UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

CANDIDATE NAME

CENTRE NUMBER | CANDIDATE NUMBER

2029659722

PHYSICS **5054/42**

Paper 4 Alternative to Practical **May/June 2011**

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.
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.

This document consists of **8** printed pages.

DC (SM/DJ) 31823/5

UNIVERSITY *of* CAMBRIDGE International Examinations

[Turn over

1 A student investigates the motion of a toy car down a ramp.

The toy car is released from rest on the ramp at position 1, as shown in Fig. 1.1.

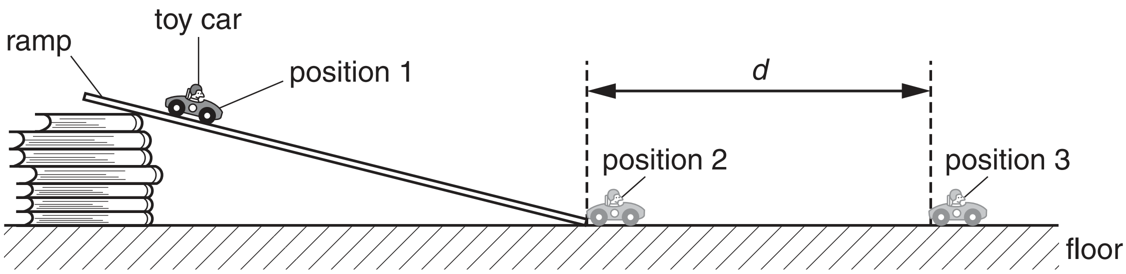

Fig. 1.1 (not to scale)

(a) The toy car leaves the ramp at position 2. It travels a distance *d* along the floor and comes to rest at position 3. Distance *d* is between 1 and 2 metres.

(i) Suggest a method for measuring *d*.

....

....[1]

(ii) Describe how the student ensures that the toy car is released from the same point on the ramp each time.

....

....

....[2]

(iii) On Fig. 1.1, mark the height *h* through which the toy car falls from position 1 to position 2. [1]

(b) The student releases the toy car from the same point on the ramp five times and measures *d* each time. The student obtains the following values of *d* in centimetres.

180	179	171	172	174

(i) Calculate d_{av}, the average value for *d*.
Give your answer to a suitable number of significant figures.

d_{av} = ...[2]

(ii) Suggest a reason why the results for *d* vary.

....

....[1]

(c) By adjusting the angle of the ramp, the student repeats the experiment for different values of the height h.
The results obtained for h and d_{av} are recorded in Fig. 1.2.

h / cm	d_{av} / cm
22	124
20	109
18	94
16	84
14	70
12	55
10	44

Fig. 1.2

(i) On Fig. 1.3, plot the graph of d_{av} / cm on the y-axis against h / cm on the x-axis.
Draw the line of best fit.

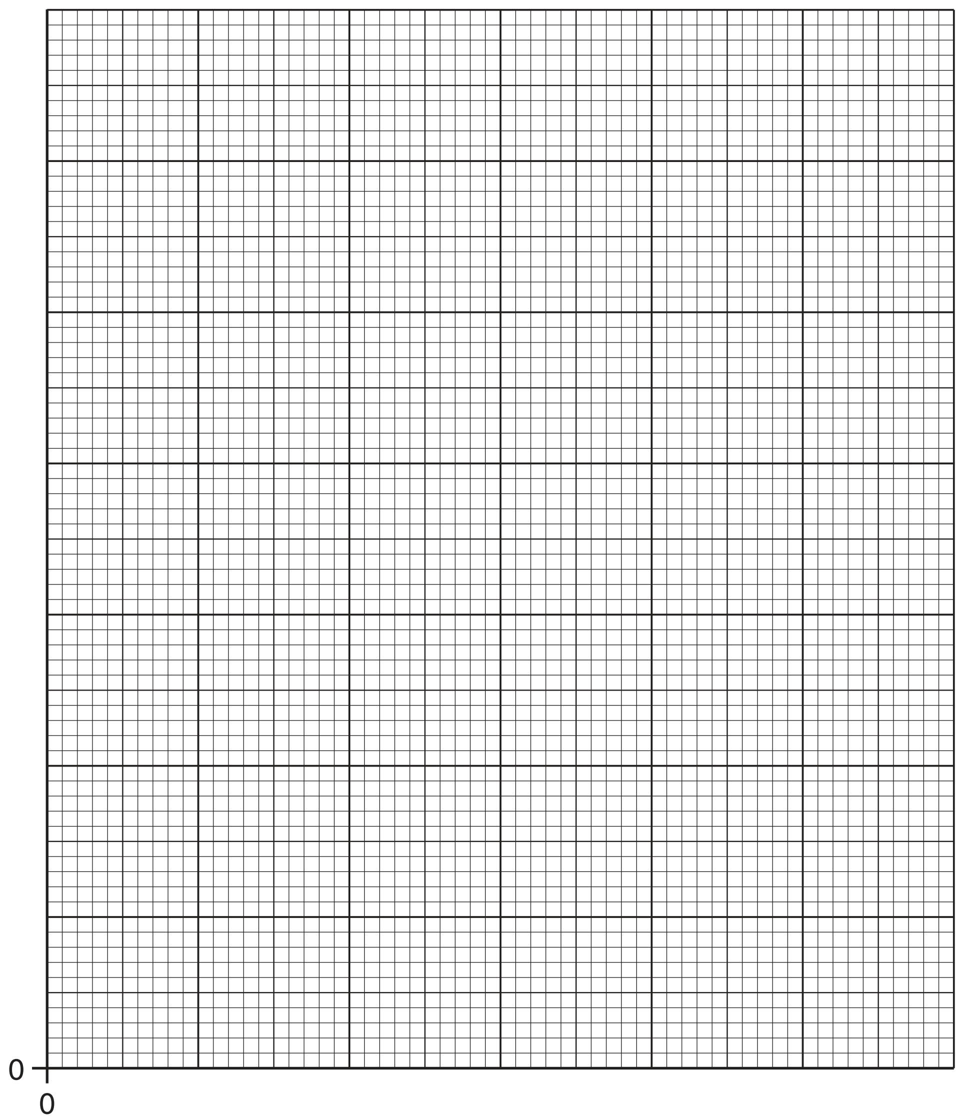

Fig. 1.3 [4]

(ii) Describe the relationship between d_{av} and h.

....

....[1]

(d) The car is now released with $h = 2\,\text{cm}$. Use your graph to state what happens to the car.

....

....[1]

2 A student investigates the effect of a converging lens on light from the Sun.

The student uses a converging lens to produce a clear image of the Sun on a piece of white card, as shown in Fig. 2.1.

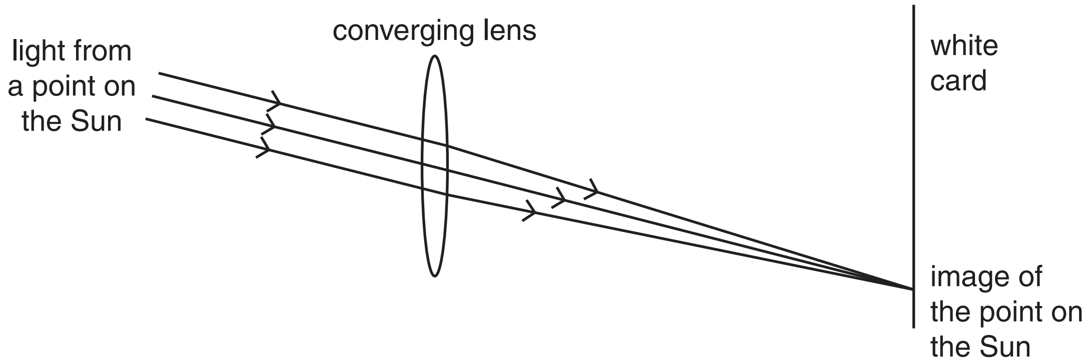

Fig. 2.1 (not to scale)

The student measures the perpendicular distance from the centre of the lens to the white card.

(a) **(i)** On Fig. 2.1, mark this distance and label it *s*. [1]

(ii) State the name given to this distance.

....[1]

(b) Describe in detail the experimental techniques used to obtain an accurate value for this distance.

....

....

....

....

....

....[3]

3 Three resistors A, B and C are connected in a circuit with a cell, as shown in Fig. 3.1.

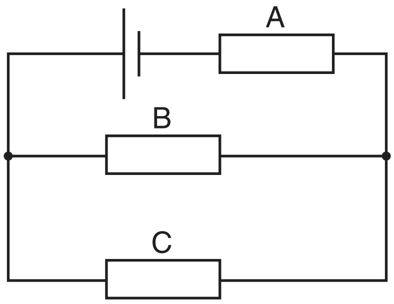

Fig. 3.1

(a) State the arrangement of resistors B and C in the circuit.

....[1]

(b) On Fig. 3.1, draw

(i) the symbol for a voltmeter to measure the voltage provided by the cell, [1]

(ii) an X to indicate the position of an ammeter to measure the current in resistor A. [1]

(c) The voltmeter is shown in Fig. 3.2.

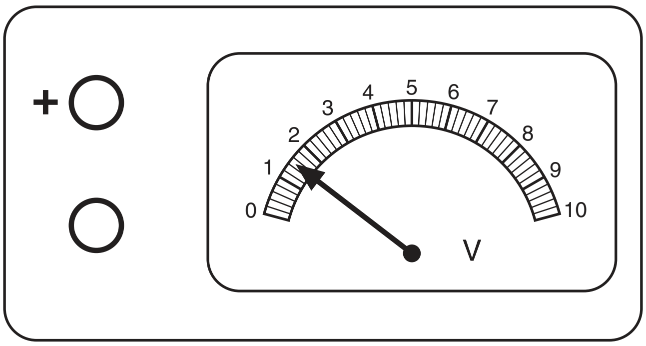

Fig. 3.2

(i) State the voltmeter reading *V* on Fig. 3.2.

V = ...[1]

(ii) Resistors A, B and C have resistances R_A, R_B and R_C where $R_A = R_B = R_C = 10\,\Omega$.

Use your answer for V in **(c)(i)** and the relationship below to find the value of the current I in resistor A.

$$\frac{V}{I} = R_A + \frac{R_C R_B}{R_C + R_B}$$

I = ...[1]

(d) Four students try to build the circuit of Fig. 3.1 with three $10\,\Omega$ resistors and a cell. Their circuit diagrams are shown in Fig. 3.3.

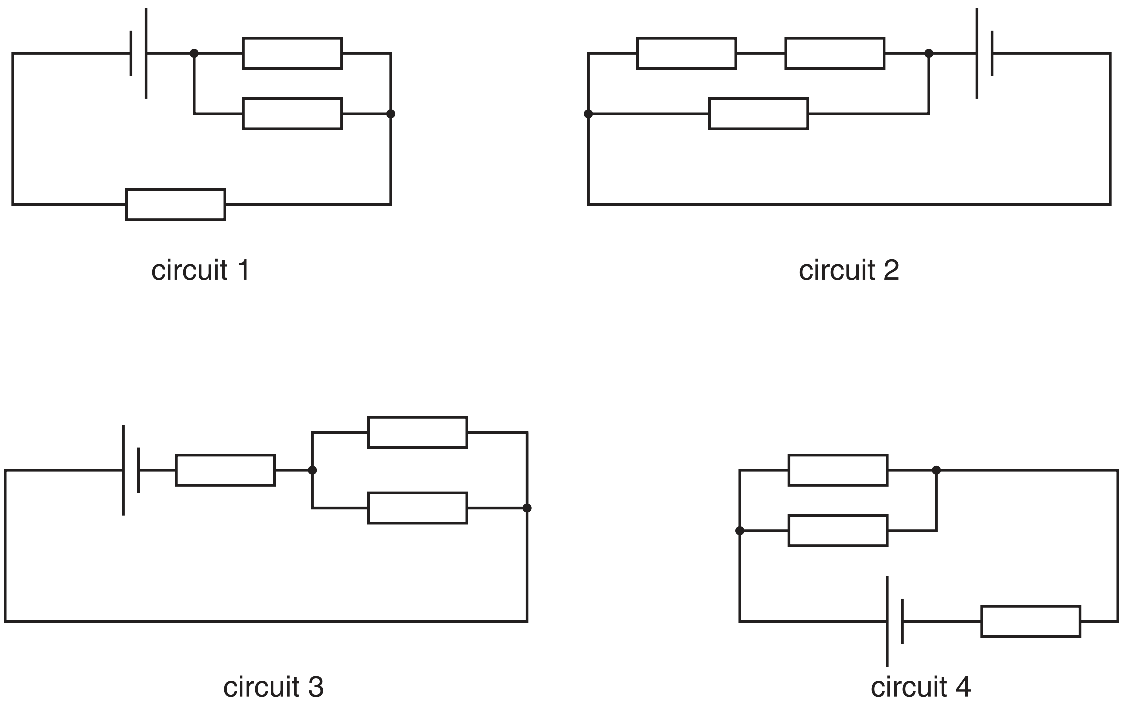

Fig. 3.3

State and explain which circuit is **not** the same as the circuit in Fig. 3.1.

....

....[1]

4 The effect of surface colour on the cooling of an object is investigated.

Fig. 4.1 shows two sets of apparatus used in this investigation.

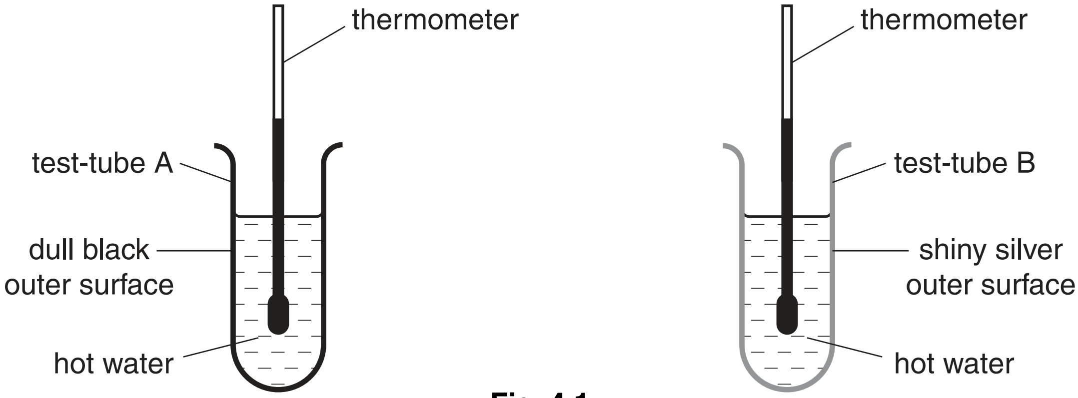

Fig. 4.1

Test-tube A has a dull black outer surface and test-tube B has a shiny silver outer surface.
The test-tubes containing hot water are allowed to cool.
Readings are taken for 20 minutes to allow cooling curves to be plotted.

(a) State two factors that must be the same for the two sets of apparatus so that the cooling curves may be compared.

1. ....

2. ....

[2]

(b) On Fig. 4.2, write the headings in the table that is to be used to record the results for test-tube A.

Fig. 4.2 [2]

(c) On Fig. 4.3, sketch and label the shape of the cooling curves for test-tube A and for test-tube B.

Fig. 4.3 [2]