



Rewarding Learning

General Certificate of Secondary Education
2017–2018

Centre Number

--	--	--	--	--

Candidate Number

--	--	--	--

Science: Single Award

Unit 3 (Physics)

Foundation Tier



[GSS31]

GSS31

WEDNESDAY 23 MAY 2018, AFTERNOON

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

You must answer the questions in the spaces provided.

Do not write outside the boxed area on each page or on blank pages.

Complete in black ink only. **Do not write with a gel pen.**

Answer **all seven** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 60.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

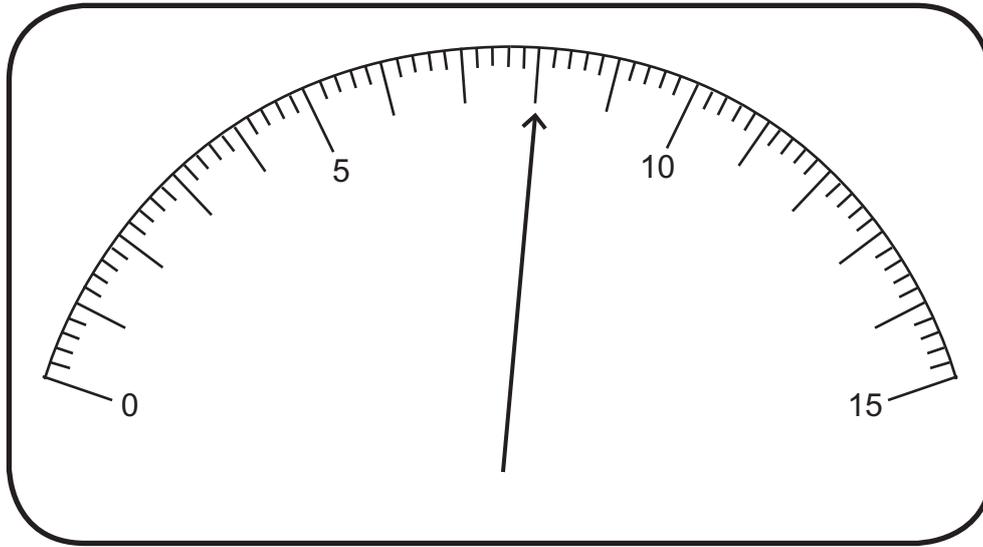
Quality of written communication will be assessed in Question **6(a)**.

12153.06R



28GSS3101

- 1 (a) The diagram below shows a meter used to measure current in an electrical circuit.



- (i) What name is given to this type of meter?

Answer _____ [1]

- (ii) What is the reading on this meter?

Answer _____ A [1]

- (b) Given below are some electrical properties and units. Using lines, match each property to its correct unit.

Property

resistance

voltage

Unit

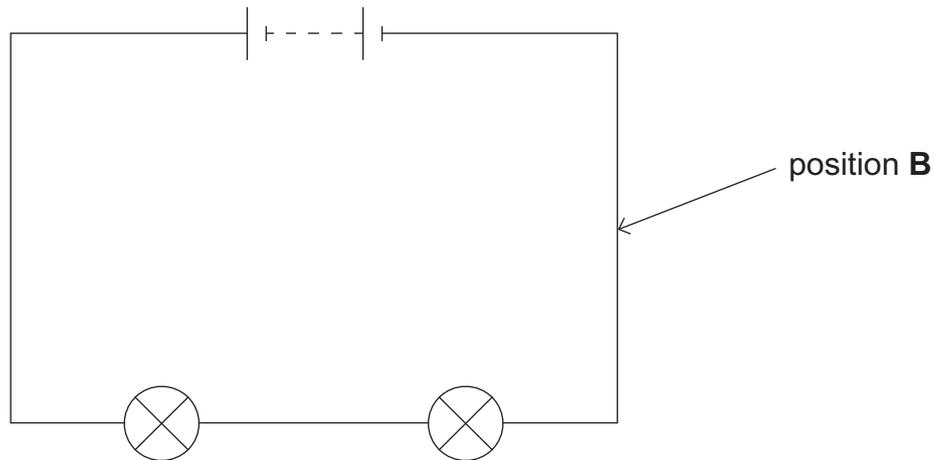
volt

joule

ohm



Shown below is a simple electrical circuit.



(c) Complete the sentences below.

Choose from:

get brighter : short : get dimmer

parallel : stay the same : series

In this circuit the bulbs are connected in _____ . If

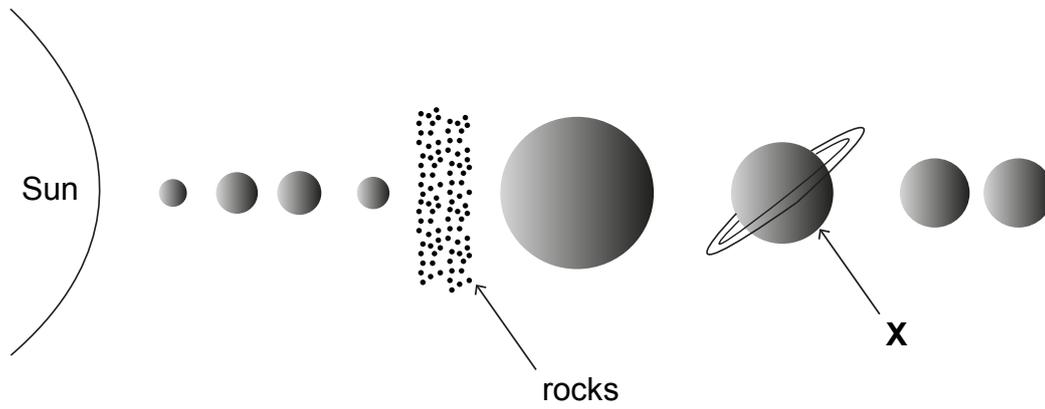
another bulb is added at position **B** the bulbs will _____ .

[2]

[Turn over



2 The diagram below shows our Solar System.

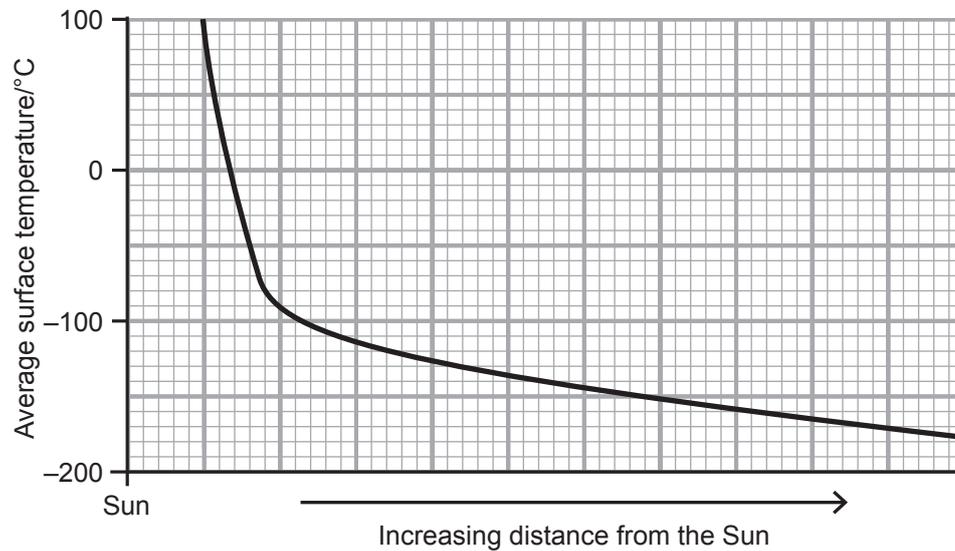


(a) Name the planet labelled X.

Answer _____ [1]



The graph below shows how the average surface temperature of some planets in our Solar System changes with their distance from the Sun.



(b) Complete the following sentence to give the trend shown by this graph.

As the distance from the Sun increases _____
 _____ [1]

(c) Place a tick (✓) beside the statement that describes the movement, if any, of most of the galaxies in the Universe.

moving closer to each other

staying the same distance apart

moving away from each other

[1]

[Turn over



(d) Complete the sentences below.

Choose from:

moon

star

galaxy

planet

An object that orbits a planet is called a _____.

An object that orbits a star is called a _____ [2]

The photograph below shows a crater formed millions of years ago when an object hit the Earth.



© David Parker / Science Photo Library

(e) Name the type of object which caused this crater.

_____ [1]





BLANK PAGE
DO NOT WRITE ON THIS PAGE
(Questions continue overleaf)

12153.06R

[Turn over



28GSS3107

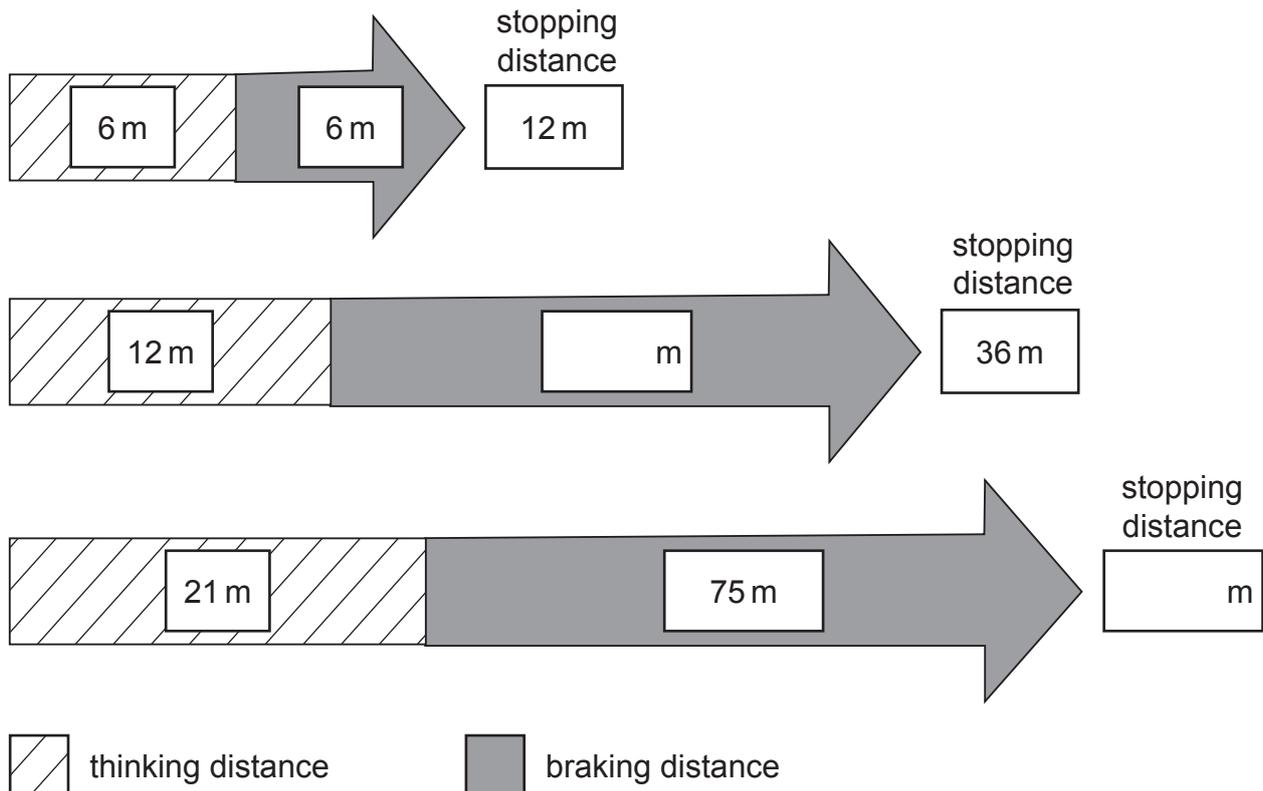
- 3 (a) The diagram below gives the stopping distances for a car travelling at different speeds.

Use the equation:

$$\text{thinking distance} + \text{braking distance} = \text{stopping distance}$$

to complete the diagram below.

There are **two** values to calculate.



[2]



The photograph below has been used to warn drivers about the dangers of driving when tired. Tiredness can slow a driver's reactions.



Drive tired and you may never wake up. 

© Contraband Collection / Alamy Stock Photo

(b) Complete the table below by placing **one** tick (✓) in each row to give the effect, if any, of slower reactions.

	Decrease	No effect	Increase
reaction time			
thinking distance			
braking distance			

[3]

[Turn over



- (c) The table below shows how the blood alcohol content (BAC) in females is affected by body mass and number of alcoholic drinks.

Number of alcoholic drinks \ Body mass	Blood alcohol content /%		
	60 kg	80 kg	100 kg
1	0.04	0.03	0.02
2	0.08	0.06	0.05
3	0.11	0.09	0.07
4	0.15	0.11	0.09
5	0.19	0.14	0.10

- (i) State the effect that increasing body mass has on blood alcohol content (BAC).

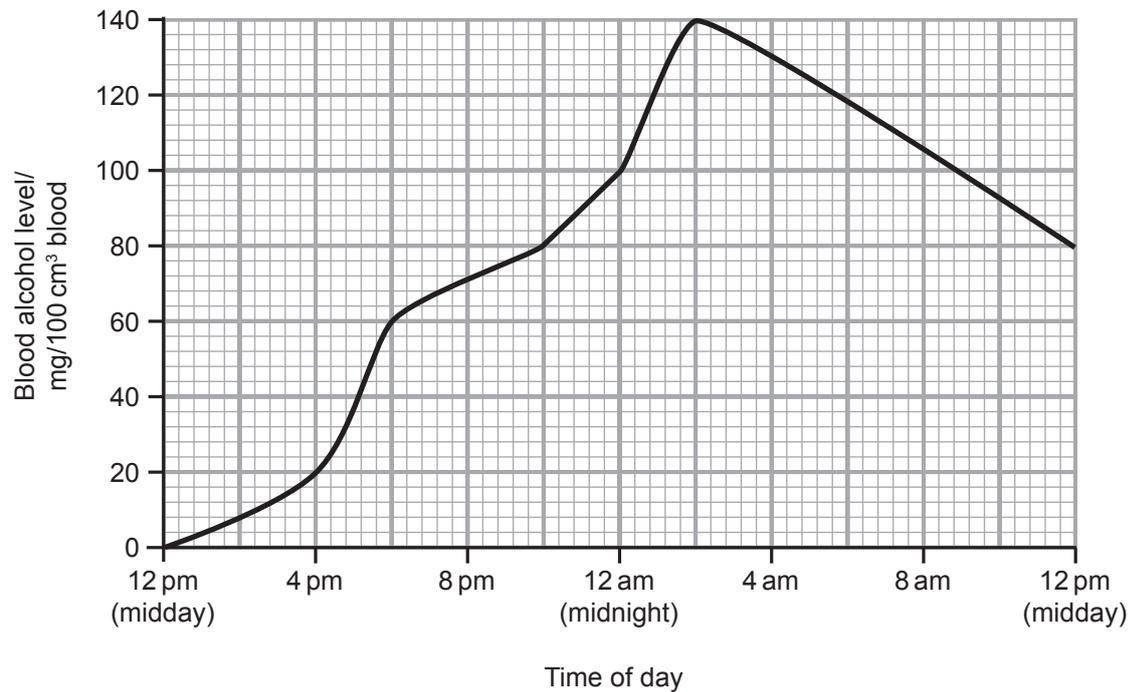
_____ [1]

- (ii) Give **one** other conclusion that can be made from this data.

_____ [1]



- (d) Maureen started drinking alcohol at midday. The graph below shows how her blood alcohol level changed over the next 24 hours.



The legal limit to drive in the UK is a blood alcohol level of 80 mg/100 cm³ blood.

- (i) At what time did Maureen first go over the legal limit for driving?

Answer _____ [1]

- (ii) Explain fully why Maureen should **not** drive at 8 am the following day.

_____ [2]

[Turn over



4 (a) Complete the sentences below about waves.

Choose from:

energy

longitudinal

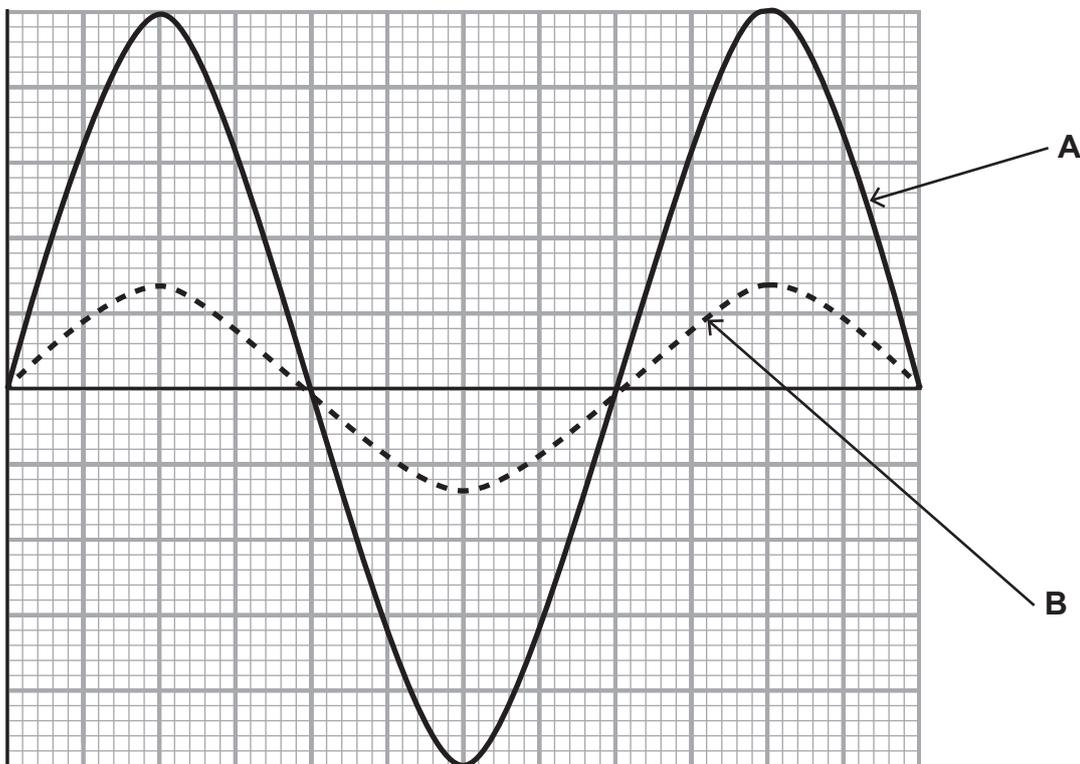
vibrations

wavelength

A wave is a series of _____.

Waves carry _____ from one place to another. [2]

The diagram below represents two waves **A** and **B**.



(b) Waves can be described by features such as amplitude, wavelength and frequency.

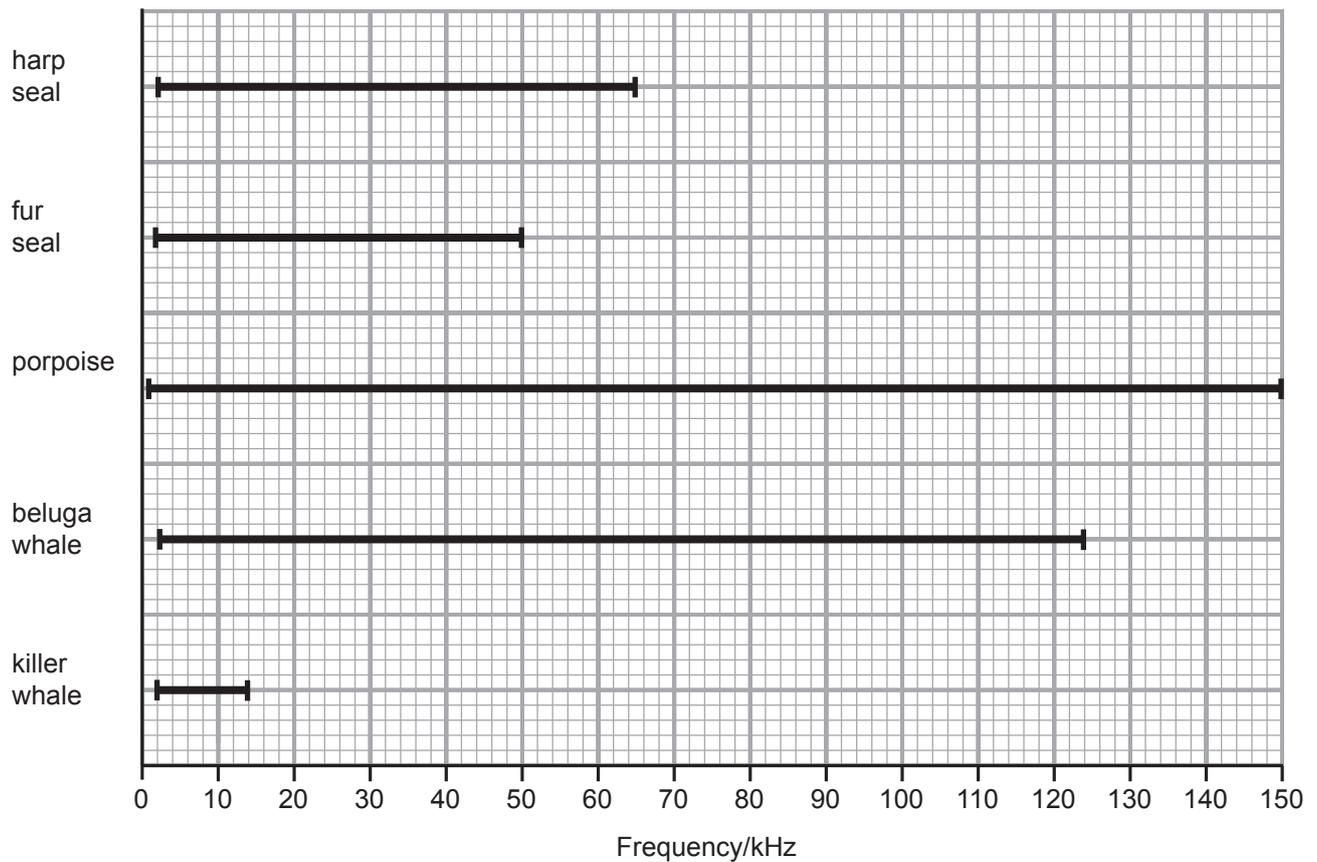
Give **one** feature of waves **A** and **B** which is:

(i) the same. _____ [1]

(ii) different. _____ [1]



(c) The chart below shows the hearing range of different sea mammals.



(i) How many of these mammals can hear ultrasound?

Answer _____ [1]

(ii) The fur seal can hear up to 50 kHz. Give this value in Hertz (Hz).

Answer _____ Hz [1]

(d) What is the **lowest** frequency a human can hear?

Answer _____ [1]

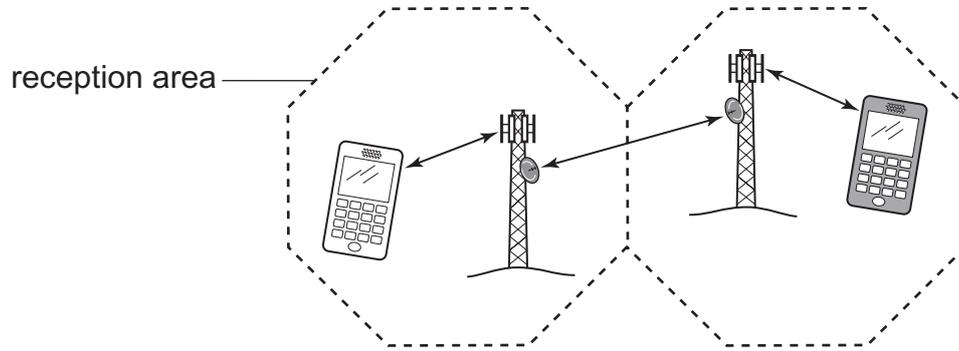
[Turn over

12153.06R



28GSS3113

(e) The diagram below shows how mobile phones transmit signals from one phone to another.



© Graham-Cameron Illustration

(i) Name the type of electromagnetic wave used to carry mobile phone signals. [1]

_____ [1]

(ii) What name is given to the reception area around a phone mast? [1]

_____ [1]



- (f) The table below shows the signal power at different distances from a mobile phone mast.

Distance/m	Power/ W/m^2
1	80.0
3	9.0
5	3.0
10	0.8
50	0.03

In the UK power levels above 2 W/m^2 are considered to be a risk to health.

- (i) Use information from the table to suggest the closest distance you could live to a mobile phone mast to avoid these health risks.

Answer _____ m [1]

- (ii) Name **one** health risk linked to the use of mobile phones.

_____ [1]

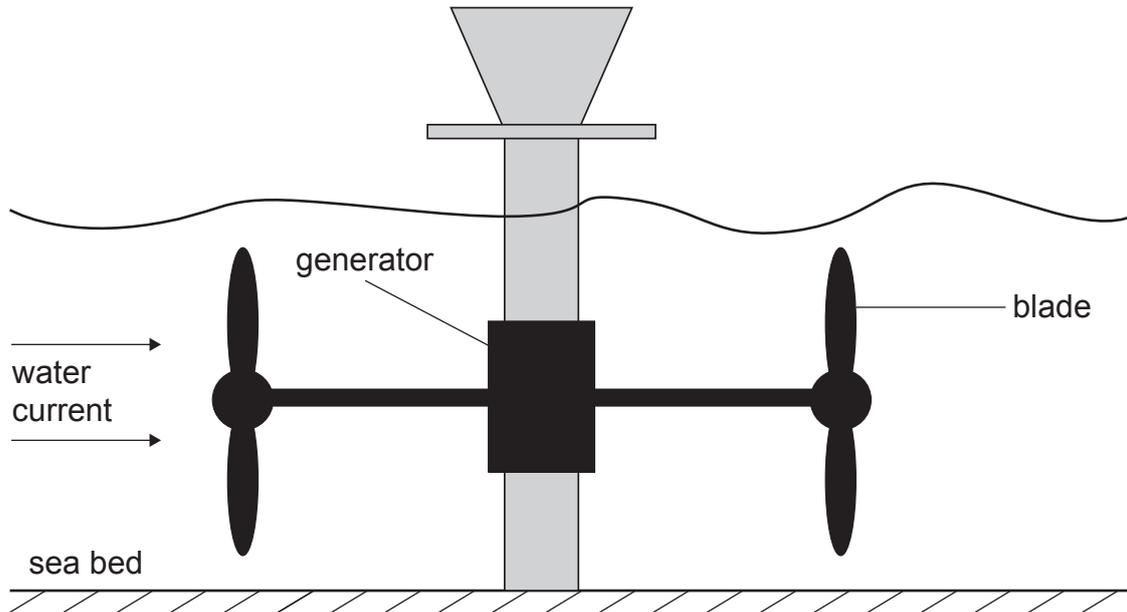
[Turn over

12153.06R



28GSS3115

- 5 (a) The diagram below shows a tidal turbine which uses water currents to generate electricity.



- (i) Tidal energy is a form of renewable energy. What is meant by the term renewable energy?

_____ [1]

- (ii) Use the diagram and your knowledge to explain fully how water currents produce electricity in the generator.

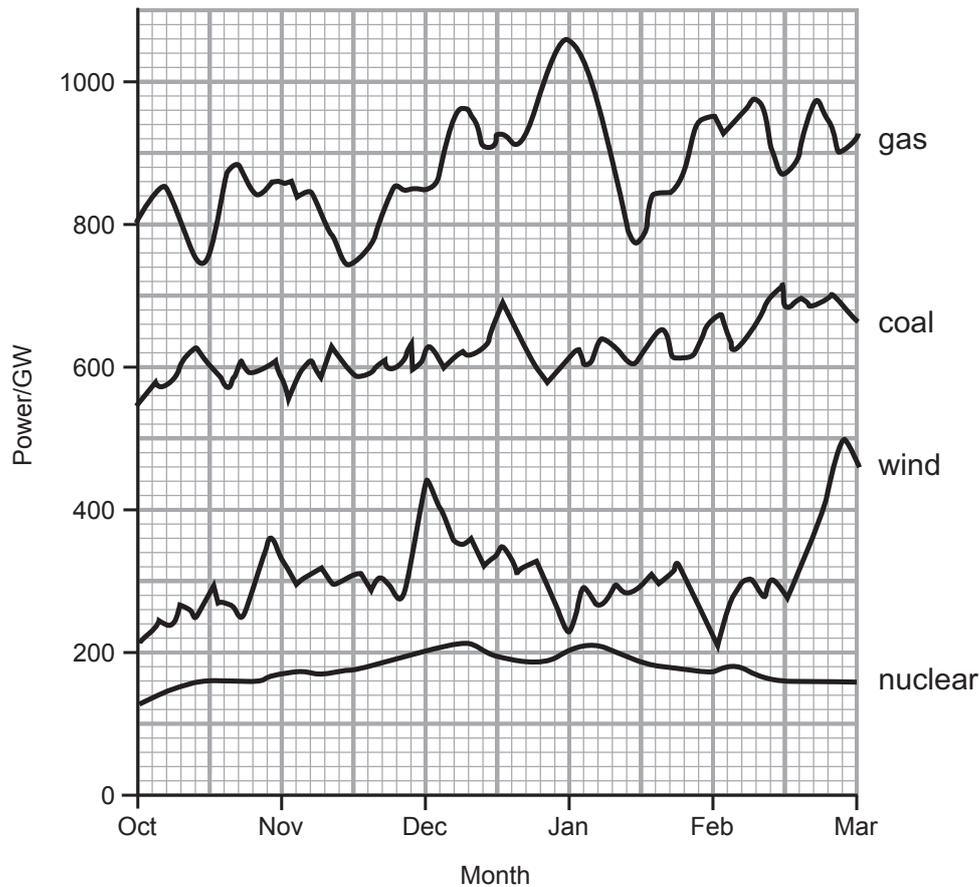
 _____ [3]

- (iii) Give **one** disadvantage of tidal turbines.

 _____ [1]



- (b) The graph below shows the power produced per day by different energy sources from October to March for part of the United Kingdom.



- (i) Name the **two** fossil fuels shown in this graph.

_____ and _____ [1]

- (ii) Calculate the difference between the maximum and minimum power produced by **wind**.

(Show your working out.)

Answer _____ GW [2]

- (iii) Suggest **one** reason why the power produced by wind varies so much.

_____ [1]

[Turn over





BLANK PAGE
DO NOT WRITE ON THIS PAGE
(Questions continue overleaf)

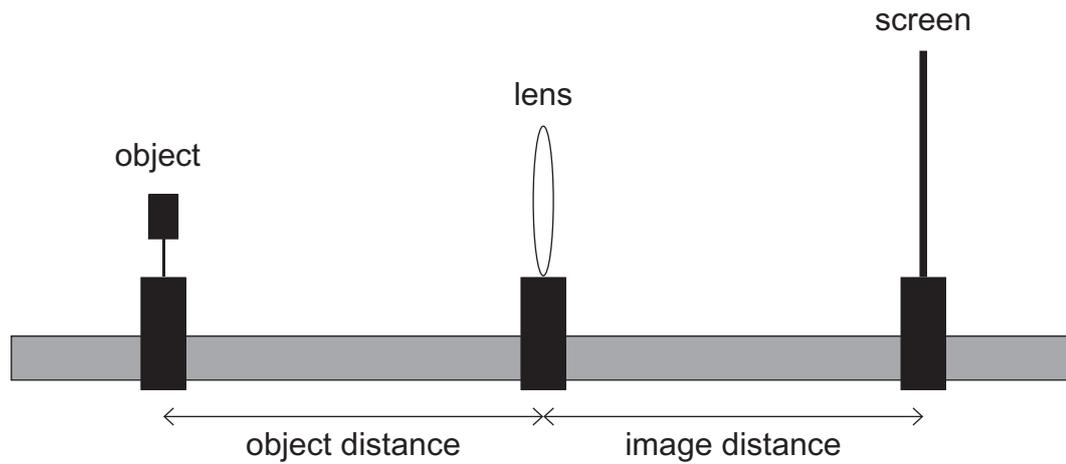
12153.06R

[Turn over



28GSS3119

(b) A student used the apparatus below to investigate a lens.

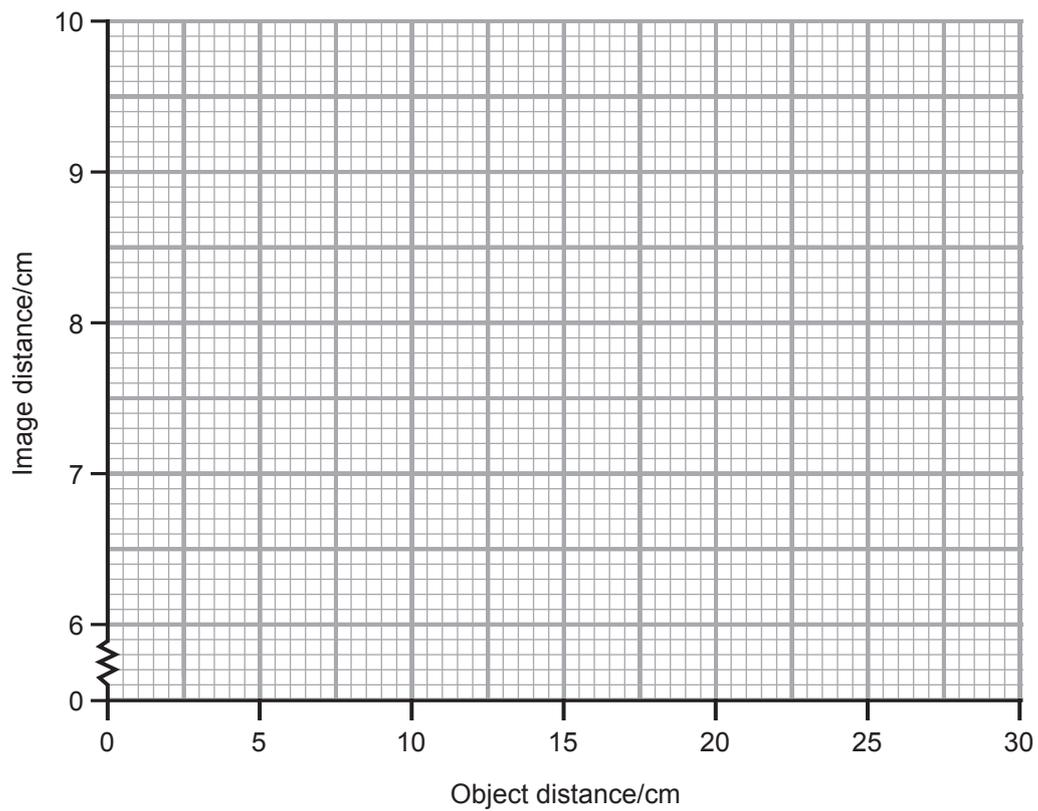


She set the object distance at 10 cm from the lens and moved the screen until it showed a clear image. She repeated this with different object distances. Her results are shown below.

Object distance/cm	Image distance/cm
10	10.0
15	7.5
20	6.7
25	6.2
30	6.0



(i) On the grid below plot and draw a line graph of these results.



[3]

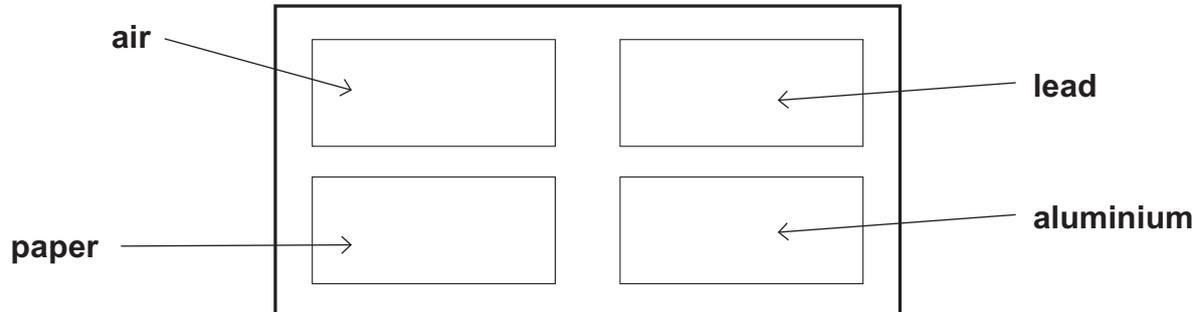
(ii) State the trend shown by these results.

[1]

[Turn over



- 7 (a) Scientists who work in nuclear power stations must wear a special badge. The badge consists of a radiation sensitive film covered by four different materials, as shown in the diagram. These materials may or may not stop the different types of radiation passing to the film.



The film turns black if any radiation reaches it by passing through the material. Shown below is the badge worn by one of the scientists.



- (i) Use the information given to identify **one** type of radiation (**alpha**, **beta** or **gamma**) that was present. Explain your answer fully.

[3]



- (ii) Some of the radiation present is background radiation.
What is meant by the term background radiation?

_____ [1]

- (iii) Radon gas is a source of background radiation. Give one other source of **natural** background radiation.

_____ [1]

The table below shows the effect of radon gas on both smokers and non-smokers.

Indoor radon level Bq/m ³	Chance of lung cancer/%	
	Non-smoker	Smoker
20	0.50	14.00
200	0.55	20.00
800	1.00	34.00

- (b) Give **one** conclusion that can be made from this information.

_____ [1]

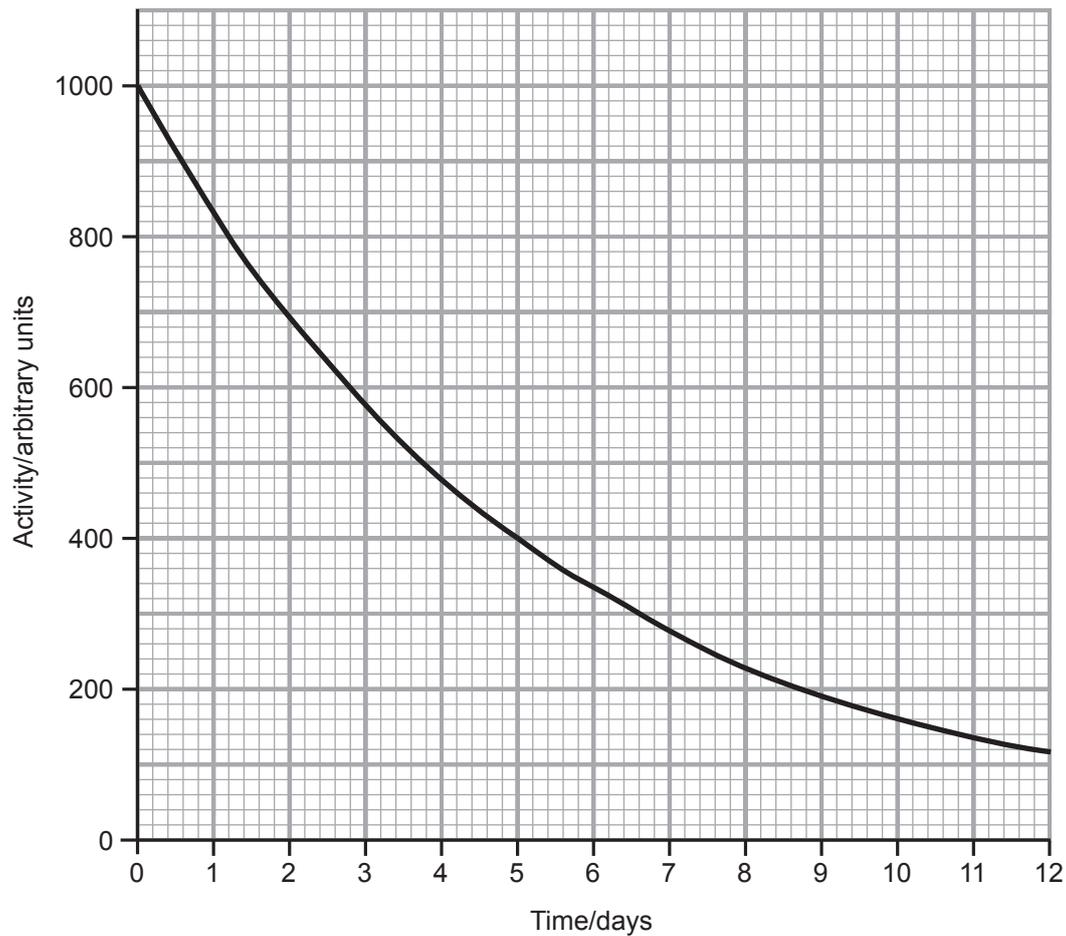
[Turn over

12153.06R



28GSS3123

The graph below shows how the radioactivity of radon-222 changes with time.



(c) Use the graph to find the half-life of radon-222.

Answer _____ days [1]

(d) Another radon source has a half-life of 1 minute. What fraction, if any, will be left after 2 minutes?

Circle the correct answer.

$\frac{1}{2}$

$\frac{1}{4}$

$\frac{1}{8}$

0

[1]



THIS IS THE END OF THE QUESTION PAPER

BLANK PAGE

DO NOT WRITE ON THIS PAGE

12153.06R



28GSS3125

BLANK PAGE
DO NOT WRITE ON THIS PAGE

12153.06R



28GSS3126





BLANK PAGE
DO NOT WRITE ON THIS PAGE

12153.06R



28GSS3127

DO NOT WRITE ON THIS PAGE

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	

Total Marks	
--------------------	--

Examiner Number

Permission to reproduce all copyright material has been applied for.
In some cases, efforts to contact copyright holders may have been unsuccessful and CCEA will be happy to rectify any omissions of acknowledgement in future if notified.

12153.06R

