

Specimen Paper

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 Level 1/2 Certificate in Science: Double Award
Specimen Paper

Double Award

Physics Paper 2F

For this paper you must have:

- a pencil, ruler and protractor
- a calculator
- the Physics Equations Sheet (enclosed).

Time allowed

- 60 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 60.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

Question 6 should be answered in continuous prose.

In this question you will be marked on your ability to:

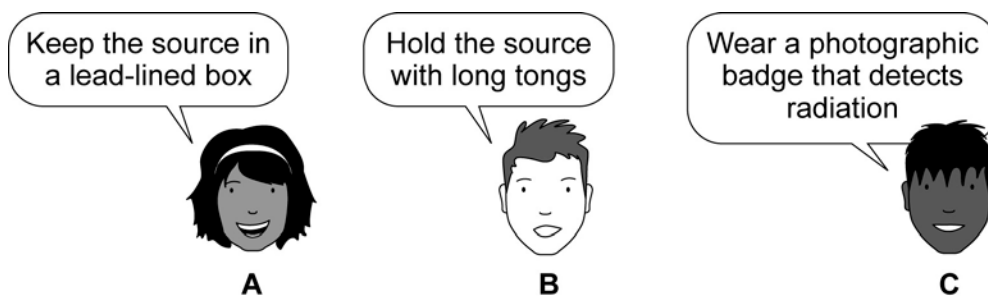
- use good English
- organise information clearly
- use specialist vocabulary where appropriate.

Advice

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

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

- 1** Before using a radioactive source, a teacher asked her students to suggest procedures that would reduce the risk of her exposure to radiation. The students made the following suggestions.

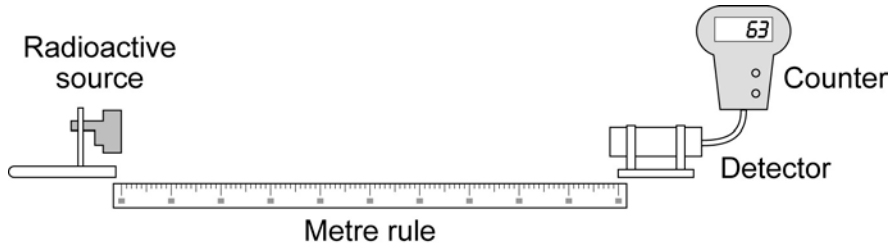


- 1 (a)** Which suggestion **A**, **B**, or **C**, would **not** reduce the exposure of the teacher to radiation?

.....

(1 mark)

1 (b) The diagram shows how the teacher measured the distance that the radiation travelled from the source. The count rate at different distances from the source was measured and recorded in the table.



Distance from source to detector in cm	Count rate in counts per minute
20	85
40	81
60	58
80	53
100	23

1 (b) (i) What type of radiation, alpha, beta or gamma, was the source emitting?

.....
(1 mark)

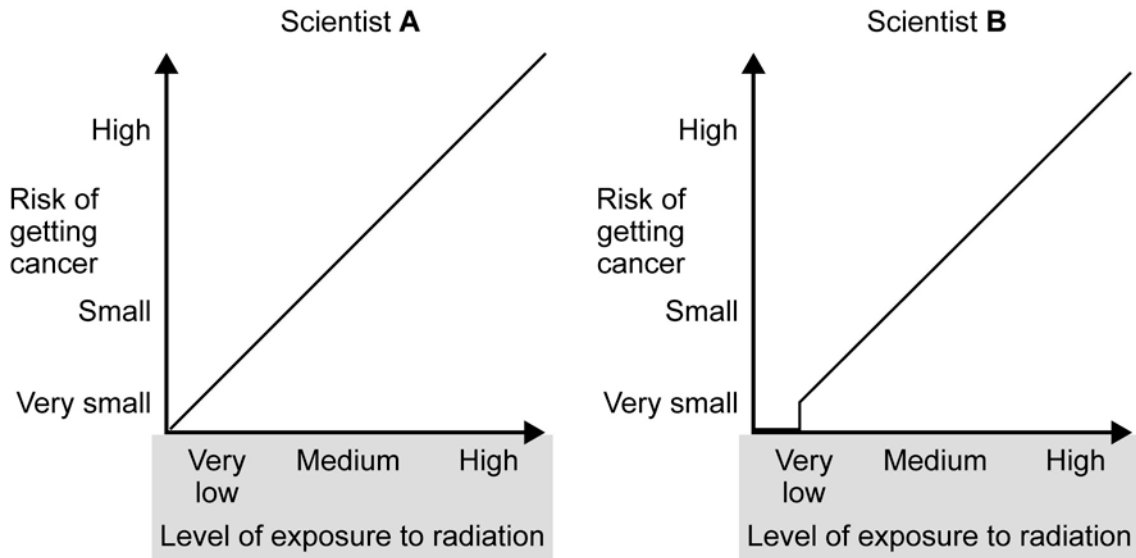
1 (b) (ii) Give **two** reasons for your choice.

1.....
.....
2.....
.....
(2 marks)

Question 1 continues on the next page

Turn over ►

1 (c) The graphs show how two scientists, **A** and **B**, think the level of exposure to radiation affects the risk of getting cancer.



Use information from the graphs to describe how the two scientists, **A** and **B**, agree **and** disagree about how the level of exposure to radiation affects the risk of getting cancer.

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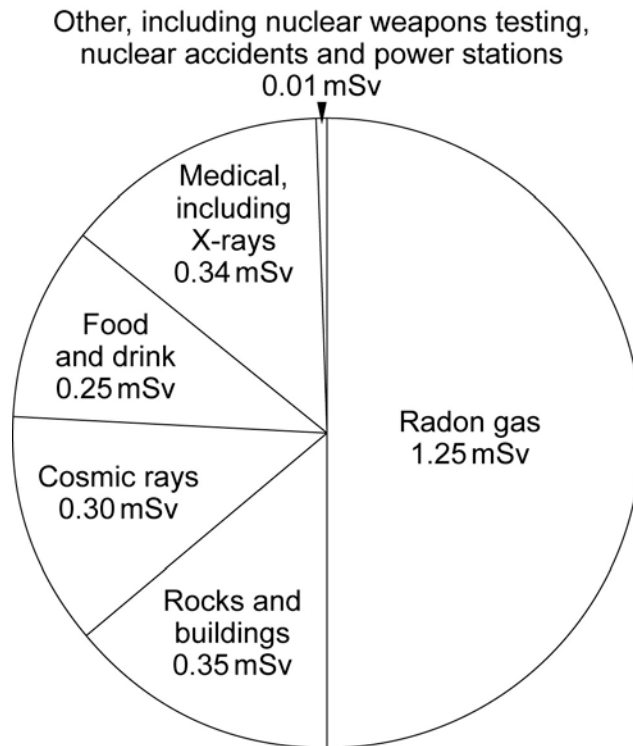
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(3 marks)

- 1 (d) The pie chart shows the sources of the background radiation and the radiation doses that the average person in the UK is exposed to in one year.

Radiation dose is measured in millisieverts (mSv).



- 1 (d) (i) What is the radiation dose that the average person in the UK receives from space?

Radiation dose = mSv
(1 mark)

- 1 (d) (ii) A student looked at the pie chart and then wrote down three statements.

Which **one** of the following statements is a correct conclusion from the pie chart?

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

In the future, more people will be exposed to a greater proportion of radon gas.

People that have never had an X-ray get 50% of their radiation dose from radon gas.

The radiation dose from natural sources is much greater than from artificial sources.

Turn over ►

(1 mark)

- 1 (e) The concentration of radon gas inside a home can vary from day to day. In some homes, the level can build up to produce a significant health risk.

The table gives data for the radiation levels measured in homes in four different places **A**, **B**, **C** and **D** in the UK. The radiation levels were measured using two detectors, one in the living room and one in the bedroom. The measurements were taken over 3 months.

Place in the UK	Number of homes in the area	Number of homes in the sample area	Average radiation level in Bq/m ³	Maximum radiation level in Bq/m ³
A	590 000	160	15	81
B	484 000	130	18	92
C	221 000	68 000	162	10 000
D	318 000	35 300	95	6 900

- 1 (e) (i) Give **two** reasons why the measurements were taken over 3 months using detectors in different rooms.

Reason 1

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Reason 2

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(2 marks)

- 1 (e) (ii) Use information from the table to suggest why a much higher proportion of homes were sampled in areas **C** and **D** than in areas **A** and **B**.

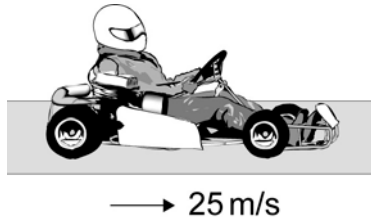
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(2 marks)

- 2 (a) The diagram shows a go-kart travelling along the straight part of an outdoor racetrack.



The total mass of the go-kart and driver is 130 kg. The velocity of the go-kart is 25 m/s.
Calculate the total momentum of the go-kart and driver.

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.....

Total momentum =

Draw a circle around the correct unit.

J/s

kg m/s

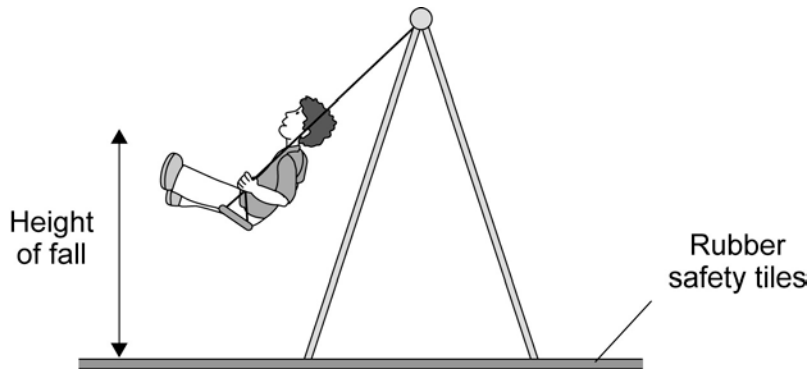
Nm

(3 marks)

Question 2 continues on the next page

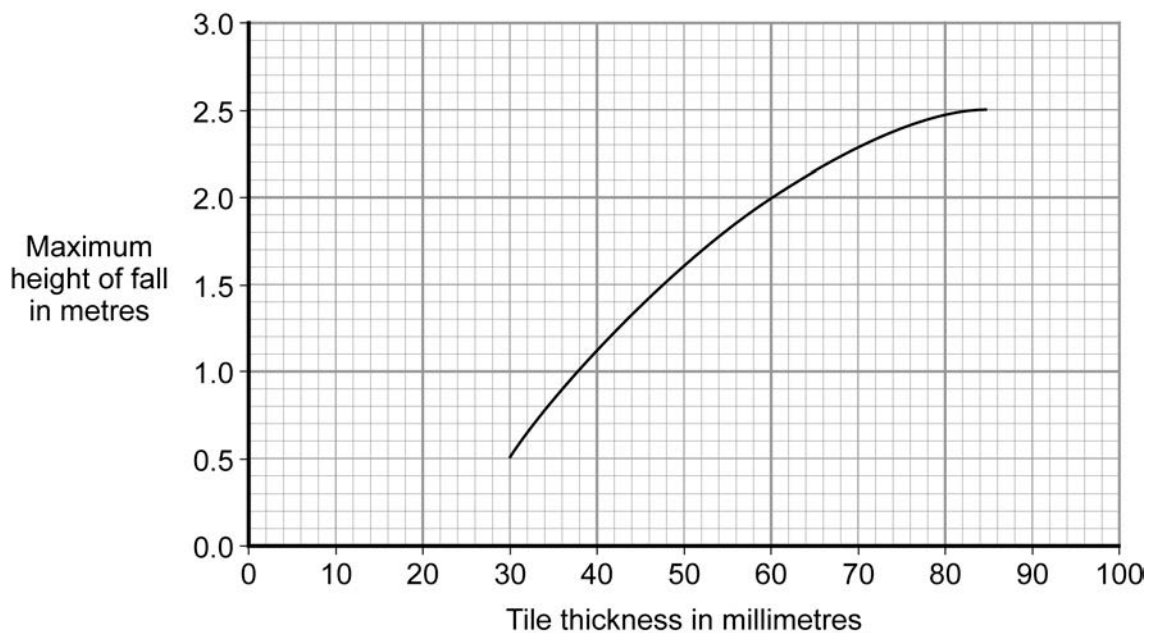
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2 (b) The diagram shows a child on a playground swing.



The playground surface is covered in rubber safety tiles. The tiles reduce the risk of serious injury to children who fall off the swing.

The graph gives the maximum height that a child can fall onto rubber safety tiles of different thicknesses and be unlikely to get a serious head injury.



2 (b) (i) Describe how the maximum height of fall relates to the thickness of the rubber safety tile.

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.....

(1 mark)

2 (b) (ii) The maximum height of any of the playground rides is 2 metres.

What minimum tile thickness should be used in the playground?

Give a reason for your answer.

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(2 marks)

2 (c) Use phrases from the box to complete the following sentences.

the force on	the work done to stop	the time taken to stop
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2 (c) (i) Falling onto a rubber surface compared to a hard surface increases

..... the child.

(1 mark)

2 (c) (ii) Momentum is lost more slowly falling onto a rubber surface than on a hard surface.

This reduces the child.

(1 mark)

8

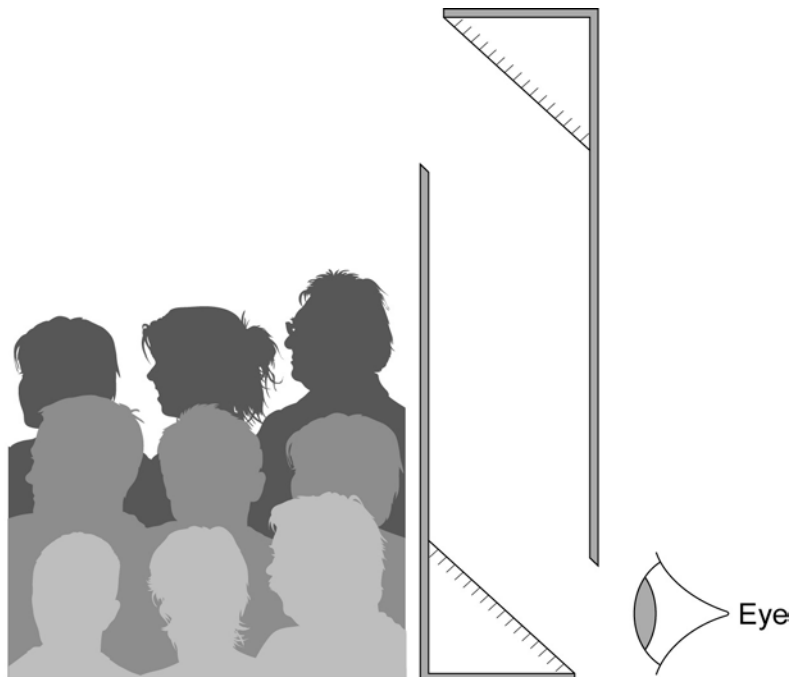
Turn over for the next question

Turn over ►

- 3** The diagram shows a periscope being used to see a distant object over the heads of a crowd of people.

The periscope has been made using two plane mirrors.

A distant object ●



- 3 (a)** Using a ruler, complete the diagram to show how a ray of light from the distant object reaches the person's eye.

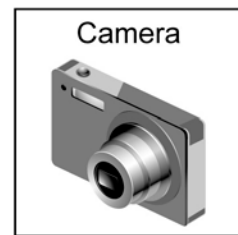
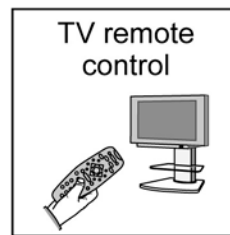
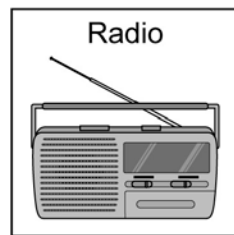
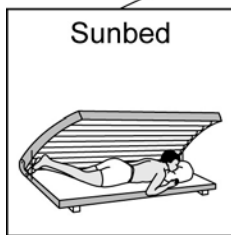
(3 marks)

- 3 (b)** The diagram shows the electromagnetic spectrum, and four devices that use electromagnetic waves. Each device uses a different type of electromagnetic wave.

Draw a line from each device to the type of electromagnetic wave that it uses.

One has been done for you.

Gamma rays	X-rays	Ultraviolet rays	Visible light	Infra red rays	Microwaves	Radio waves
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(3 marks)

- 3 (c)** A headline from a newspaper article is shown below.



- 3 (c) (i)** What serious health problem, caused by using a sunbed too much, may lead to death?

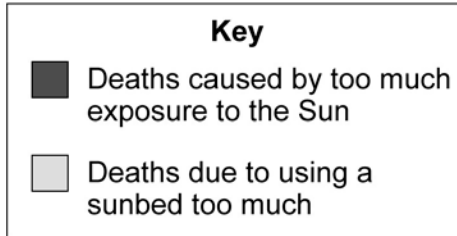
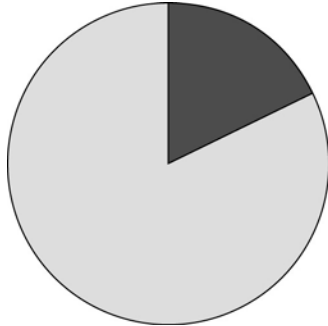
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(1 mark)

Question 3 continues on the next page

Turn over ►

3 (c) (ii) The pie chart shows the number of deaths in Britain each year, that may have been caused by using sunbeds too much and deaths that may have been caused by too much exposure to the Sun.



It is difficult for a doctor to be certain that a person has died because of using a sunbed too much.

Suggest why.

.....

.....

(1 mark)

3 (c) (iii) A spokesperson for a leading health charity said:

'We want people, especially young people, to know the possible dangers of using a sunbed.'

Why is it important to know the possible dangers of using a sunbed?

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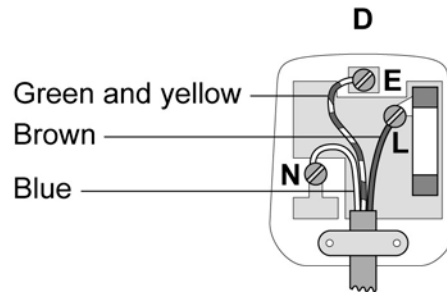
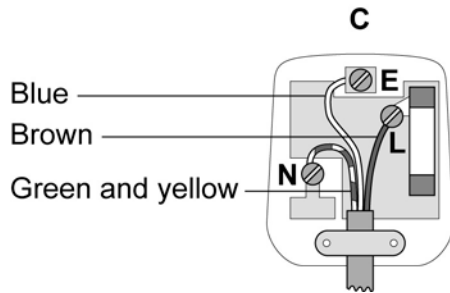
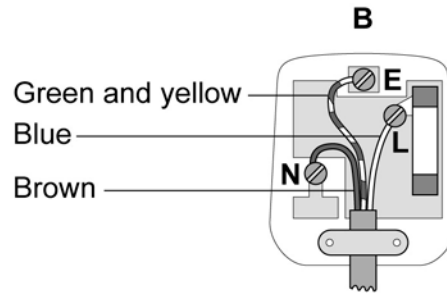
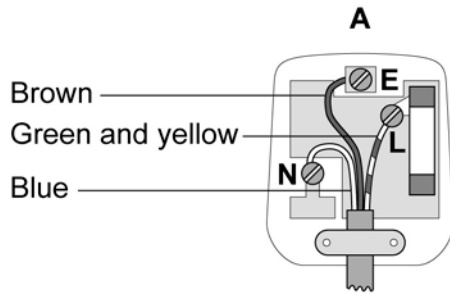
(1 mark)

9

4 (a) The diagrams show the inside of a 13 amp plug.

Which **one** of the plugs, **A**, **B**, **C** or **D**, is correctly wired?

Write your answer, **A**, **B**, **C** or **D**, in the box.



The plug that is correctly wired is

(1 mark)

Question 4 continues on the next page

Turn over ►

4 (b) A householder finds that the 3 amp fuse in the plug for a lamp needs to be replaced. She only has a 13 amp fuse available.

Explain why she should not use the 13 amp fuse.

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(2 marks)

4 (c) Use numbers given in the box to complete the following sentences.

12	50	110	230
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In the UK, the mains electricity supply is volts.

The frequency of the UK mains electricity supply is hertz.

(2 marks)

4 (d) Many electrical appliances have an Earth wire.

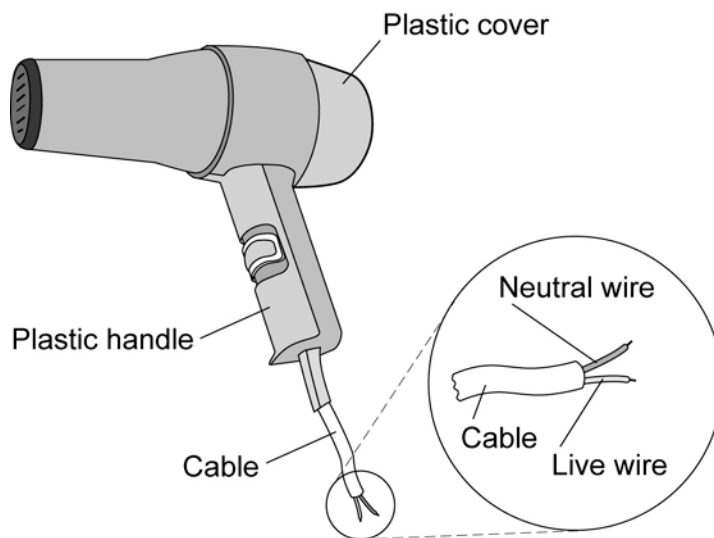
4 (d) (i) What is the purpose of an Earth wire?

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.....

(1 mark)

4 (d) (ii) The diagram shows a hairdryer designed to be used with the UK mains supply.

The cable connecting the hairdryer to the plug does not have an Earth wire.



Why does the hairdryer **not** need a cable with an Earth wire?

.....
.....

(1 mark)

4 (d) (iii) Which **one** of the following metals are the two wires inside the cable made from?

Draw a ring around your answer.

aluminium

copper

steel

(1 mark)

Turn over for the next question

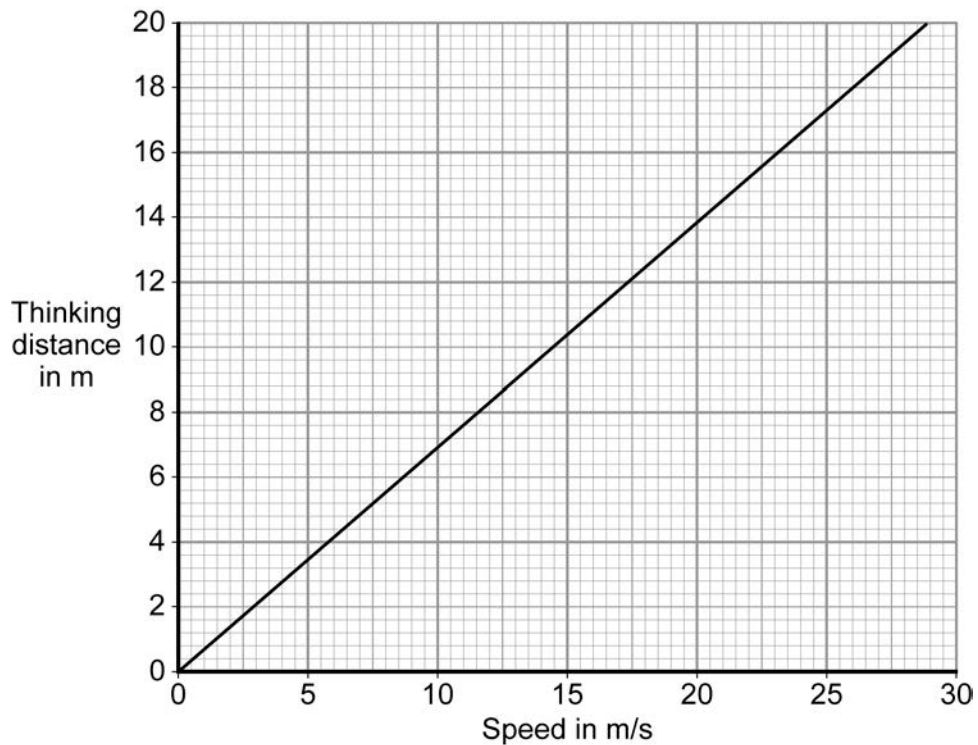
Turn over ►

- 5 (a) (i)** The total stopping distance of a car has two parts. One part is the distance the car travels during the driver's reaction time. This distance is called the thinking distance.

State **one** factor that affects the thinking distance.

.....
(1 mark)

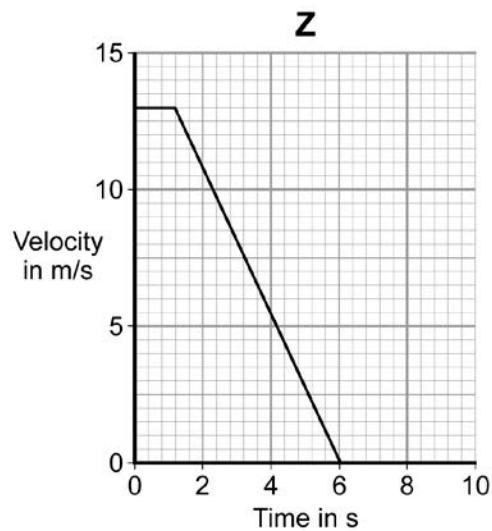
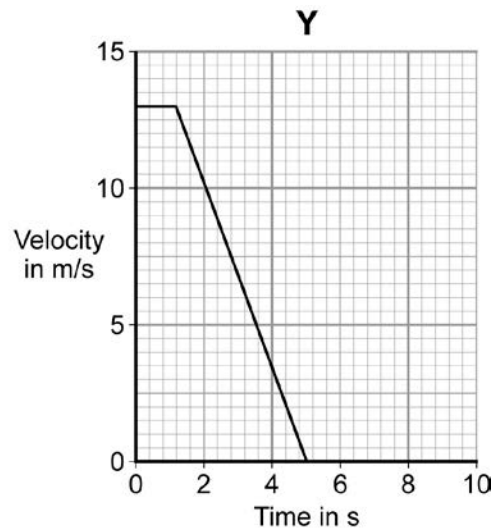
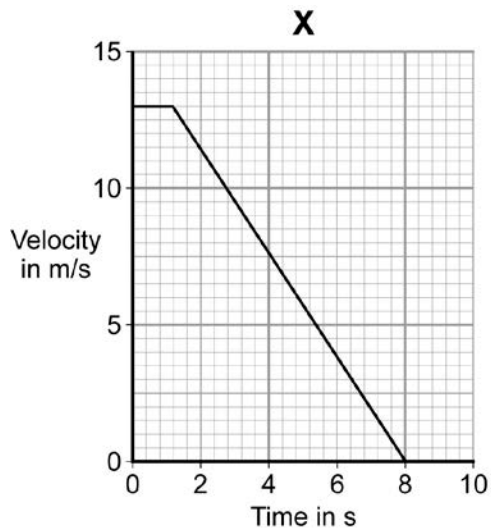
- 5 (a) (ii)** The graph shows the relationship between the speed of a car and the thinking distance.



Describe the relationship between speed and thinking distance.

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.....
(2 marks)

- 5 (a) (iii) Three cars, X, Y and Z, are being driven along a straight road towards a set of traffic lights. The graphs show how the velocity of each car changes once the driver sees that the traffic light has turned to red.



Which one of these cars, X, Y or Z, stops in the shortest distance?

.....
(1 mark)

Question 5 continues on the next page

Turn over ►

- 5 (b)** A student wants to find out whether listening to music affects reaction time. He is going to investigate this with the help of other students. The diagram shows the student doing the investigation.



The student holds a 30 cm ruler, then lets go. As soon as the second student sees the ruler fall, she closes her hand, stopping the ruler. The further the ruler falls before being stopped, the slower her reaction time.

- 5 (b) (i)** In this investigation, one variable is the distance the ruler falls before being stopped. What type of variable is this?

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

independent variable

dependent variable

control variable

(1 mark)

- 5 (b) (ii)** Describe how the student could find out whether listening to music affects reaction time.

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(2 marks)

5 (b) (iii) To make a valid conclusion about whether listening to music affects reaction time the student will need to keep some factors in his investigation the same.

Suggest **three** factors that the student should keep the same.

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(3 marks)

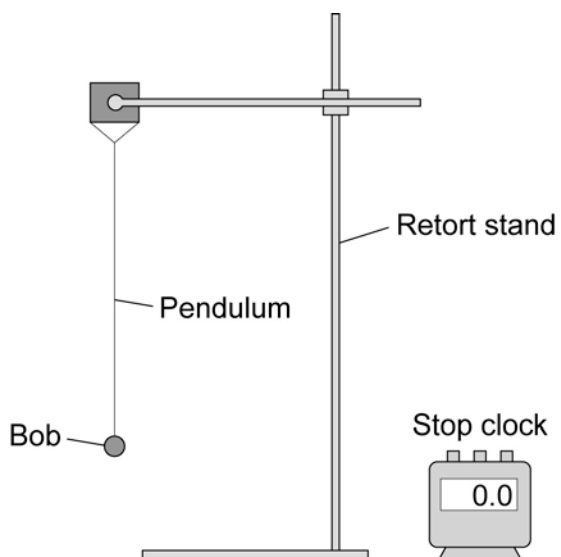
10

Turn over for the next question

Turn over ▶

6 The diagram shows a pendulum and a stop clock.

A student carried out an investigation to find out how the time for one swing of the pendulum depends on the length of the pendulum.



The student's data is recorded in the table.

Experiment	Mass of bob in grams	Length of pendulum in metres	Time for 10 swings in seconds	Time for 1 swing in seconds
A	15.2	0.20	9.2	0.92
B	15.2	0.40	12.8	1.28
C	15.2	0.60	15.0	1.50
D	15.2	0.80	18.0	1.80
E	15.2	1.00	20.0	2.00

In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.

Describe how the student would use the apparatus in the diagram to obtain the data shown in the table.

You should include:

- the measurements the student would make
- a risk assessment.

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(6 marks)

6

Turn over for the next question

Turn over ▶

7 (a) Describe how energy transfer takes place quickly by conduction in a metal.

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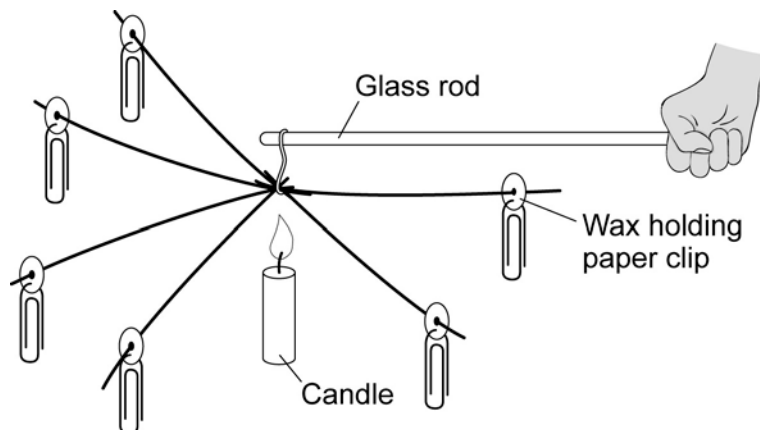
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(3 marks)

7 (b) (i) A student knows that some metals are better thermal conductors than others.

She investigated wires made from several different metals.

The diagram shows the equipment the student used to test six of the wires.



She held the glass rod so that the junction where the six wires met was directly above the flame of the candle.

When the wax melted, the paperclip dropped down to the bench.

She measured the time taken for the wax holding the paperclip to melt.

The repeatability of the results of this investigation may be poor. Suggest why.

.....

(1 mark)

7 (b) (ii) The results of the investigation are shown below.

Metal	Time for wax to melt in seconds
aluminium	42
brass	94
copper	28
iron	106
lead	120
zinc	78

The metals from the table are made into 1 cm^3 blocks.

Which metal would produce a block with the lowest U-value?

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Give the reason for your answer.

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(2 marks)

6

END OF QUESTIONS

There are no questions printed on this page

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