



Centre Number

71	
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Candidate Number

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General Certificate of Secondary Education  
2013–2014

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**Science: Single Award**

Unit 3 (Physics)

Foundation Tier

[GSS31]

MV18

MONDAY 19 MAY 2014, AFTERNOON

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**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(b)**.

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- 1 Shown below are devices which change electrical energy into other types of energy.



Iron



MP3 Player



Torch



Drill

- (a) Use lines to match each device with the main type of energy it produces. [3 marks]

**Device**

Iron

MP3 Player

Torch

Drill

**Energy type**

Sound

Heat

Movement

Light

(b) The drill has a power rating of 805 W and is connected to the 230 V mains.

(i) Use the equation:

$$\text{current} = \frac{\text{power}}{\text{voltage}}$$

to calculate the amount of current flowing to the drill.  
[2 marks]

(Show your working out.)

Answer \_\_\_\_\_

(ii) What size of fuse should be fitted in the plug of the drill?

Circle the correct answer. [1 mark]

1

3

5

13

30

(iii) Apart from the fuse, name **one** other safety feature of a 3-pin plug. [1 mark]

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(iv) Name the unit of current. [1 mark]

Choose from:

**volt**

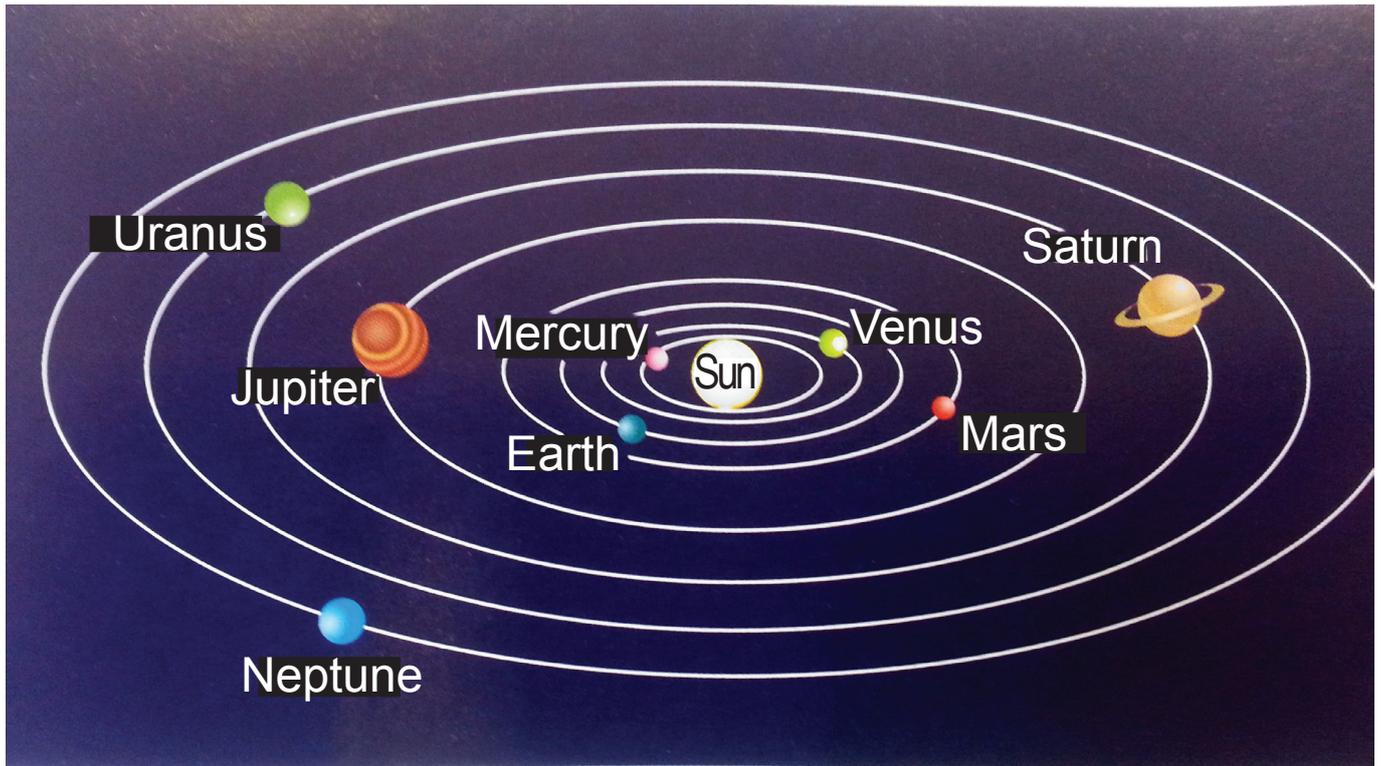
**watt**

**amp**

**joule**

Answer \_\_\_\_\_

2 The diagram below shows our Solar System.



(a) (i) Suggest which planet will be coldest. Explain your answer. [2 marks]

Planet \_\_\_\_\_

Explanation \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

(ii) Name this model of the Solar System.

Circle the correct answer. [1 mark]

**geocentric**

**concentric**

**heliocentric**

- (b) The table below gives information about four planets in our Solar System.

Planet	Diameter/ km	Gravity/ N/kg	Number of moons
Jupiter	142 800	26	67
Uranus	51 118	11	27
Neptune	49 528	12	13
Mars	6790	4	2

Use the table to answer the following questions.

- (i) Describe the relationship between planet diameter and number of moons. [1 mark]

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- (ii) Using the information in the table, a student made the following suggestion.

“The bigger the diameter of a planet, the more gravity it will have.”

Was the student correct? Explain your answer. [1 mark]

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(c) NASA has stated that humans will land on Mars by 2025.

A major concern is the long distance to Mars. Explain fully why this might be a problem. [2 marks]

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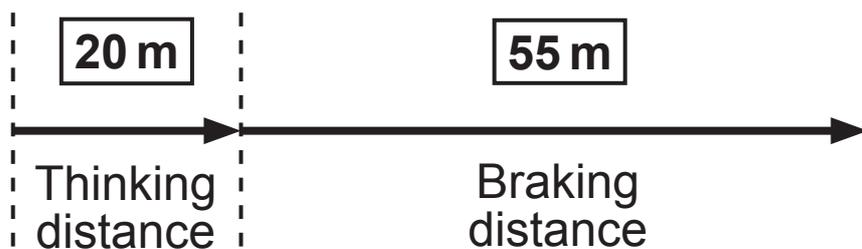
- 3 (a) The table below gives some factors which might affect thinking and braking distances. Complete the table.  
[3 marks]

Choose from:

**increased** : **no effect** : **decreased**

Factor	Thinking distance	Braking distance
Wet road surface		
Faster speed		
Bald tyres	no effect	increased
New brakes		

- (b) The information shown below is for a car travelling at 25 m/s.



Calculate the stopping distance for this car. [1 mark]

Answer \_\_\_\_\_ m

- (c) The Lincolnshire Road Safety Partnership researched the effect that speed cameras had on speeding vehicles. Their results are shown in the table below.

Speed limit/mph	% vehicles exceeding the speed limit	
	Before cameras introduced	After cameras introduced
30	40	8
40	26	4
50	38	0.4
60	15	6
70	16	2

- (i) What conclusion can be made from these results about the use of speed cameras? [1 mark]

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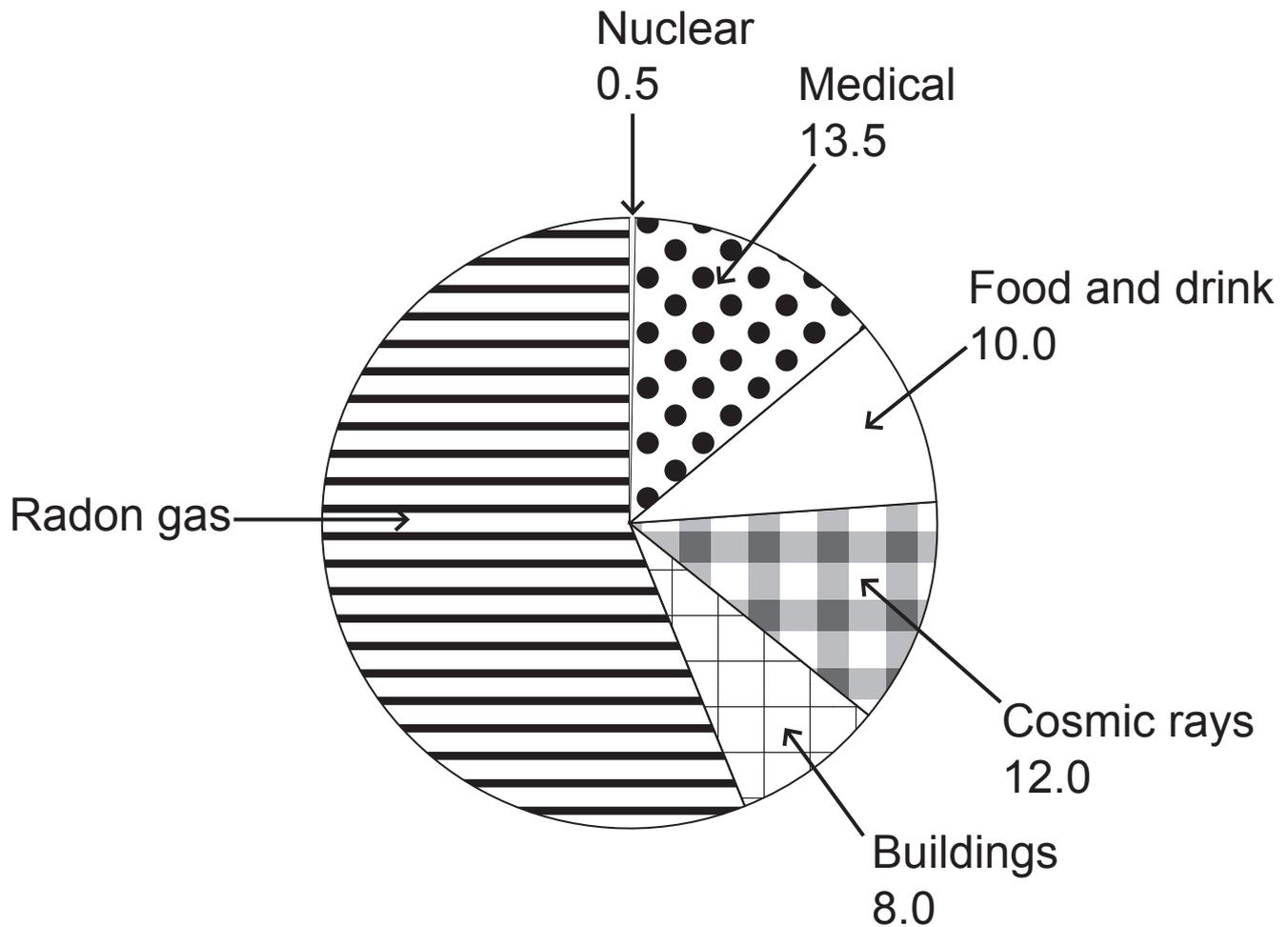
- (ii) At which speed limit did speed cameras produce the biggest change in the percentage of speeding vehicles? [1 mark]

Answer \_\_\_\_\_ mph

- (iii) Apart from speed cameras, name **one** other traffic calming measure. [1 mark]

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- 4 The pie chart below shows the percentage of each source of radiation that a person is exposed to in one year.



- (a) (i) Calculate the percentage of radiation received from radon gas. [2 marks]

(Show your working out.)

Answer \_\_\_\_\_ %

(ii) What collective name is given to these sources of radiation? [1 mark]

Choose from:

**foreground**

**underground**

**background**

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(b) Radiation can be used to keep food fresh for longer.

(i) Explain fully how radiation extends the shelf life of fresh food. [2 marks]

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(ii) Suggest how a longer shelf life will benefit a shopkeeper. [1 mark]

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- (c) The picture below shows a patient about to undergo radiotherapy. This involves a brain tumour (cancer) being targeted with radiation.



Explain fully, in terms of the penetrating power of radiation, why gamma is used rather than alpha or beta. [3 marks]

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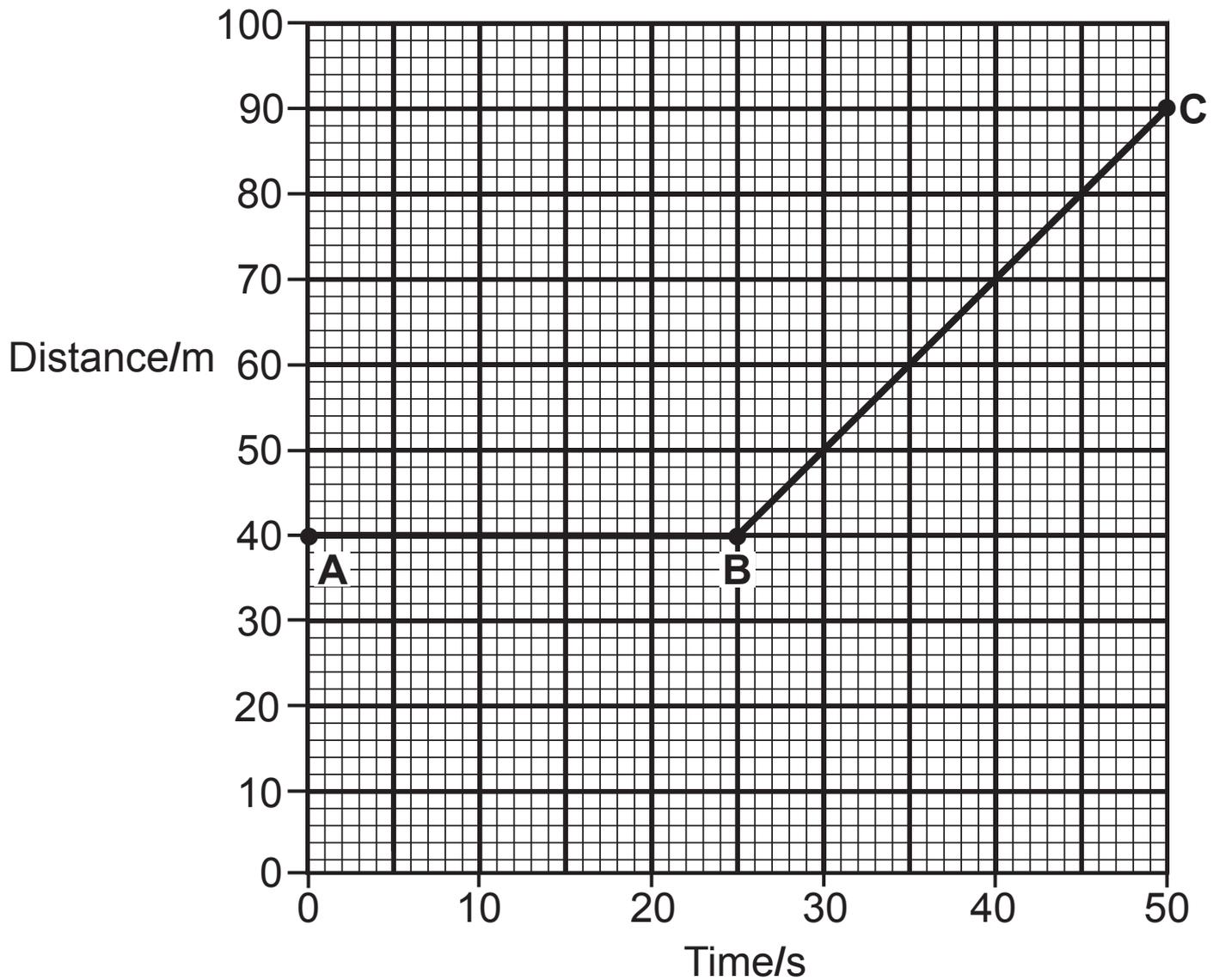
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**(Questions continue overleaf)**

- 5 (a) The distance–time graph for part of a train journey is shown below.



- (i) Describe the motion of the train from: [2 marks]

**A to B** \_\_\_\_\_

**B to C** \_\_\_\_\_

(ii) Use the equation:

$$\text{average speed} = \frac{\text{distance}}{\text{time}}$$

to calculate the average speed of the train between **A** and **C**. [2 marks]

(Show your working out.)

Answer \_\_\_\_\_ m/s

- (b) Patrick investigated the average speeds of five racing cars (**A**, **B**, **C**, **D** and **E**) over a two lap race.

The results are shown in the table below.

<b>Car</b>	<b>1st lap time/s</b>	<b>2nd lap time/s</b>
<b>A</b>	40	55
<b>B</b>	50	50
<b>C</b>	55	55
<b>D</b>	55	45
<b>E</b>	40	75

If all the cars start at the same time, which **two** will finish together? [1 mark]

\_\_\_\_\_ and \_\_\_\_\_

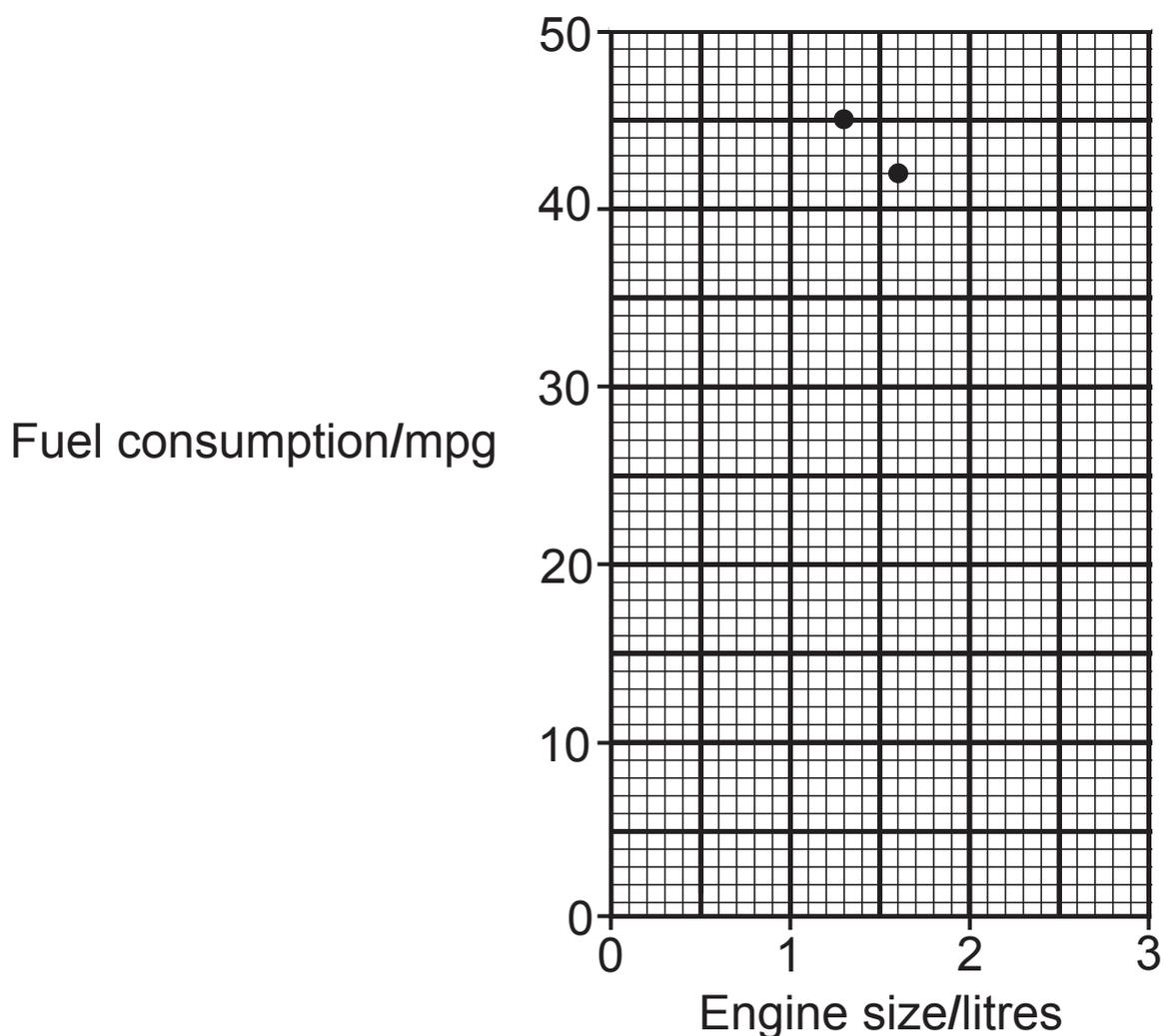
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**(Questions continue overleaf)**

- 6 (a) The table below gives information about five different makes of car.

Make	Engine size/ litres	Fuel consumption/ mpg
Aster	1.3	45
Lazio	1.6	42
Torino	1.8	39
Viva	2.0	37
Megro	2.5	32

- (i) Use this information to complete the graph below, including a line of best fit. [2 marks]



(ii) Use your graph to find the fuel consumption of a 1.0 litre engine. [1 mark]

Answer \_\_\_\_\_ mpg

(b) Car manufacturers are trying to make cars more efficient.

(i) Suggest **one** way car manufacturers are making cars more efficient. [1 mark]

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(ii) Petrol and diesel are made from oil, a finite fossil fuel. Explain the term 'finite' and why it is important to have more efficient cars. [2 marks]

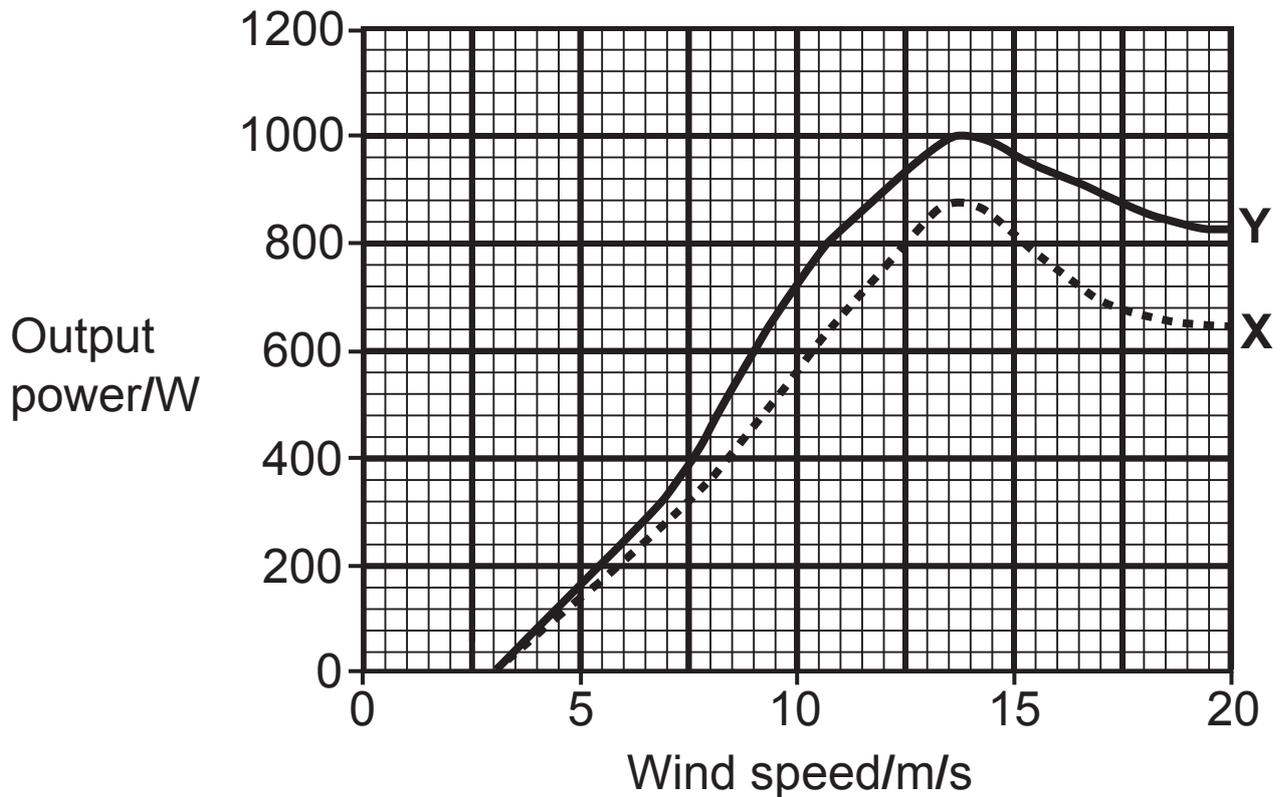
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- 7 (a) The graph below shows the performance of two types of wind turbine (X and Y).



- (i) Calculate the difference between the maximum power produced by the two turbines. [2 marks]

(Show your working out.)

Answer \_\_\_\_\_ W

(ii) Describe in detail how the output power of turbine X changes as the wind speed increases. [3 marks]

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(b) (i) Wind energy is classed as renewable. What does the term 'renewable' mean? [1 mark]

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(ii) Give **one** environmental advantage and **one** disadvantage of using wind energy. [2 marks]

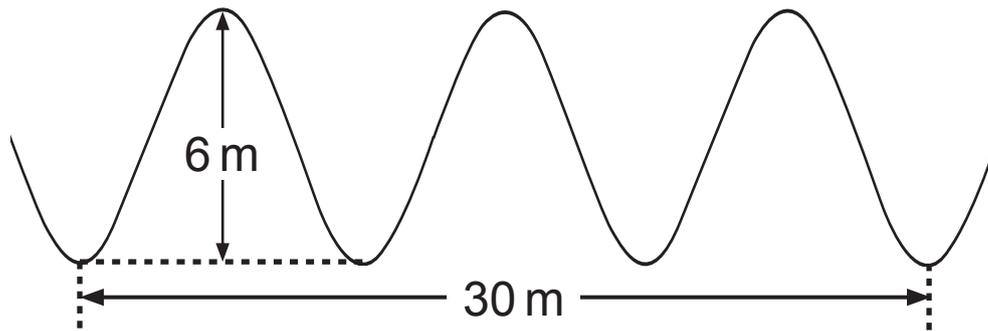
Advantage \_\_\_\_\_

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Disadvantage \_\_\_\_\_

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8 (a) The diagram below shows some sea waves.



Use the information in the diagram to answer the following questions.

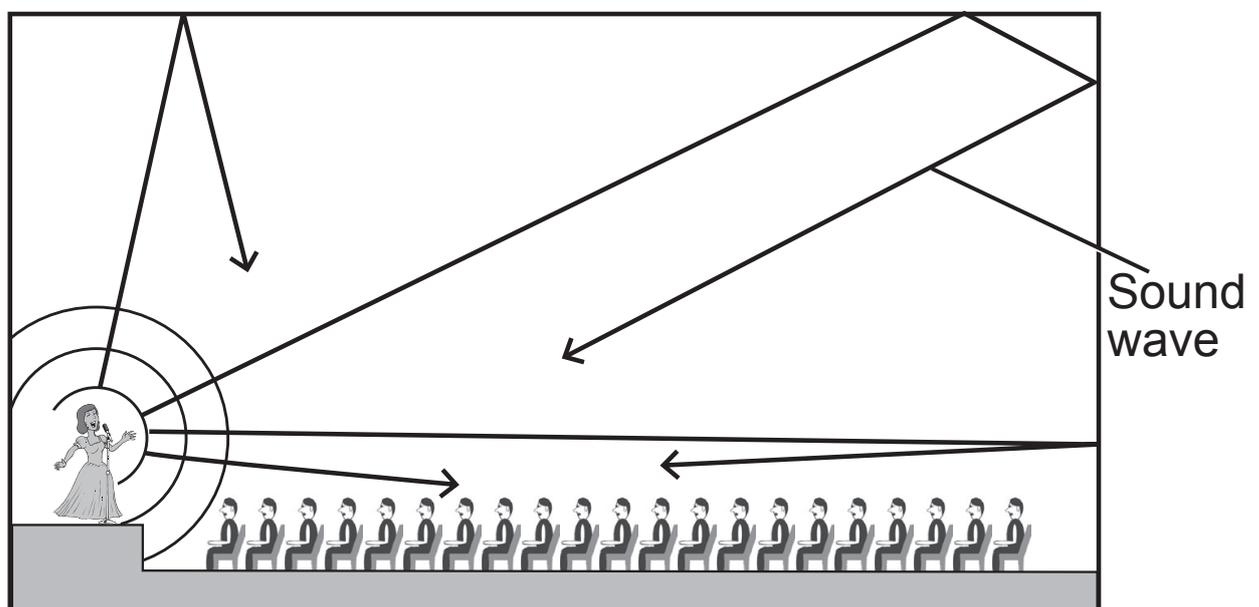
(i) What is the amplitude of these waves? [1 mark]

Answer \_\_\_\_\_ m

(ii) What is the wavelength of these waves? [1 mark]

Answer \_\_\_\_\_ m

(b) The diagram below shows the sound waves in a badly designed concert hall. Some of the audience complain that the sound they hear is not very clear.





(c) Explain fully what ultrasound is. [2 marks]

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**THIS IS THE END OF THE QUESTION PAPER**

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## Sources

Pg 2 Q1(i) .... Iron © iStock/Thinkstock

Pg 2 Q1(ii) ....MP3 Player © iStock/Thinkstock

Pg 2 Q1(iii) ...Torch © iStock/Thinkstock

Pg 2 Q1(iv) ...Drill © Stockbyte/Thinkstock

Pg 5 Q2 .....Solar System Diagram © Barking Dog Art

Pg 10 Q4 .....Pie Chart showing percentage of each source of radiation that is exposed to in one year

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Pg 12 Q4(c) ....Radiotherapy treatment photo © Stevie Grand/Science Photo Library

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Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
<b>Total Marks</b>	

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