Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2016–2017

Science: Single Award

MV18

Unit 3 (Physics)
Foundation Tier

[GSS31]

FRIDAY 24 FEBRUARY 2017, MORNING

Time

1 hour, plus your additional time allowance.

Instructions to Candidates

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all eight** questions.

Information for Candidates

The total mark for this paper is 60.
Figures in brackets printed at the end of each question indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in Question **8(a)**.

1 **(a)** The diagram below shows how a television uses 1000 J of electrical energy.

(i) Calculate the amount of energy that is wasted by this television. [1 mark]

Answer _____ J

(ii) Name **two** types of useful energy produced by a television. [2 marks]

Choose from:

electrical

sound

heat

light

movement

_____ and _____

(iii) Name **one** type of waste energy produced by a television. [1 mark]

Circle the correct answer.

electrical

sound

heat

light

movement

(b) Suggest **two** ways that electricity bills in a house could be reduced. [2 marks]

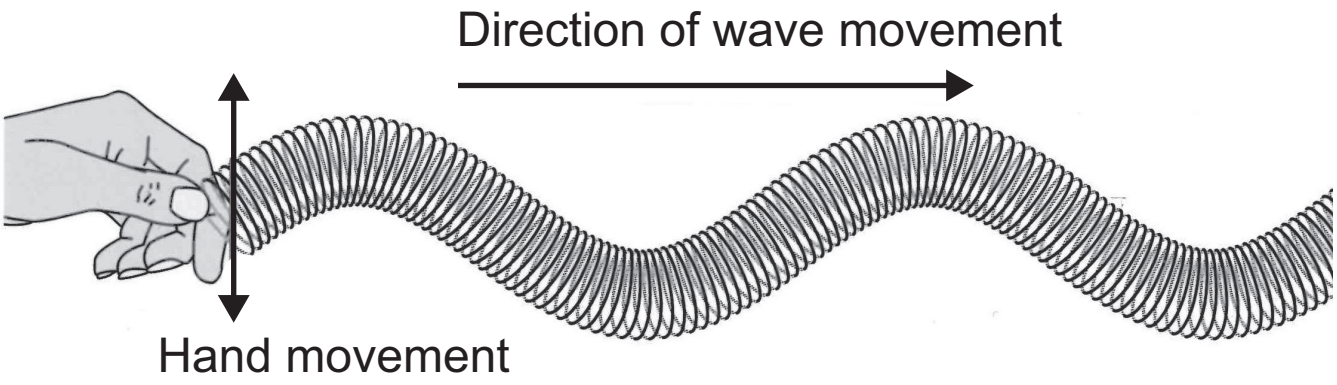
1. _____

_____

2. _____

_____

2 **(a)** The diagram below shows a wave produced on a slinky spring.



(i) Complete the following sentences. [2 marks]

Choose from:

hertz

energy

vibrations

frequency

vacuum

Waves are produced by _____ .

Waves carry _____ from one place to another.

(ii) Name the type of wave shown in the diagram opposite. [1 mark]

Choose from:

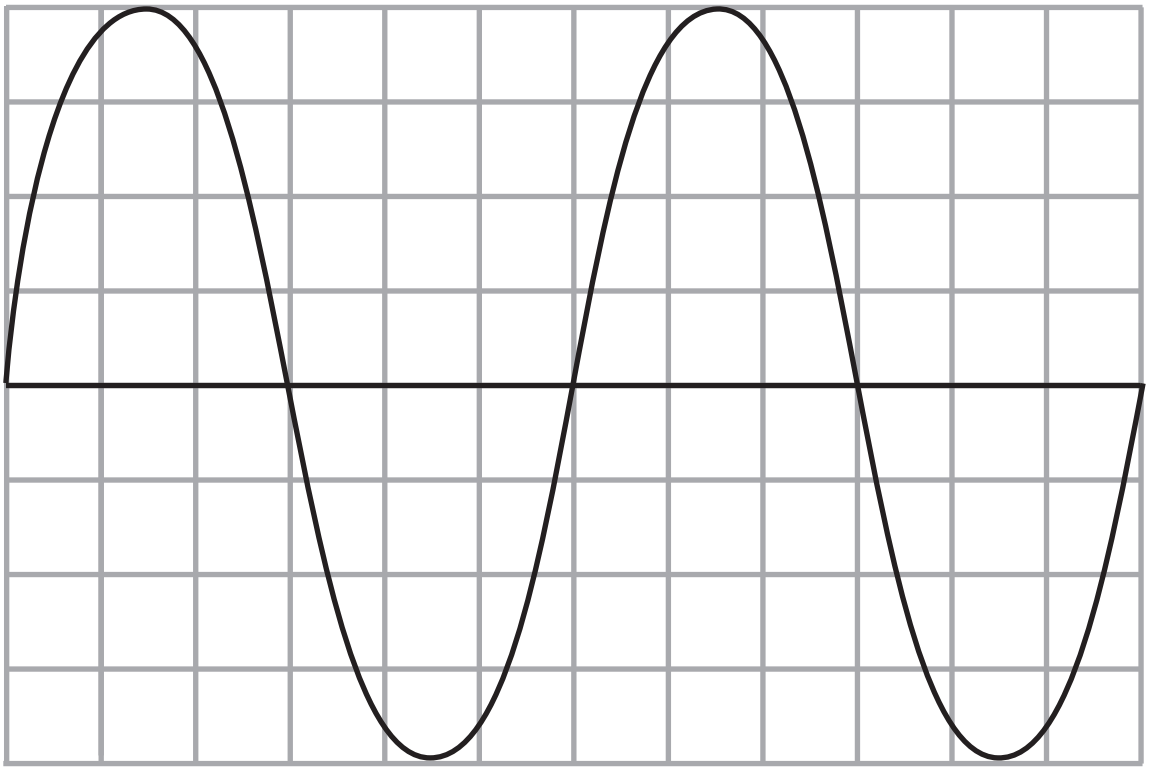
longitudinal

transverse

converse

Answer _____

(b) The diagram below represents a sound wave. Each square on the grid represents one centimetre.



1 square = 1 cm

(i) What is the amplitude of this wave? [1 mark]

Choose from:

4

6

8

Answer _____ cm

(ii) What is the wavelength of this wave? [1 mark]

Choose from:

3

6

12

Answer _____ cm

(c) The table below gives the noise levels in a concert at different distances from the loudspeakers.

Distance/m	Noise level/dB
1	120
2	
4	108
8	102
16	96
32	90

(i) Complete the table by giving the noise level at 2 metres. [1 mark]

(ii) Noise levels above 100 dB cause loss of hearing. Use the table to suggest the shortest distance that a person should stand from these loudspeakers to avoid causing loss of hearing. [1 mark]

Answer _____ m

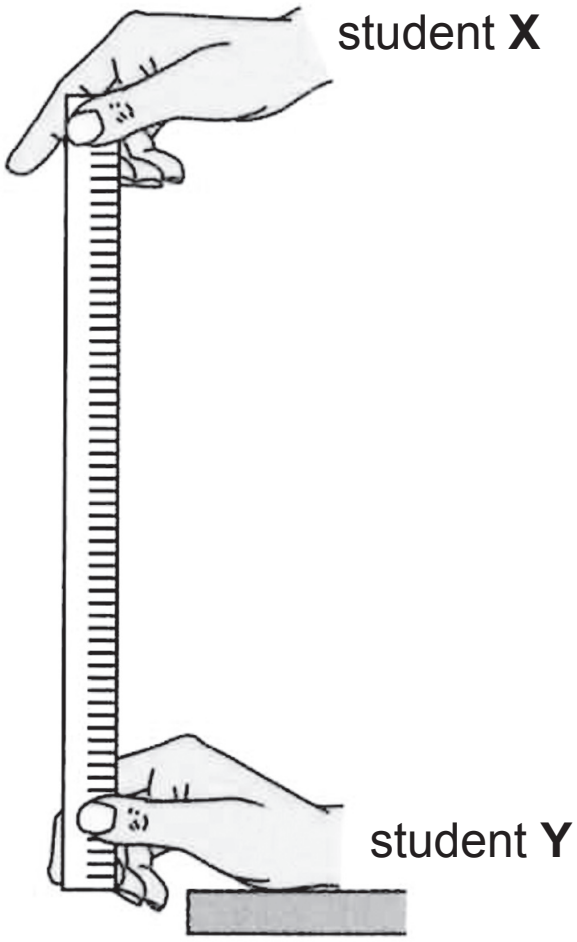
(iii) Suggest **one** other factor, apart from loud sounds, that will cause hearing loss. [1 mark]

_____

(iv) Reflected sound waves cause a major problem in concert halls. What are reflected sound waves called? [1 mark]

_____

3 The diagram below shows a metre stick being used to investigate the reactions of student **Y**.



(a) Describe how the metre stick is used to check the reactions of student **Y**. [2 marks]

(b) The table below gives the results for three other students who carried out this investigation.

Student	Distance ruler drops/cm			
	1st attempt	2nd attempt	3rd attempt	Average
A	16	11	9	12
B	20	11	8	13
C	15	14	10	13

(i) Why did each student repeat the test and average the results? [1 mark]

Circle the correct answer.

to make the experiment fair

to make the results reliable

to make the results more accurate

(ii) Complete the following sentence describing a conclusion that can be made from these results. [1 mark]

As the number of attempts increases

_____

_____

(iii) Which student (**A**, **B** or **C**) has the fastest average reactions? Explain your choice. [2 marks]

(c) The stopping distance of a vehicle can be calculated as shown below.

stopping distance = **thinking distance** + **braking distance**

Some people have faster reactions than others and this affects their stopping distance when driving.

(i) Describe and explain the effect that faster reactions have on stopping distance. [2 marks]

(ii) Give **one** factor that slows a person's reactions. [1 mark]

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(Questions continue overleaf)

4 **(a)** The table below gives information about six of the planets in our Solar System.

Planet	**Distance from the Sun /million km**	**Surface temperature /°C**	**Gravity/ N/kg**
Earth	150	22	10
	228	–23	4
Jupiter	778	–150	26
Saturn	1427	–180	11
	2870	–210	12
Neptune	4497	–220	12

(i) Complete the table by adding the names of two planets in the correct order. [2 marks]

(ii) Complete the following sentence to give a trend shown by this information. [1 mark]

As the distance _____

_____

(iii) Use the equation:

weight = mass × gravity

to calculate the weight of a 75 kg person on Saturn.
[2 marks]

(Show your working out.)

Answer _____ N

(b) Our Solar System contains one star and eight planets.
Give **two** differences between a star and a planet.
[2 marks]

1. _____

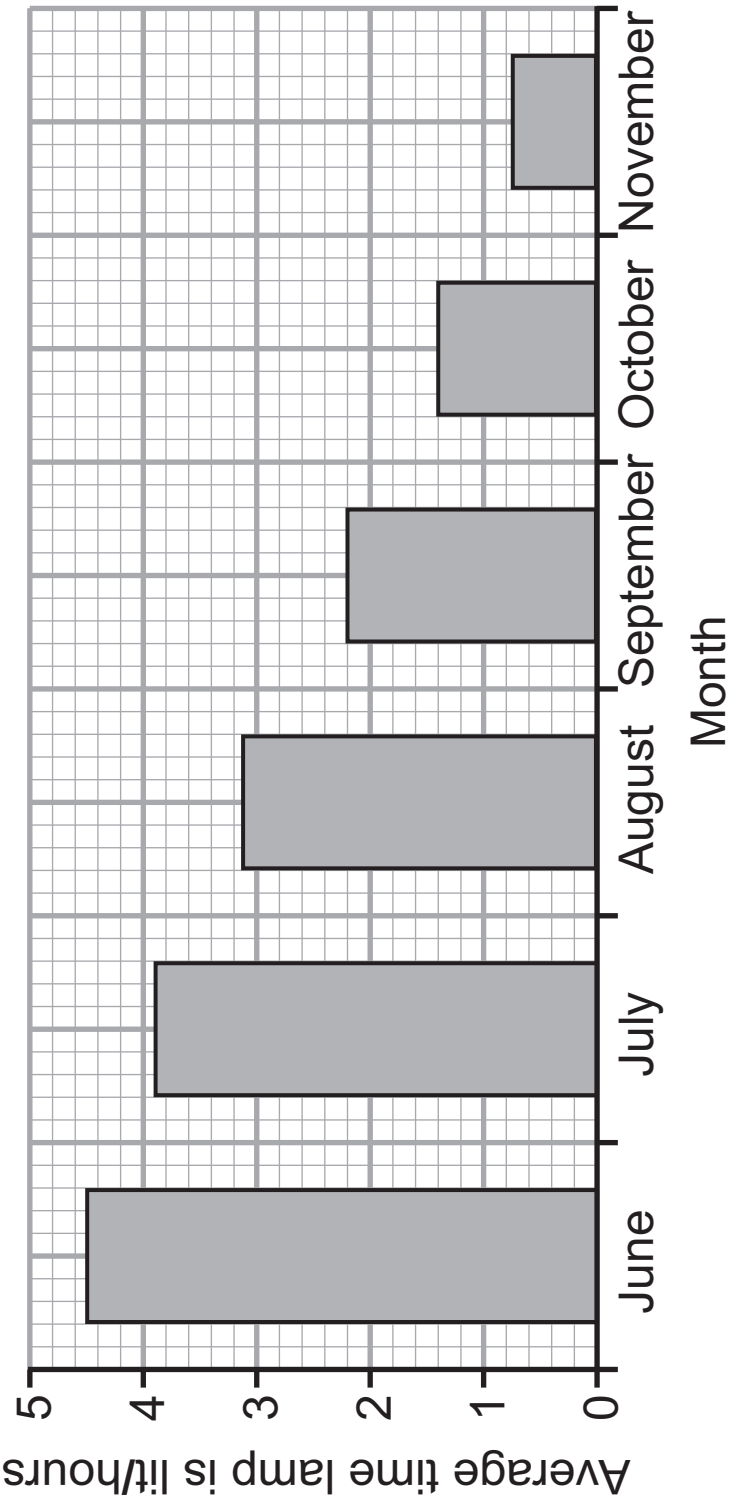
2. _____

5 Shown below is a solar powered lamp.

These lamps use sunlight to charge a battery. Then at night this battery provides electricity to light the lamp.

A student investigated how long, on average, the lamp stayed lit each night during six months of the year.
The results are shown opposite.

(a) Describe and explain the results of this investigation. [3 marks]



(b) Solar and wind power are renewable energy sources.

(i) What is meant by the term 'renewable'? [1 mark]

_____

_____

(ii) Give **one** environmental advantage of using wind power. [1 mark]

_____

(iii) Give **one** environmental disadvantage of using wind power. [1 mark]

_____

(iv) Name **one** other renewable energy source. [1 mark]

_____

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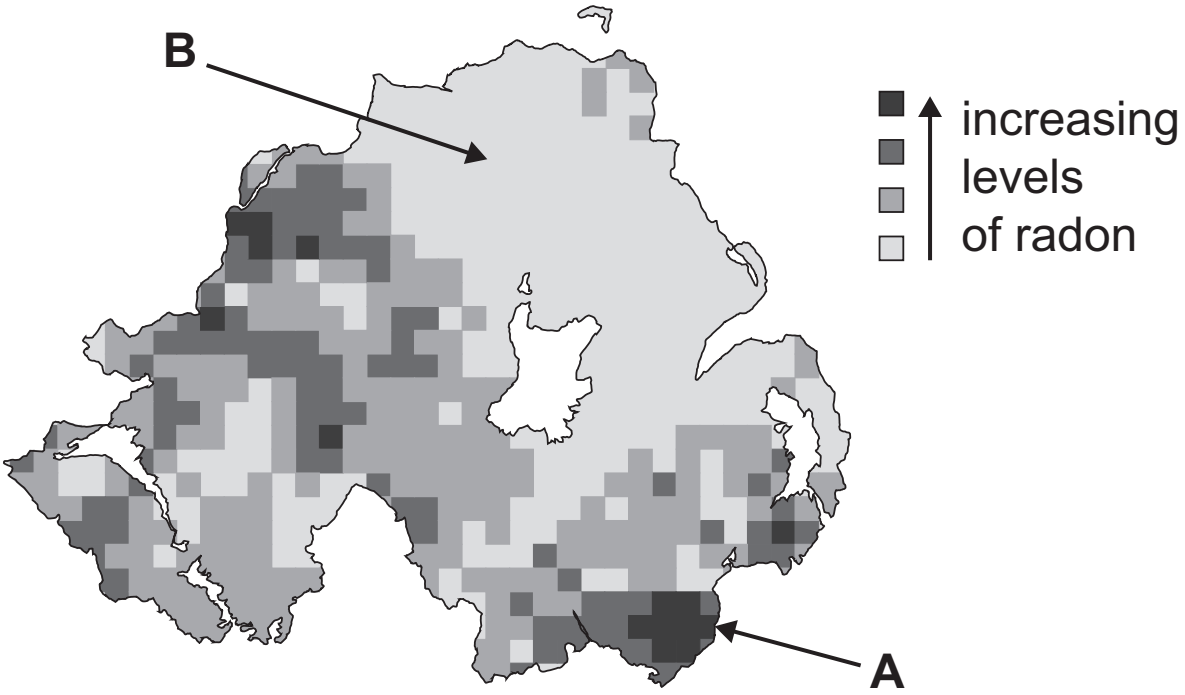
(Questions continue overleaf)

6 **(a)** The diagram below shows the amount of radon gas which occurs naturally in Northern Ireland.



The table below gives information on percentage (%) increased risk of death from lung cancer due to radon.

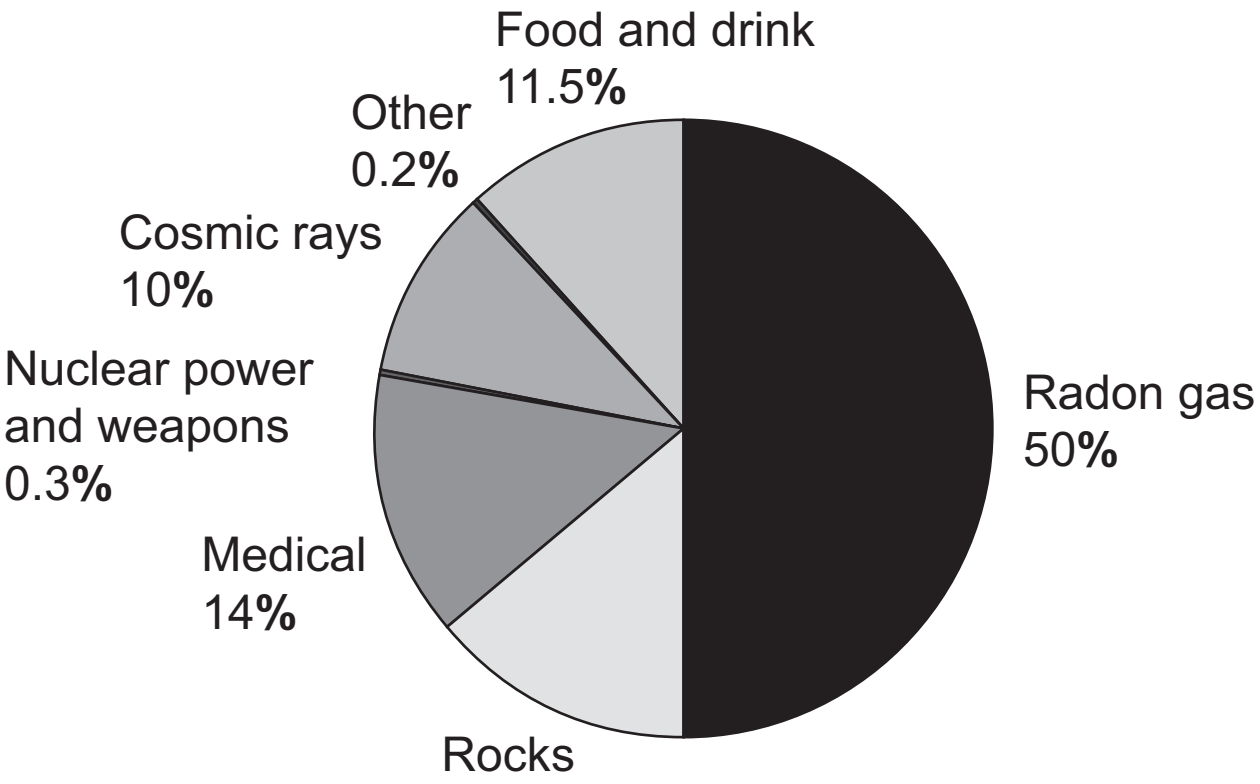
Radon level/ Bq/m^3	**Increased risk of death by lung cancer/%**
0	0
100	0
200	0.6
300	1.0
400	1.4
500	1.8
600	2.2
700	2.6
800	3.0

(i) Use the information opposite to explain fully why it would be safer to live in area **B** than area **A**. [2 marks]

If radon levels are 200 Bq/m^3 or higher, the government requires that action must be taken to reduce this radon level within a home.

(ii) Use information from the table to suggest why this level is set at 200 Bq/m^3. [1 mark]

(b) The pie chart below shows typical sources of background radiation.



(i) What is meant by the term 'background radiation'? [1 mark]

_____

_____

(ii) Calculate the percentage of background radiation that is from rocks. [2 marks]

(Show your working out.)

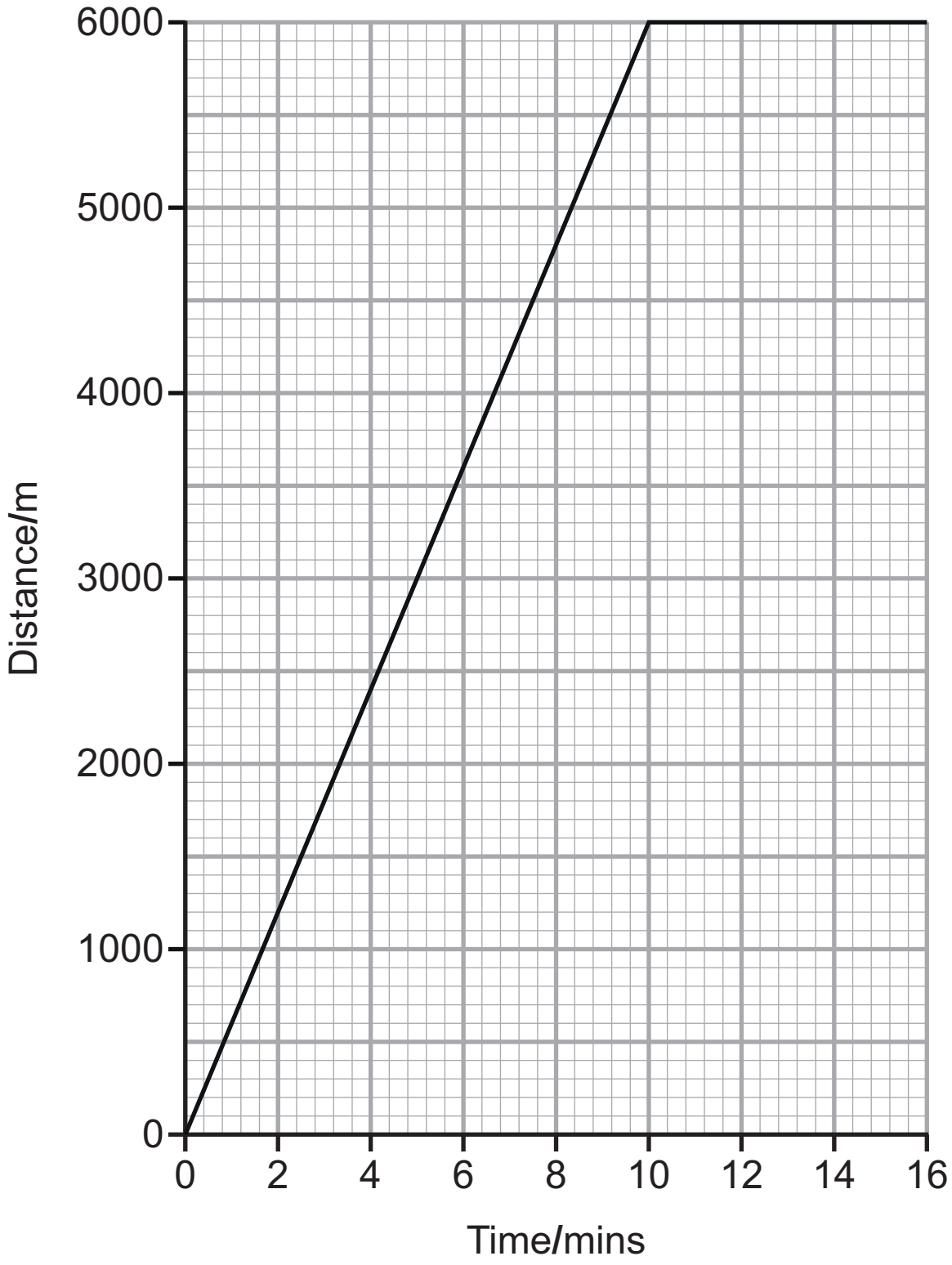
Answer _____ **%**

(iii) Suggest **one** possible cause of the radiation from medical sources. [1 mark]

_____

_____

7 The distance–time graph below is for a pizza delivery bike.



(a) Describe fully the motion of the bike. [2 marks]

(b) The table below gives the distance travelled and time taken for the journey of another bike.

Time/mins	Distance/m
0	0
4	2000
7	3500
10	5000
11	5500
14	5500
16	5500

(i) On the grid opposite, use these values to draw the distance–time graph for this bike. [3 marks]

(ii) How can you tell from the graph which bike was faster? [1 mark]

8 **(a)** The most common fuels used to make electricity are fossil fuels.

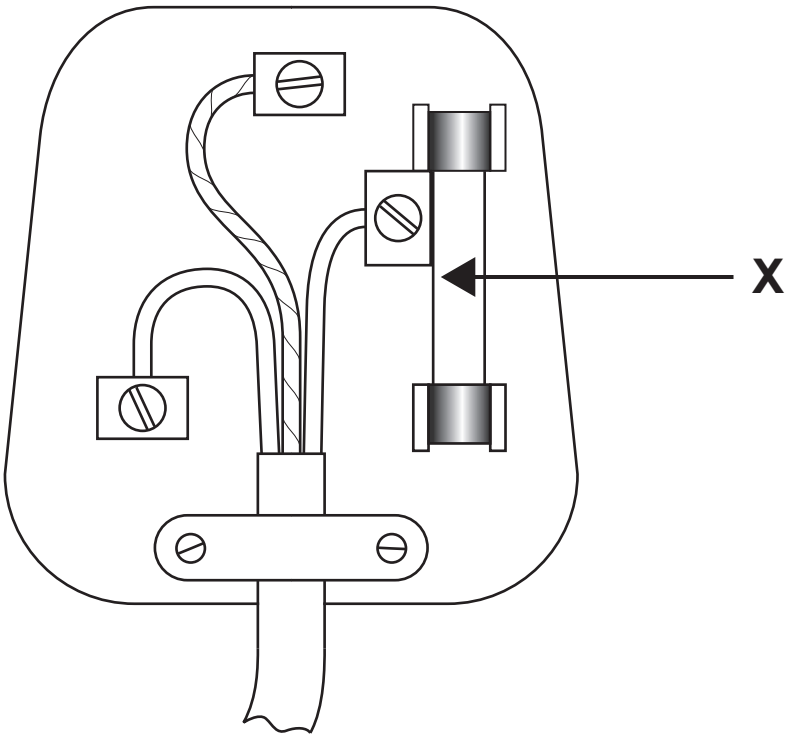
Describe how fossil fuels were formed and are now used to produce electricity. [6 marks]

Your answer should include:

- the names of three fossil fuels;
- how fossil fuels were formed;
- what happens inside a fossil fuel power station.

In this question you will be assessed on your written communication skills including the use of specialist scientific terms.

(b) To supply electricity to any appliance three-pin plugs are used.



Name the part labelled **X** in the diagram and explain how it works. [3 marks]

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Q6(a) .....© BMJ 2009;338:a3110

Q8(b) .....Source: Principal Examiner

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Question Number	**Marks**
1	
2	
3	
4	
5	
6	
7	
8	
Total Marks	