UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

* 4 7 4 3 9 6 1 1 7 7 *

PHYSICS **0625/02**

Paper 2 Core **May/June 2009**

1 hour 15 minutes

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.
Take the weight of 1 kg to be 10 N (i.e. acceleration of free fall = 10 m/s^2).

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.

For Examiner's Use	
1	
2	
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11	
12	
Total	

This document consists of **19** printed pages and **1** blank page.

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1 A schoolteacher is concerned about the large number of vehicles passing along the busy road next to the school. He decides to make a measurement to find the number of vehicles per minute. Using the school clock he notes the following readings.

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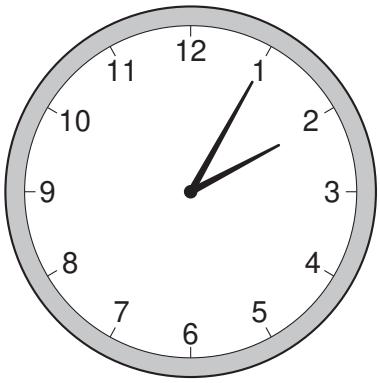
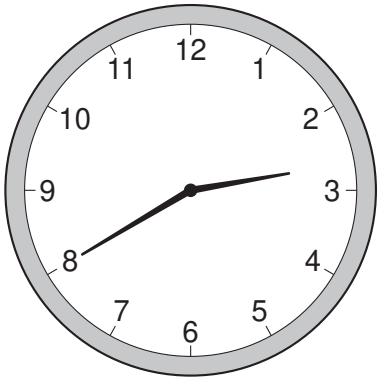
appearance of clock at beginning of investigation



appearance of clock at end of investigation



vehicles counted travelling left to right = 472

vehicles counted travelling right to left = 228

(a) Calculate the time for which the schoolteacher was counting vehicles.

counting time = ... min [1]

(b) Calculate the total number of vehicles passing the school per minute.

vehicles per minute = ... [3]

[Total: 4]

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2 In the left-hand column below are four physical quantities that might be measured in the Physics laboratory. In the right-hand column are eight statements which might be definitions of the quantities in the left-hand column.

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Use a line to join each quantity with its definition. An example has been given to help you. There is only one definition for each quantity.

work	force of gravity on a body
	how big the body is
mass	power of a given force
	weight ÷ mass
weight	amount of matter in a body
	force × distance moved
density	mass ÷ volume
	the acceleration due to gravity

[3]

[Total: 3]

3 The car in Fig. 3.1 is on a level road.

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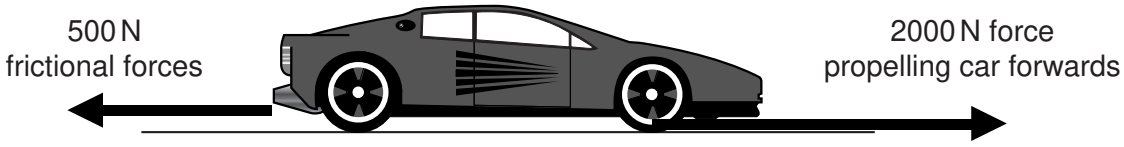

Fig. 3.1

(a) Calculate the magnitude of the resultant force on the car.

resultant force = ... N [1]

(b) Tick the box below that describes the motion of the car.

travels forward at constant speed	☐
travels forward with increasing speed	☐
travels forward with decreasing speed	☐
travels backward at constant speed	☐
travels backward with increasing speed	☐
travels backward with decreasing speed	☐
remains at rest	☐

[1]

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(c) The frictional forces increase to 2000 N when the car is moving. What happens to the car?

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..... [1]

(d) Suggest two things that might have caused the frictional forces in **(c)** to increase.

1. .....

2. ..... [2]

[Total: 5]

4 Fig. 4.1 shows a manometer, containing mercury, being used to monitor the pressure of a gas supply.

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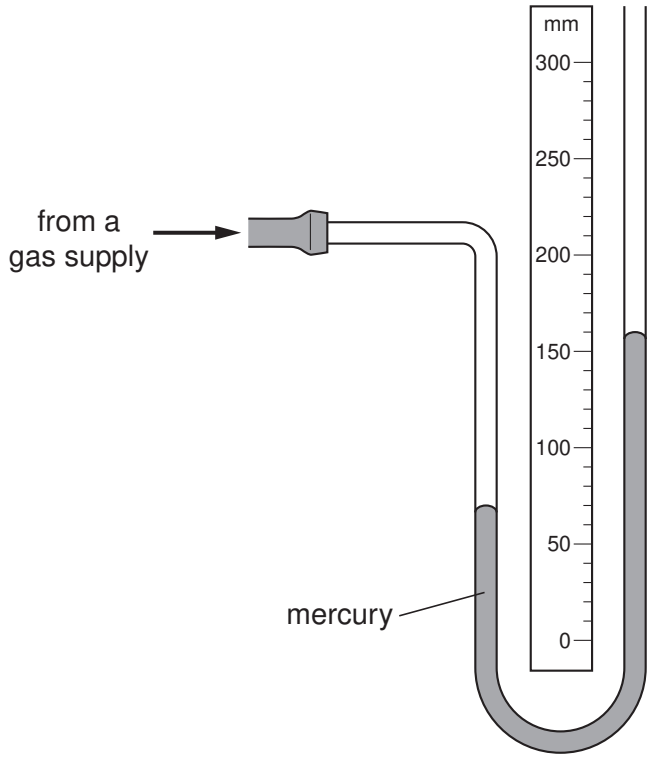

Fig. 4.1

(a) Using the scale on Fig. 4.1, find the vertical difference between the two mercury levels.

difference = ... mm [1]

(b) What is the value of the excess pressure of the gas supply, measured in millimetres of mercury?

excess pressure = ... mm of mercury [1]

(c) The atmospheric pressure is 750 mm of mercury.

Calculate the actual pressure of the gas supply.

actual pressure = ... mm of mercury [1]

(d) The gas pressure now decreases by 20 mm of mercury.

On Fig. 4.1, mark the new positions of the two mercury levels. [2]

[Total: 5]

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5 Fig. 5.1 shows a typical laboratory thermometer.

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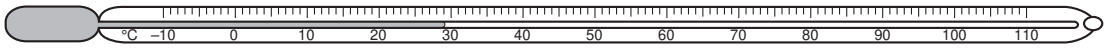

Fig. 5.1

(a) Explain why the thermometer has

(i) thin walls on its bulb,

.....

..... [1]

(ii) thick walls on its stem,

.....

..... [1]

(iii) a narrow capillary tube along which the liquid expands.

.....

..... [1]

(b) Suggest a liquid which the thermometer might contain.

..... [1]

(c) Such a thermometer is calibrated at the ice point and the steam point. The scale is put on between these two marks.

State the values of

(i) the ice point, ...

(ii) the steam point. .....

[2]

[Total: 6]

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6 Fig. 6.1 shows the waveform of the note from a bell. A grid is given to help you take measurements.

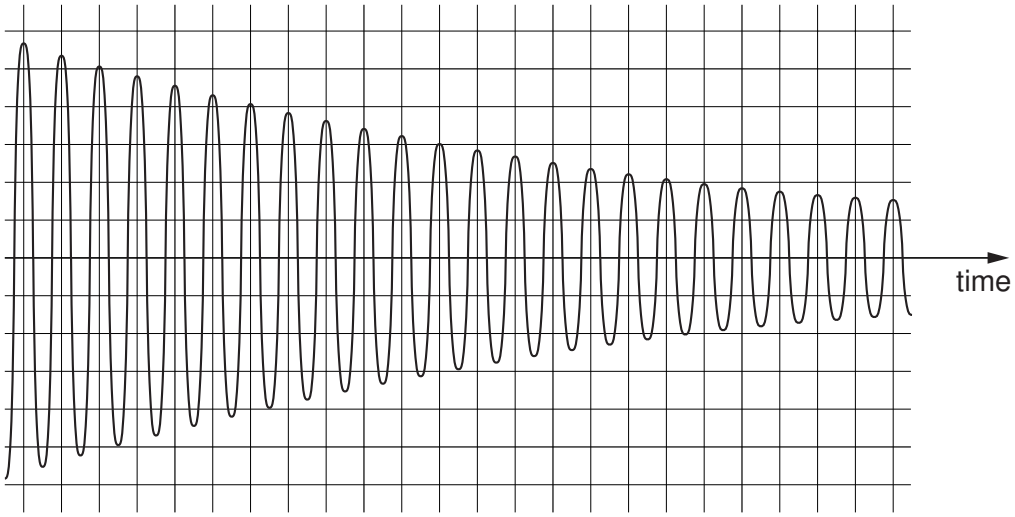

Fig. 6.1

(a) (i) State what, if anything, is happening to the loudness of the note.

..... [1]

(ii) State how you deduced your answer to **(a)(i)**.

..... [1]

(b) (i) State what, if anything, is happening to the frequency of the note.

..... [1]

(ii) State how you deduced your answer to **(b)(i)**.

..... [1]

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(c) **(i)** How many oscillations does it take for the amplitude of the wave to decrease to half its initial value?

..... [1]

(ii) The wave has a frequency of 300 Hz.

1. What is meant by *a frequency of 300 Hz*?

.....

..... [1]

2. How long does 1 cycle of the wave take?

..... [1]

3. How long does it take for the amplitude to decrease to half its initial value?

..... [2]

(d) A student says that the sound waves, which travelled through the air from the bell, were longitudinal waves, and that the air molecules moved repeatedly closer together and then further apart.

(i) Is the student correct in saying that the sound waves are longitudinal? .....

(ii) Is the student correct about the movement of the air molecules? .....

(iii) The student gives light as another example of longitudinal waves.

Is this correct? .....
[2]

[Total: 11]

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[Turn over

7 Two apartment blocks are one each side of a road, as shown in Fig. 7.1. A beam of light from a police helicopter is hitting the top window H of the left-hand apartment block.

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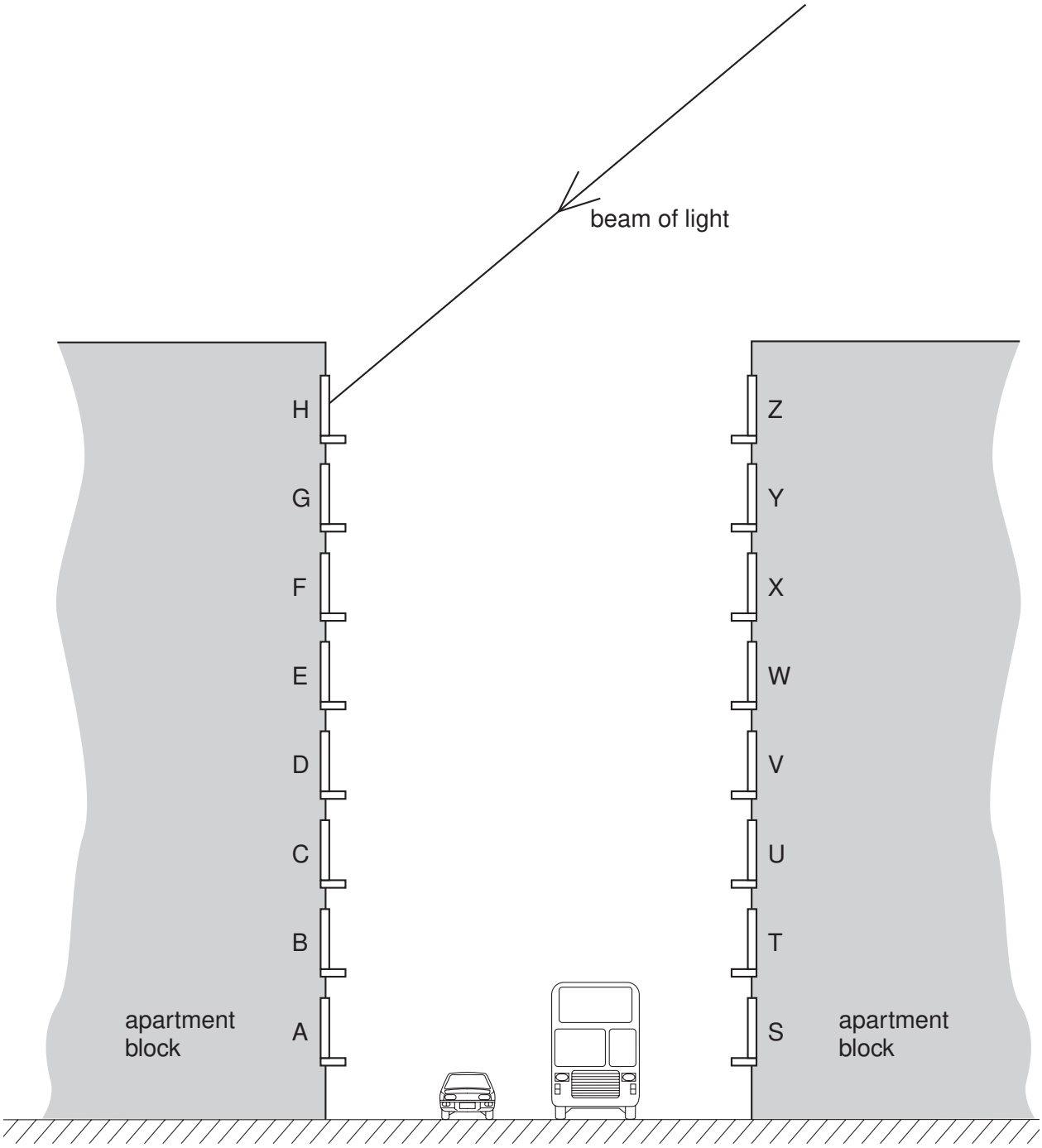

Fig. 7.1

(a) (i) On Fig. 7.1,

1. draw the normal at the point where the beam hits window H, [1]

2. label the angle of incidence of the beam of light on window H. [1]

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(ii) State the equation that links the angle of incidence with the angle of reflection.

..... [1]

(iii) Which window does the beam hit next, after reflection from H?

..... [1]

(iv) Which other windows, if any, receive light from the helicopter?

..... [1]

(b) Fig. 7.2 shows another example of reflection. The drawing is incomplete.

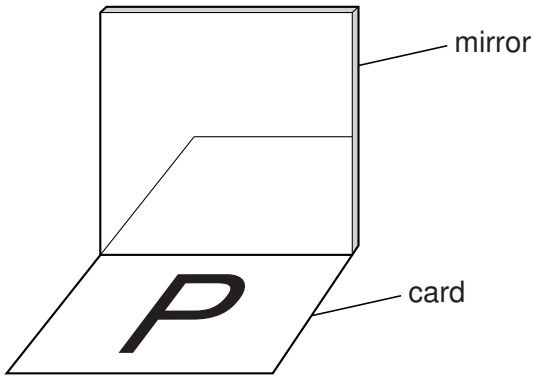

Fig. 7.2

The horizontal card with the letter P on it is being reflected in the vertical mirror.

On Fig. 7.2, draw the reflection of the letter P. [2]

[Total: 7]

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8 **(a)** Four rods are shown in Fig. 8.1.

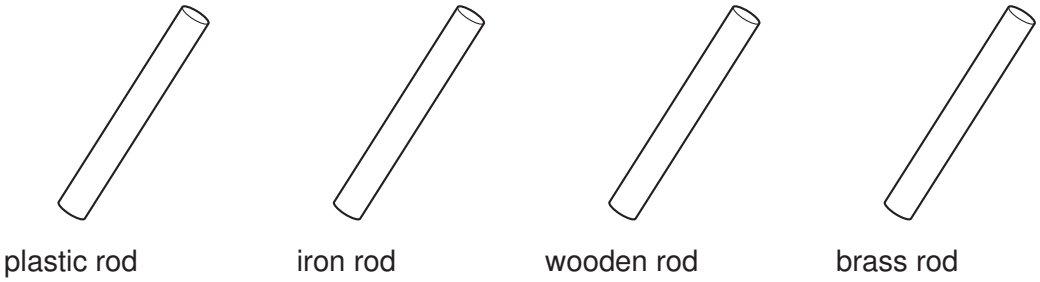

Fig. 8.1

State which of these could be held in the hand at one end and be

(i) magnetised by stroking it with a magnet,

..... [1]

(ii) charged by stroking it with a dry cloth.

..... [1]

(b) Magnets A and B in Fig. 8.2 are repelling each other.

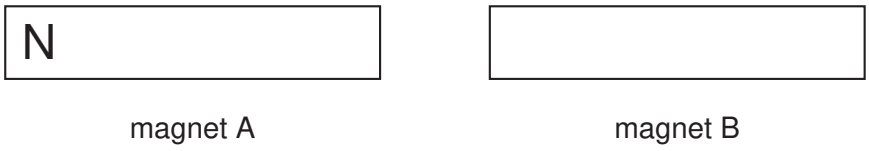

Fig. 8.2

The north pole has been labelled on magnet A.

On Fig. 8.2, label the other three poles. [1]

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(c) Charged rods C and D in Fig. 8.3 are attracting each other.

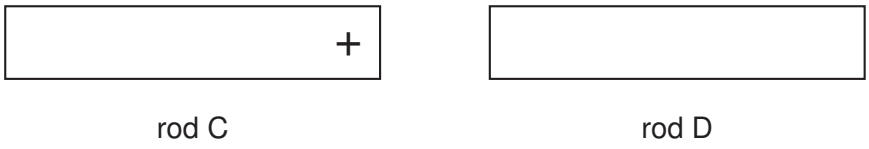

Fig. 8.3

On Fig. 8.3, show the charge on rod D. [1]

(d) Fig. 8.4 shows a plotting compass with its needle pointing north.

Fig. 8.4

A brass rod is positioned in an east-west direction. A plotting compass is put at each end of the brass rod, as shown in Fig. 8.5.

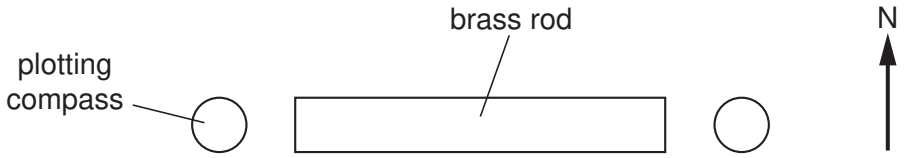

Fig. 8.5

On Fig. 8.5, mark the position of the pointer on each of the two plotting compasses. [2]

[Total: 6]

9 Fig. 9.1 shows a simple circuit.

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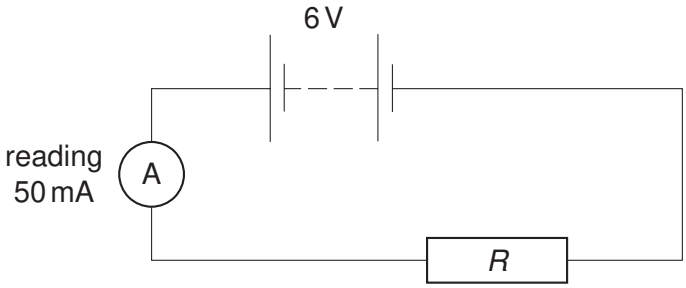

Fig. 9.1

(a) What is the value of

(i) the e.m.f. of the battery,

..... [1]

(ii) the current in the circuit?

..... [1]

(b) Calculate the resistance *R* of the resistor.

R = ... [3]

(c) State how the circuit could be changed to

(i) halve the current in the circuit,

..... [2]

(ii) reduce the current to zero.

..... [1]

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(d) A student wishes to include a switch in the circuit, but mistakenly connects it as shown in Fig. 9.2.

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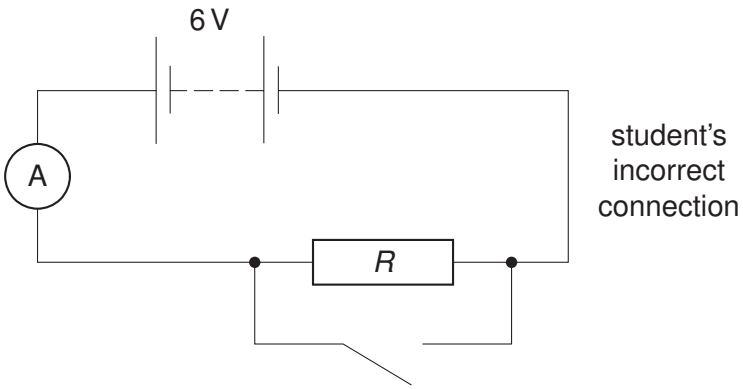

Fig. 9.2

(i) Comment on the size of the current in the circuit if the student closes the switch.

..... [1]

(ii) What effect would this current have on the circuit?

.....

.....

..... [2]

[Total: 11]

10 The apparatus in Fig. 10.1 is called a force-on-conductor balance. When there is an electric current I as shown in XY, there is a force on XY that pulls it down. This force is measured by putting weights in the pan until XY is brought back to its original position.

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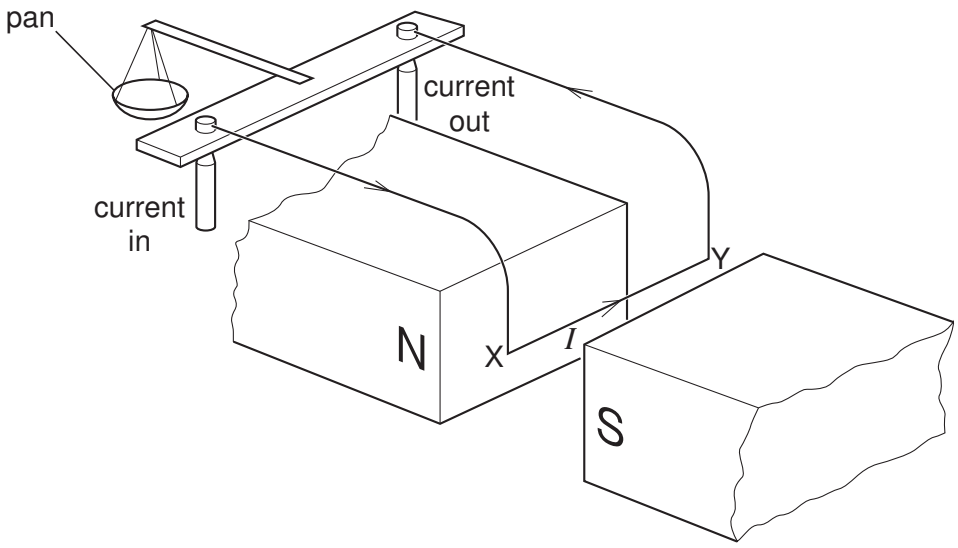

Fig. 10.1

(a) State what would happen if the current direction were from Y to X.

..... [1]

(b) An experimenter uses the balance to determine the force F on XY for different currents I. His results are given below.

I/A	0	0.5	1.0	1.5	2.0
F/N	0	0.012	0.023	0.035	0.047

(i) On the grid of Fig. 10.2,

1. mark suitable scales to plot a graph of F/N against I/A for these values, [2]
2. plot the points on your grid, [2]
3. draw the best straight line through your points. [1]

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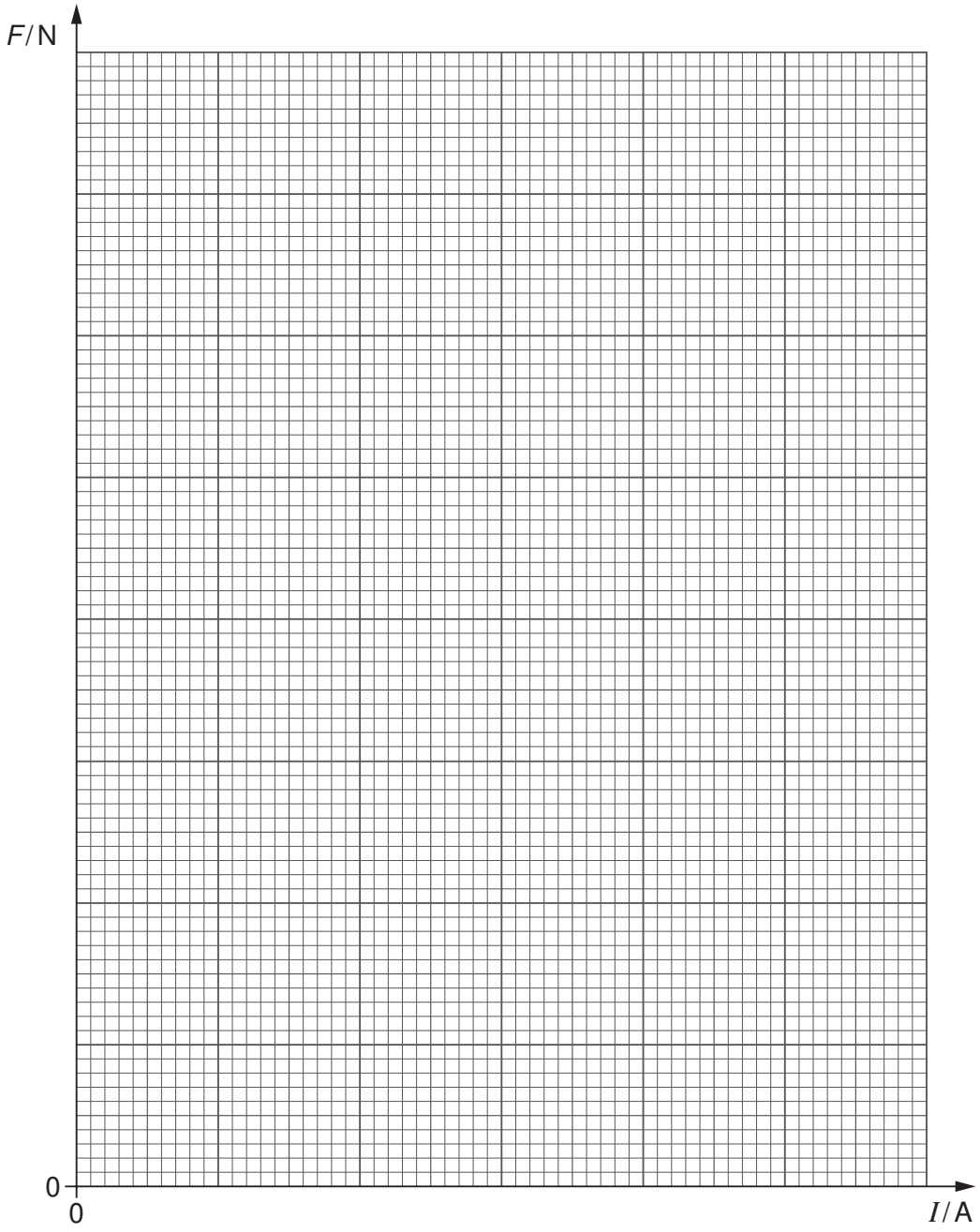

Fig. 10.2

(ii) From your graph, find the force on XY when the current is 1.6 A.

force = ... N [1]

(c) Name one common device that uses the effect demonstrated by the force-on-conductor balance.

..... [1]

[Total: 8]

11 Fig. 11.1 represents a cathode-ray tube containing a number of different parts. There are empty boxes connected to four of the parts. These boxes are for some of the answers to this question. Not all of the boxes will be used.

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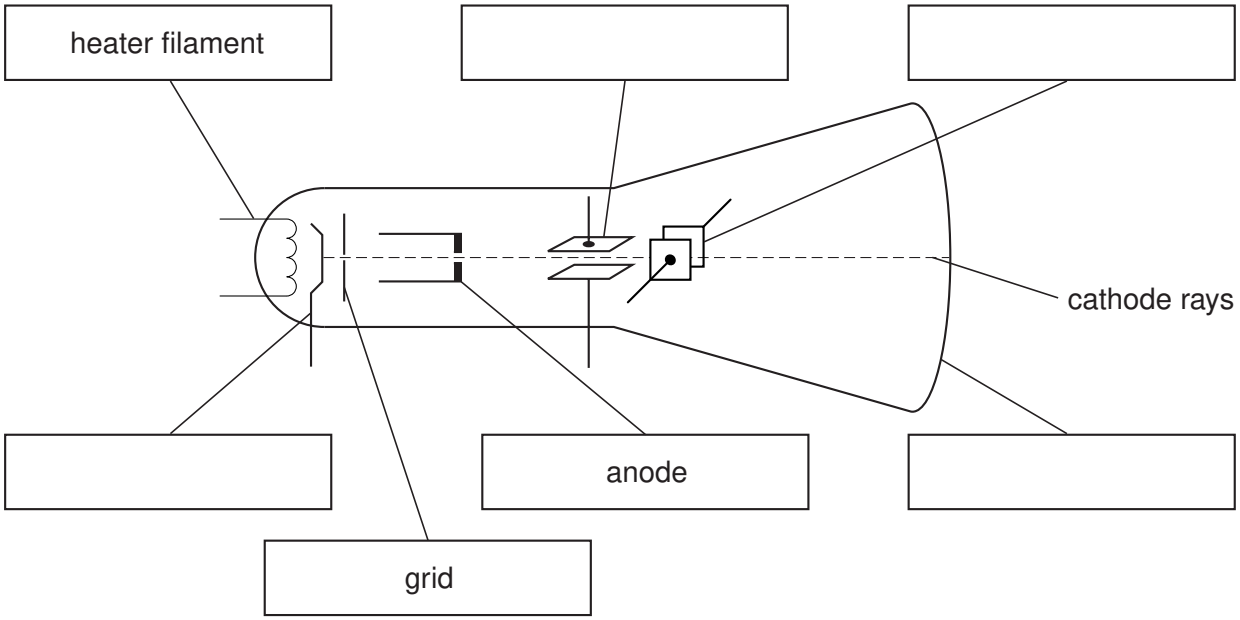

Fig. 11.1

(a) On Fig. 11.1, write the word CATHODE in the appropriate box. [1]

(b) One part shown in Fig. 11.1 is used to deflect the cathode rays up and down.

Write UP AND DOWN in the appropriate box. [1]

(c) One part glows when the cathode rays strike it.

Write GLOWS in the appropriate box. [1]

(d) On Fig. 11.1, draw a battery connected so that the cathode is heated. [1]

(e) Name the particles that make up cathode rays. ..... [1]

(f) What fills the rest of the space in the cathode-ray tube? Tick one box.

air	☐
alpha particles	☐
hydrogen	☐
steam	☐
vacuum	☐

[1]

[Total: 6]

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12 The following table includes some of the properties of alpha, beta and gamma radiations.

Complete the table by filling in the missing properties.

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	alpha	**beta**	**gamma**	
nature	2 protons + 2 neutrons			[2]
approximate mass		1 unit		[2]
charge	positive			[2]
ability to penetrate solids		very penetrating		[2]

[Total: 8]

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