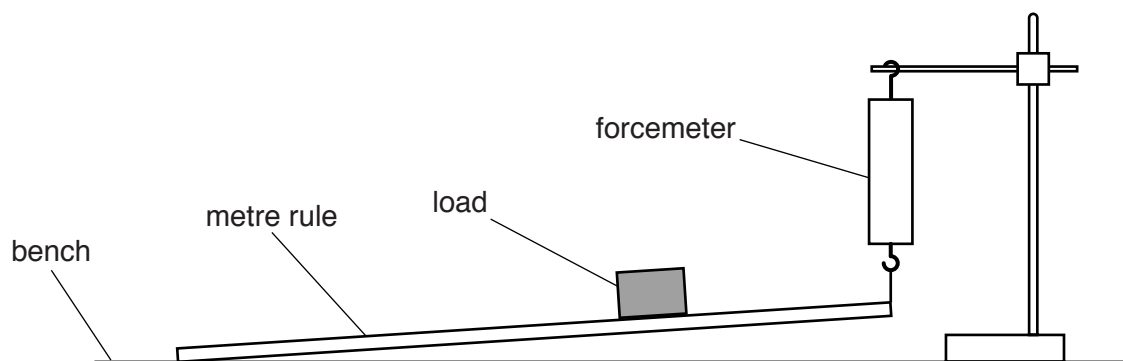


**Fig. 2.1**

- (a) Fig. 2.2 shows the position of the load on the metre rule. The load is always at this position on the rule.

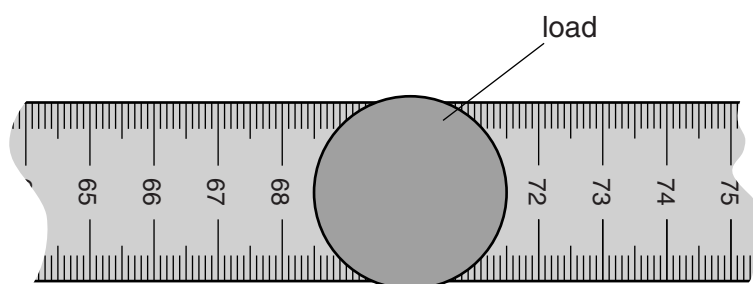


**Fig. 2.2 (not full size)**

Determine the scale reading on the metre rule at which the centre of the load is located. Show your working.

scale reading = ..... cm [2]

- (b) The student measures the force  $F$  indicated by the forcemeter for different loads placed on the rule.

Figs. 2.3 (a)–(e) show the scale of the forcemeter for values of load  $L = 1.00\text{ N}$ ,  $2.00\text{ N}$ ,  $3.00\text{ N}$ ,  $4.00\text{ N}$  and  $5.00\text{ N}$ .

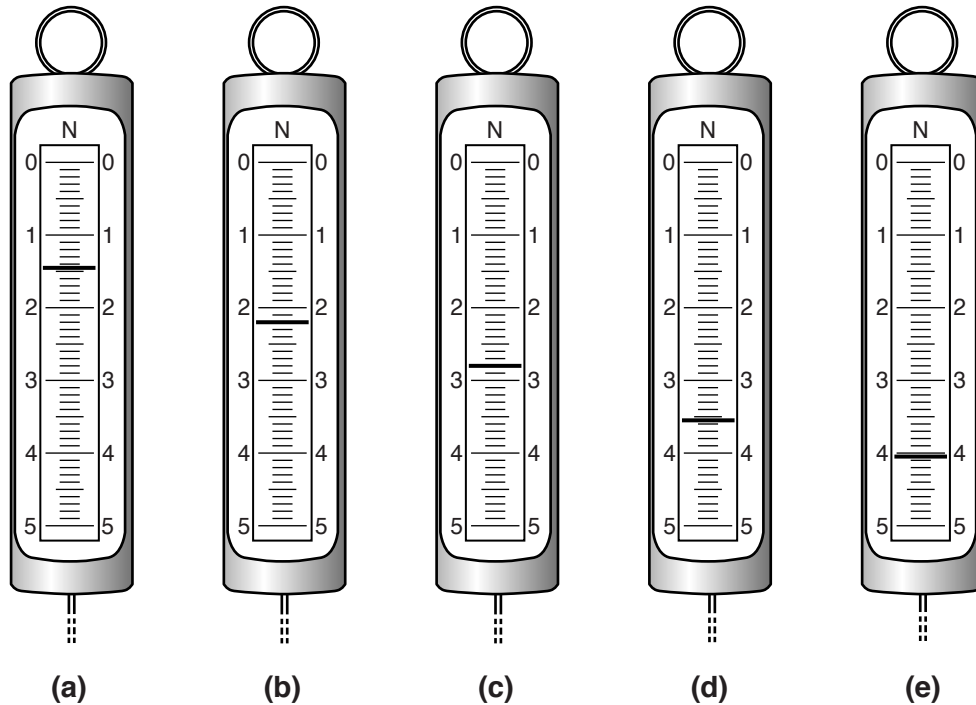


**Fig. 2.3**

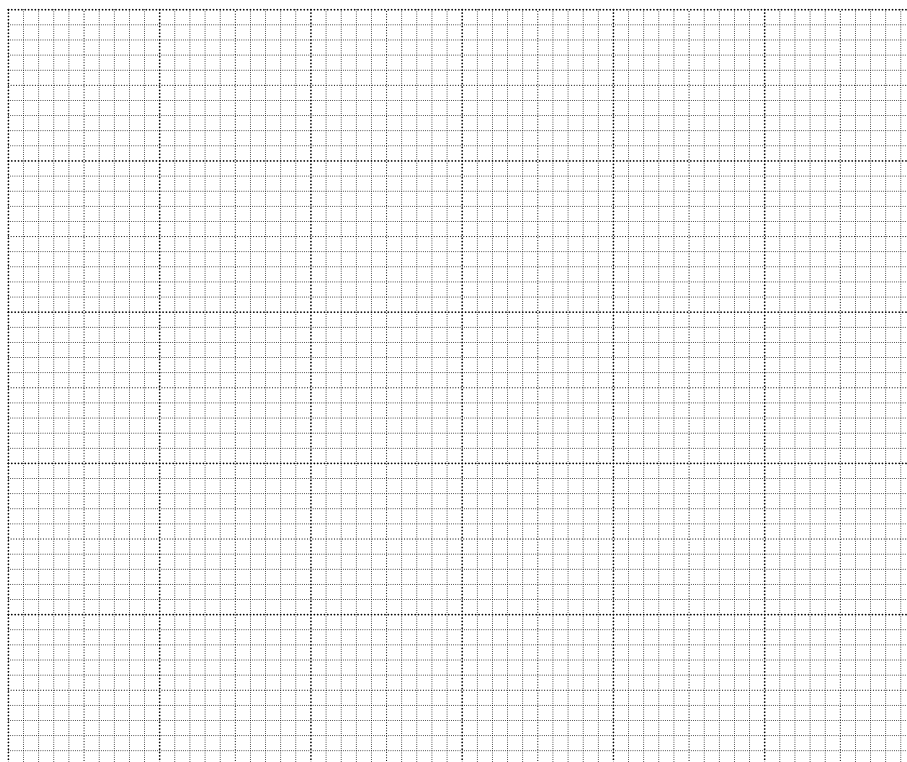
In Table 2.1, record the value of  $F$  for each load.

**Table 2.1**

| $L/\text{N}$ | $F/\text{N}$ |
|--------------|--------------|
| 1.00         |              |
| 2.00         |              |
| 3.00         |              |
| 4.00         |              |
| 5.00         |              |

[2]

- (c) Plot a graph of  $F/N$  ( $y$ -axis) against  $L/N$  ( $x$ -axis). Start your graph at the origin (0,0).



[4]

- (d) (i) Determine the value  $y$  of the intercept of the line on the  $F$  axis.

$y = \dots\dots\dots$  [1]

- (ii) The weight  $W$  of the metre rule is numerically equal to  $2y$ .

Write down a value for  $W$  to a suitable number of significant figures for this experiment.

$W = \dots\dots\dots$  [2]

- (e) Assuming that the procedure is carried out carefully, suggest a possible source of inaccuracy in this experiment.

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

[Total: 12]

- 3 A student notices that the size of the image produced by a converging lens changes when the lens is moved further away from an object.

Plan an experiment to investigate how the size of the image varies with the object distance for a converging lens suitable for school experiments.

Write a plan for the experiment, including:

- a labelled diagram of the apparatus needed
- instructions for carrying out the experiment
- the factors that will limit the range of object distances
- the graph you will plot
- one precaution you will take to ensure reliable results, explaining what might be the effect of not taking this precaution.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

**[Turn over**

- 4 The class is investigating a circuit containing two lamps in series.

They are using the circuit shown in Fig. 4.1.

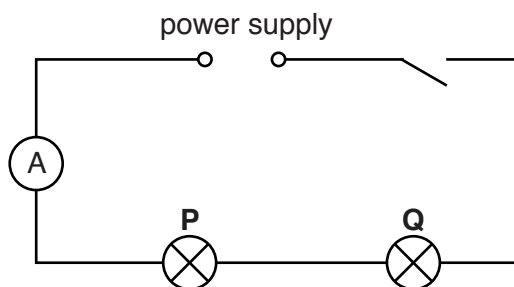


**Fig. 4.1**

- (a) On Fig. 4.1, use the standard symbol to show a voltmeter connected to measure the potential difference (p.d.) across lamp **P**. [1]
- (b) Record the current  $I$  in the circuit, as shown on the ammeter in Fig. 4.2.

$I = \dots\dots\dots$  [2]

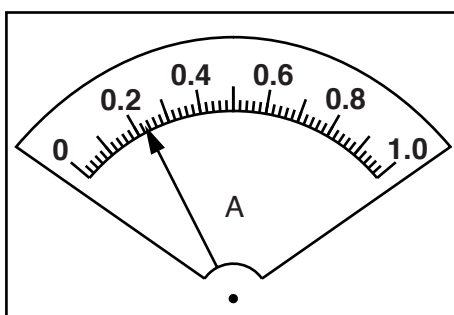


**Fig. 4.2**

- (c) Fig. 4.3 shows the readings on voltmeters connected to measure the potential difference across each lamp.

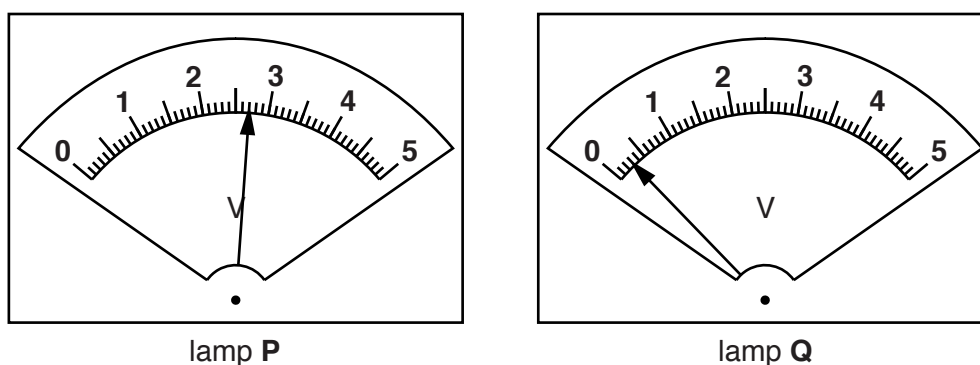


Fig. 4.3

In Table 4.1, record the potential difference  $V_P$  across lamp **P** and the potential difference  $V_Q$  across lamp **Q**.

Table 4.1

| lamp     | potential difference / V | observation of brightness |
|----------|--------------------------|---------------------------|
| <b>P</b> | $V_P = \dots\dots\dots$  | very bright               |
| <b>Q</b> | $V_Q = \dots\dots\dots$  | not glowing               |

[1]

- (d) Table 4.1 also shows the brightness of each lamp.

- (i) A student thinks that, as lamp **Q** is not glowing, its filament must have broken.

State one piece of evidence from the results in (b) and (c) that shows this cannot be the case.

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

- (ii) The working potential difference for each lamp to be at its full brightness is 2.5V.

Suggest how the results for  $V_P$  and  $V_Q$  might help to explain the observations of the brightness of the lamps.

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

- (e) Calculate the total resistance  $R$  of the lamps in the circuit, using the equation

$$R = \frac{(V_P + V_Q)}{I} .$$

$$R = \dots\dots\dots[2]$$

- (f) A student measures the potential difference  $V_S$  across the power supply.

$$V_S = \dots\dots\dots 3.1\text{ V} \dots\dots\dots$$

He suggests that  $V_S$  should be equal to  $V_P + V_Q$  .

State whether the measurements support this suggestion. Justify your statement by reference to the results.

statement .....

justification .....

.....  
[2]

[Total: 11]

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge International Examinations Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at [www.cie.org.uk](http://www.cie.org.uk) after the live examination series.

Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.