Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
TOTAL	

AQA

General Certificate of Secondary Education
Foundation Tier
January 2013

Additional Science PHY2F

Unit Physics P2

F

Physics

Unit Physics P2

Wednesday 30 January 2013 9.00 am to 9.45 am

For this paper you must have:
- a ruler.

You may use a calculator.

Time allowed
- 45 minutes

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

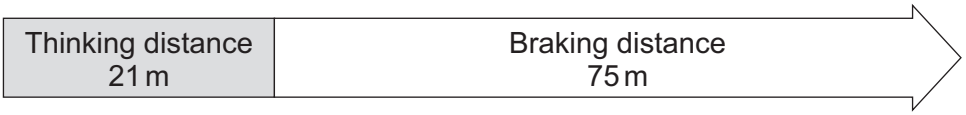
Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 45.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

Advice
- In all calculations, show clearly how you work out your answer.

Answer **all** questions in the spaces provided.

1 (a) A car driver makes an emergency stop.

The chart shows the 'thinking distance' and the 'braking distance' needed to stop the car.



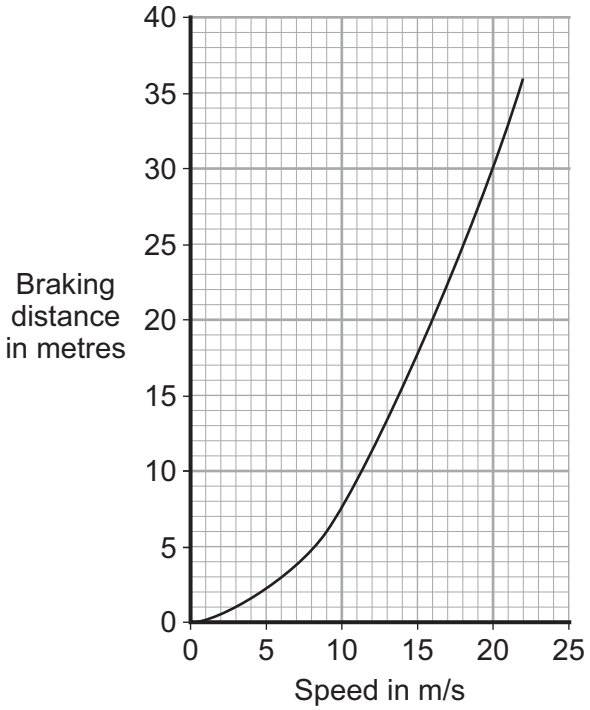
Calculate the total stopping distance of the car.

.....

Stopping distance = ... m

(1 mark)

1 (b) The graph shows how the braking distance of a car driven on a dry road changes with the car's speed.



The braking distance of the car on an icy road is longer than the braking distance of the car on a dry road.

1 (b) (i) Draw a new line on the graph to show how the braking distance of the car on an icy road changes with speed.

(2 marks)

1 (b) (ii) Which **one** of the following would also increase the braking distance of the car?

Put a tick (✓) in the box next to your answer.

Rain on the road ☐

The driver having drunk alcohol ☐

The driver having taken drugs ☐

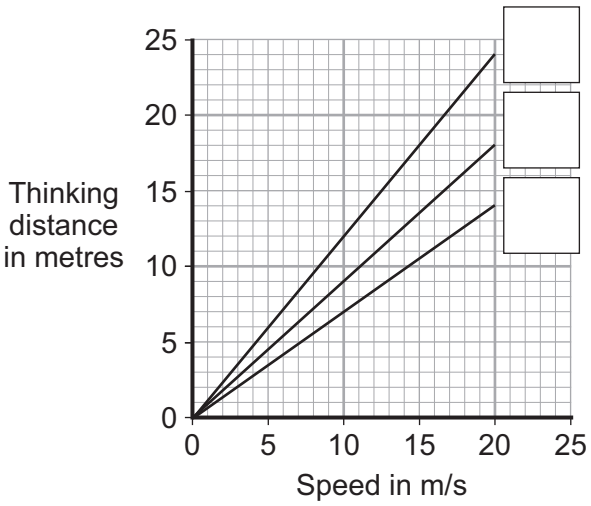
(1 mark)

1 (c) The thinking distance depends on the driver's reaction time.

The table shows the reaction times of three people driving under different conditions.

Car driver	Condition	Reaction time in seconds
A	Wide awake with no distractions	0.7
B	Using a hands-free mobile phone	0.9
C	Very tired and listening to music	1.2

The graph lines show how the thinking distance for the three drivers, **A**, **B**, and **C**, depends on how fast they are driving the car.



1 (c) (i) Match each graph line to the correct driver by writing **A**, **B**, or **C** in the box next to the correct line.

(2 marks)

Question 1 continues on the next page

1 (c) (ii) The information in the table cannot be used to tell if driver **C**'s reaction time is increased by being tired **or** by listening to music.
Explain why.

.....

.....

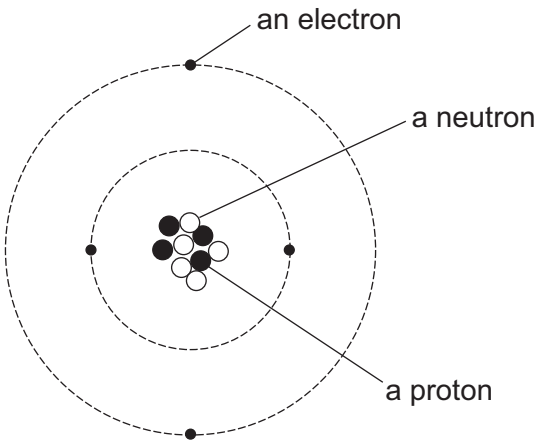
.....

.....

(2 marks)

8

2 The diagram represents an atom of beryllium. The three types of particle that make up the atom have been labelled.



2 (a) Use the labels from the diagram to complete the following statements.

Each label should be used once.

The particle with a positive charge is ..... .

The particle with the smallest mass is ..... .

The particle with no charge is ..... .

(2 marks)

2 (b) What is the mass number of a beryllium atom?

Draw a ring around your answer.

4	**5**	**9**	**13**

Give a reason for your answer.

.....

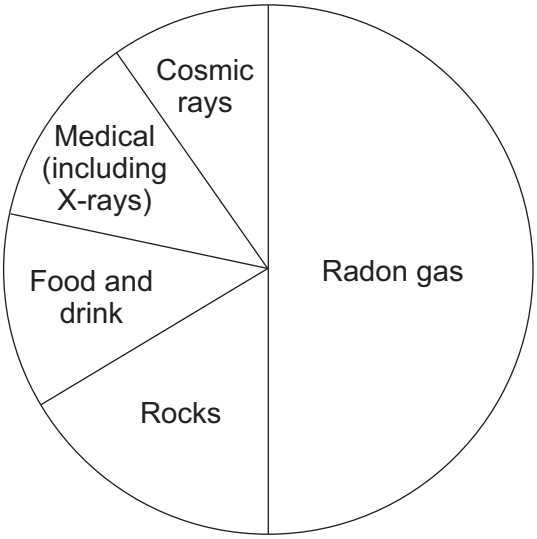
.....

(2 marks)

4

Turn over ▶

3 The pie chart shows the average proportions of background radiation from various sources in the UK.



3 (a) Three sources of background radiation are given in **List A**.
Statements about sources of background radiation are given in **List B**.

Draw **one** line to link each source of background radiation in **List A** to the statement about that source given in **List B**.

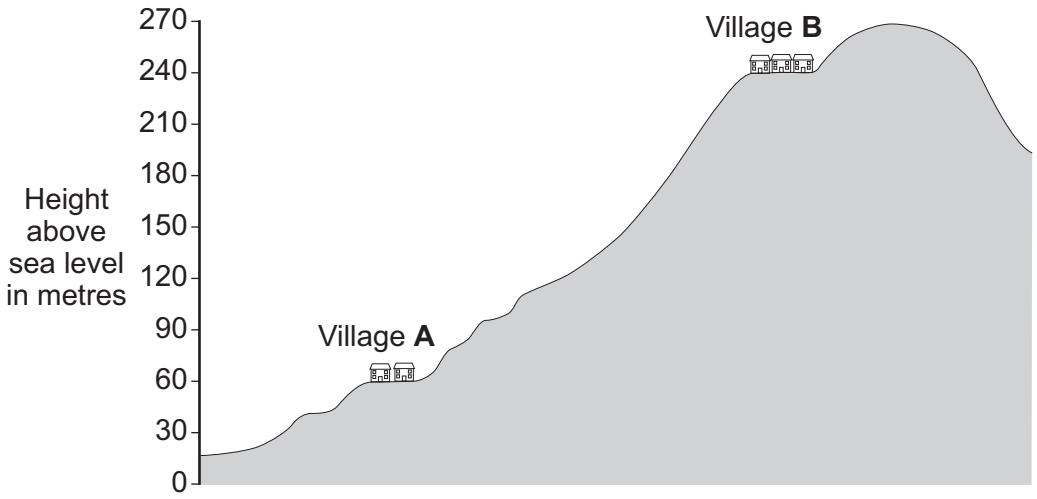
Draw only **three** lines.

List A	**List B**
	Are used to show broken bones.
X-rays	
	The radiation comes from outer space.
Cosmic rays	
	Comes from soil containing a radioactive isotope of potassium.
Radon gas	
	On average gives 50% of all background radiation.

(3 marks)

3 (b) The level of background radiation from cosmic rays is not the same everywhere. For every 30 metres above sea level, the amount of background radiation increases by one unit.

The diagram shows the position of two villages, **A** and **B**, built on a hill.



How is the amount of background radiation from cosmic rays different in village **A** compared to village **B**?

To obtain full marks, you must include a calculation in your answer.

.....

.....

.....

.....

.....

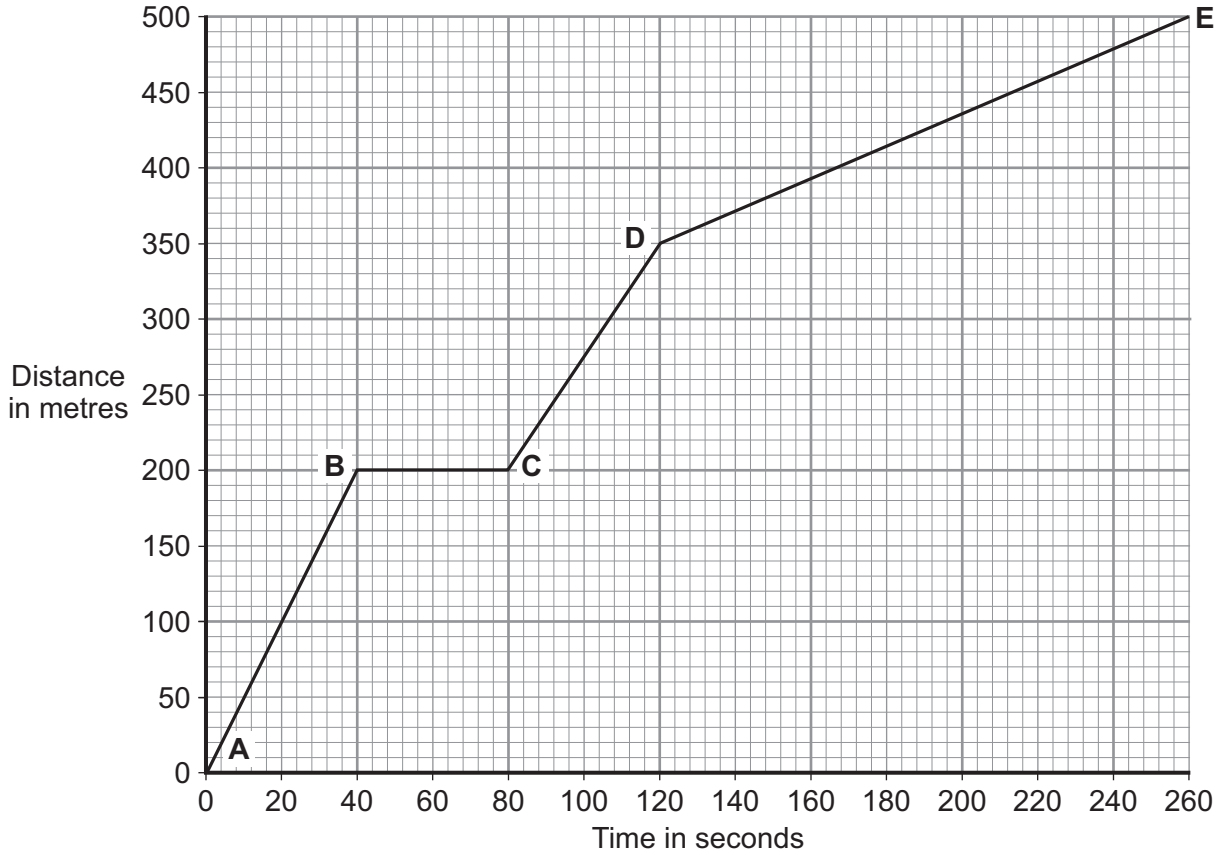
.....

(3 marks)

6

Turn over for the next question

4 Part of a bus route is along a high street.
The distance-time graph shows how far the bus travelled along the high street and how long it took.



4 (a) Between which two points was the bus travelling the slowest?

Put a tick (✓) in the box next to your answer.

Points	**Tick (✓)**
A – B	
C – D	
D – E	

Give a reason for your answer.

.....

.....

(2 marks)

4 (b) The bus travels at 5 m/s between points **A** and **B**.
The bus and passengers have a total mass of 16 000 kg.

Use the equation in the box to calculate the momentum of the bus and passengers between points **A** and **B**.

momentum = mass x velocity

Show clearly how you work out your answer.

.....

.....

Momentum = ... kg m/s
(2 marks)

4 (c) A cyclist made the same journey along the high street.
The cyclist started at the same time as the bus and completed the journey in 220 seconds. The cyclist travelled the whole distance at a constant speed.

4 (c) (i) Draw a line on the graph to show the cyclist's journey.
(2 marks)

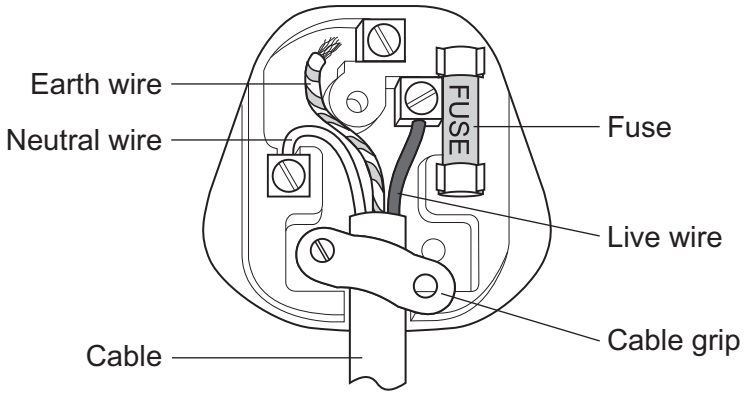
4 (c) (ii) After how many seconds did the cyclist overtake the bus?

The cyclist overtook the bus after ..... seconds.
(1 mark)

7

Turn over for the next question

5 (a) The diagram shows the inside of an incorrectly wired three-pin plug.



5 (a) (i) What **two** changes need to be made so that the plug is wired correctly?

1 .....

.....

2 .....

.....

(2 marks)

5 (a) (ii) The fuse inside a plug is a safety device.

Explain what happens when too much current passes through a fuse.

.....

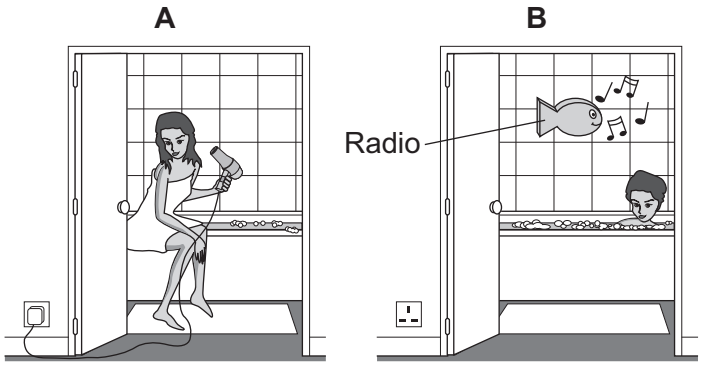
.....

.....

.....

(2 marks)

5 (b) Each of these pictures shows an electrical appliance being used in a bathroom.



Using the hairdryer in picture **A** is dangerous. However, it is safe to use the battery-operated radio in picture **B**.

Explain why.

.....

.....

.....

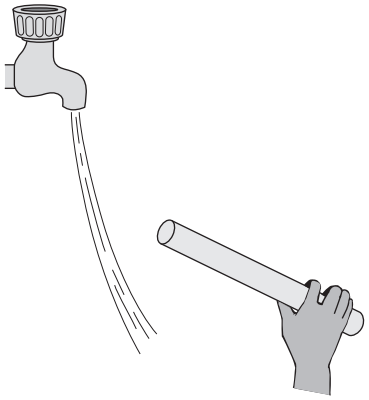
.....

(2 marks)

6

Turn over for the next question

6 (a) The diagram shows a negatively charged plastic rod held near to a thin stream of water. The water is attracted towards the rod.



Which **one** of the following statements explains what is happening to the charge in the water?

Tick (✓) **one** box.

The positive and the negative charges in the water are attracted to the rod. ☐

The positive and the negative charges in the water are repelled by the rod. ☐

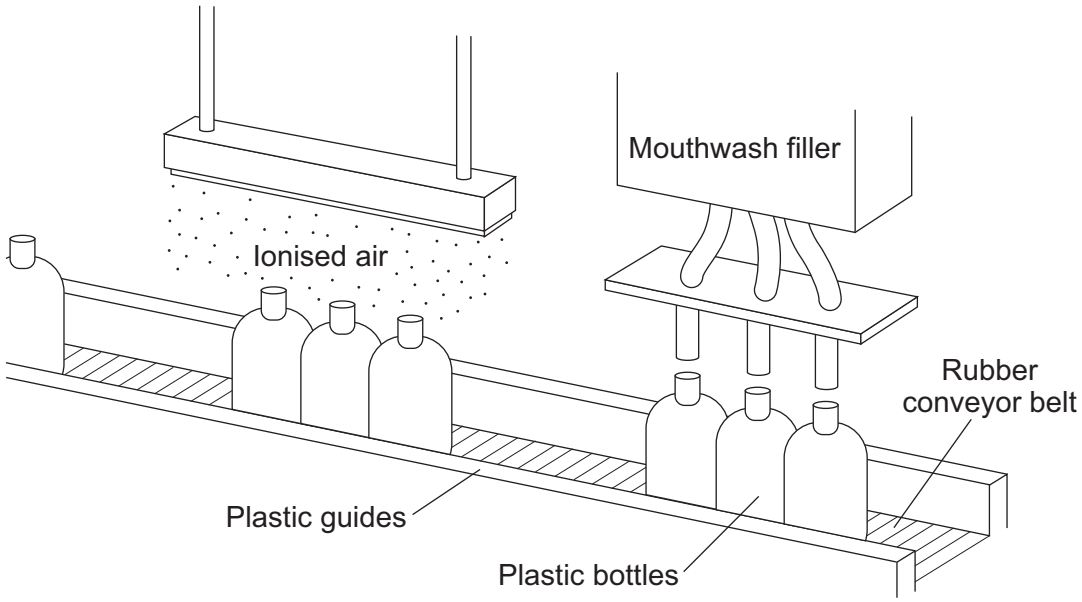
The negative charge in the water is repelled by the rod and the positive charge is attracted to the rod. ☐

The negative charge in the water is attracted to the rod and the positive charge is repelled by the rod. ☐

(1 mark)

6 (b) A company that produces bottles of mouthwash found a problem with the automatic filling system.

As the bottles go towards the filler, the bottles move around on the conveyor belt and become electrostatically charged. This causes the stream of mouthwash to move sideways, missing the open top of the bottle.



The company came up with an answer to the problem. Before the bottles reach the filler, the bottles pass through a stream of ionised air. The ions in the air neutralise the charge on the bottles.

6 (b) (i) Explain why the plastic bottles became charged.

.....

.....

.....

.....

(2 marks)

6 (b) (ii) What happens to the structure of an atom to change the atom into an ion?

.....

.....

(1 mark)

6 (b) (iii) Earthing the conveyor belt with a conducting wire would not have solved this problem. Give a reason why.

.....

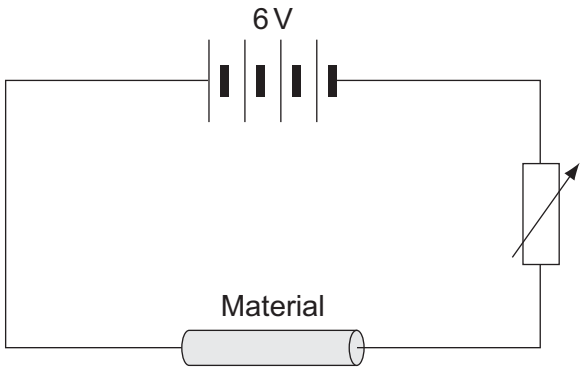
.....

(1 mark)

5

Turn over ▶

7 (a) The diagram shows the circuit used to investigate the resistance of a sample of a material.
The diagram is not complete; the ammeter and voltmeter are missing.



7 (a) (i) Draw the symbols for the ammeter and voltmeter on the diagram in the correct places.
(2 marks)

7 (a) (ii) How can the current through the material be changed?

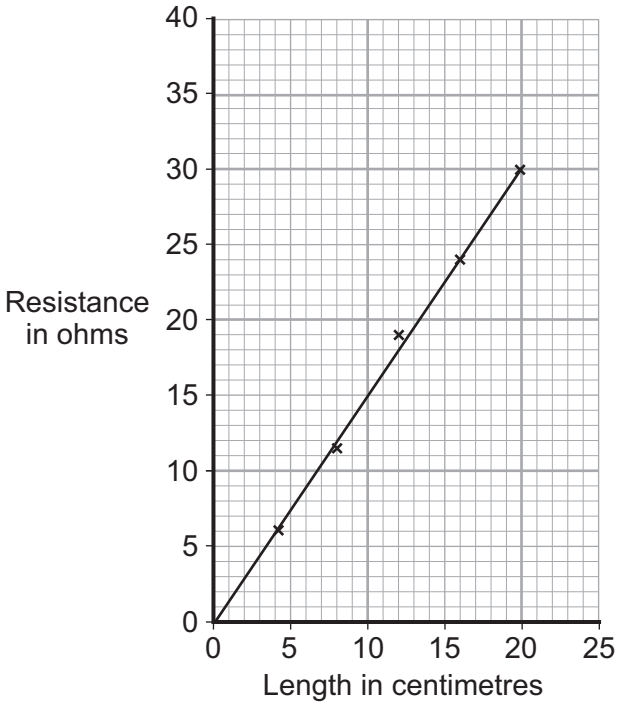
.....

.....
(1 mark)

7 (b) The material, called conducting putty, is rolled into cylinders of different lengths but with equal thickness.

Graph 1 shows how the resistance changes with length.

Graph 1



7 (b) (i) The current through a 25 cm length of conducting putty was 0.15 A.

Use **Graph 1** to find the resistance of a 25 cm length of conducting putty.

Resistance = ... ohms

(1 mark)

7 (b) (ii) Use your answer to **(b) (i)** and the equation in the box to calculate the potential difference across a 25 cm length of conducting putty.

potential difference = current × resistance

Show clearly how you work out your answer.

.....

.....

.....

Potential difference = ... volts

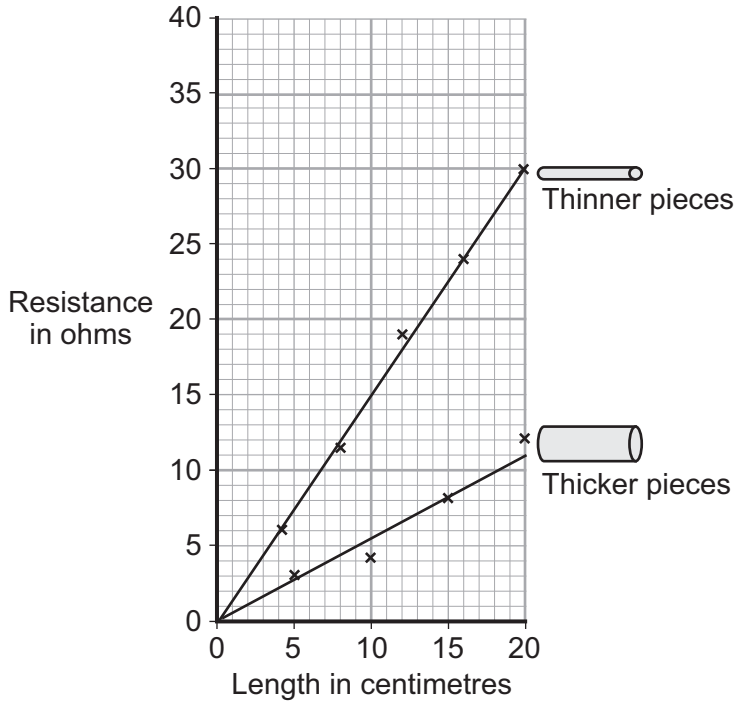
(2 marks)

Question 7 continues on the next page

Turn over ▶

7 (c) A second set of data was obtained using thicker pieces of conducting putty. Both sets of results are shown in **Graph 2**.

Graph 2



7 (c) (i) What is the relationship between the resistance and the thickness of the conducting putty?

.....

.....

(1 mark)

7 (c) (ii) Name **one** error that may have reduced the accuracy of the results.

.....

(1 mark)

7 (c) (iii) How could the reliability of the data have been improved?

.....

.....

(1 mark)

9

END OF QUESTIONS