



Centre Number

71	
----	--

Candidate Number

--

General Certificate of Secondary Education  
2013–2014

---

## Science: Single Award

Unit 3 (Physics)

Foundation Tier

[GSS31]

MV18
------

FRIDAY 15 NOVEMBER 2013, AFTERNOON

---

### 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.

1 (a) The pictures below show some electrical appliances.



**kettle**



**microphone**



**loudspeaker**



**television**

(i) Which appliance above produces most light energy? [1]

Answer \_\_\_\_\_

(ii) Which appliance changes sound energy into electrical energy? [1]

Answer \_\_\_\_\_

(b) Complete the following sentence. [2]

Choose from:

**carried      destroyed      created      changed**

The law of conservation of energy states that energy cannot be \_\_\_\_\_

or \_\_\_\_\_, it can only be

\_\_\_\_\_ from one form to another.

(c) The table below shows the power of some electrical appliances.

<b>Appliance</b>	<b>Power/watts</b>
kettle	2000
oven	4000
toaster	800
television	200

(i) Which appliance is **not** designed to produce heat? [1]

Answer \_\_\_\_\_

(ii) Which appliance has a power rating of 2 kW? [1]

Answer \_\_\_\_\_

(d) The oven uses a current of 17 amps. Which fuse should the oven have fitted? [1]

Circle the correct answer.

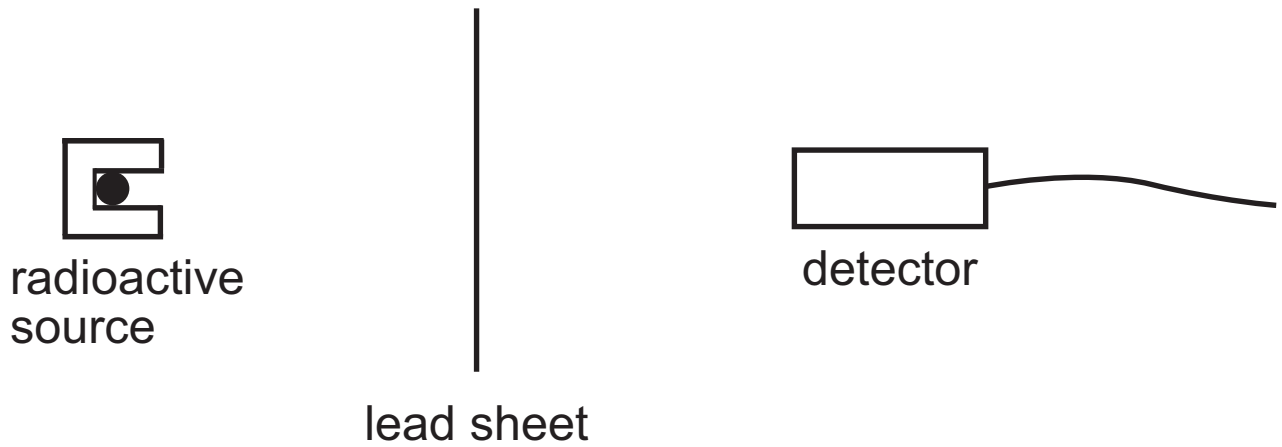
**5A**

**15A**

**30A**

**45A**

- 2 The equipment below measures the amount of gamma radiation stopped by different thicknesses of lead.

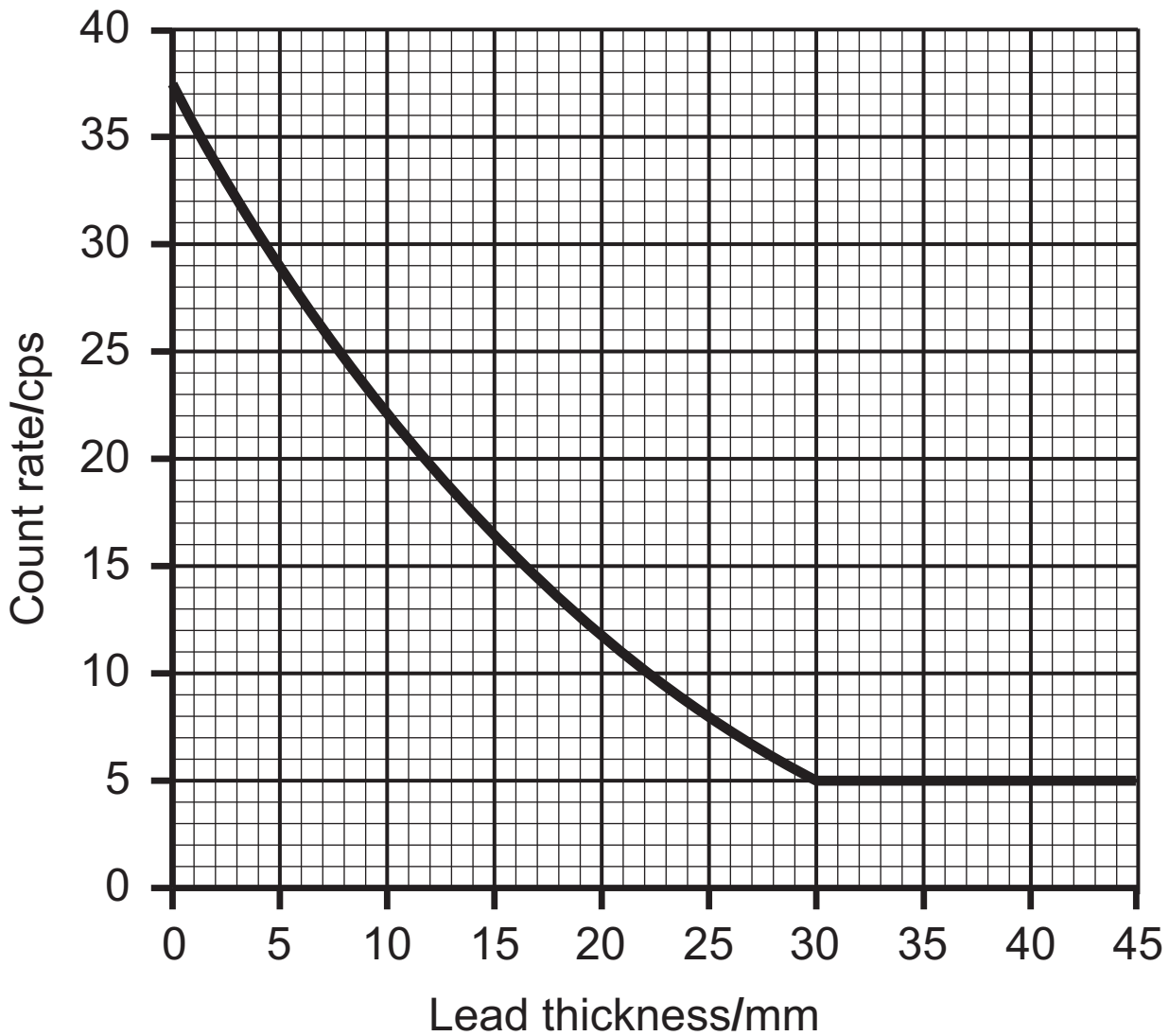


- (a) State **two** things that have to be kept the same to make the test fair. [2]

1. \_\_\_\_\_  
\_\_\_\_\_

2. \_\_\_\_\_  
\_\_\_\_\_

(b) The results of the experiment are shown in the graph below.



(i) Complete the following sentence to describe fully the conclusion that can be made from these results. [2]

As the thickness of lead increases \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**(ii)** Complete the sentence below. [1]

Choose from:

**surround      underground      background**

The count rate never falls to zero because of the radiation that is always around us. This is called

\_\_\_\_\_ radiation.

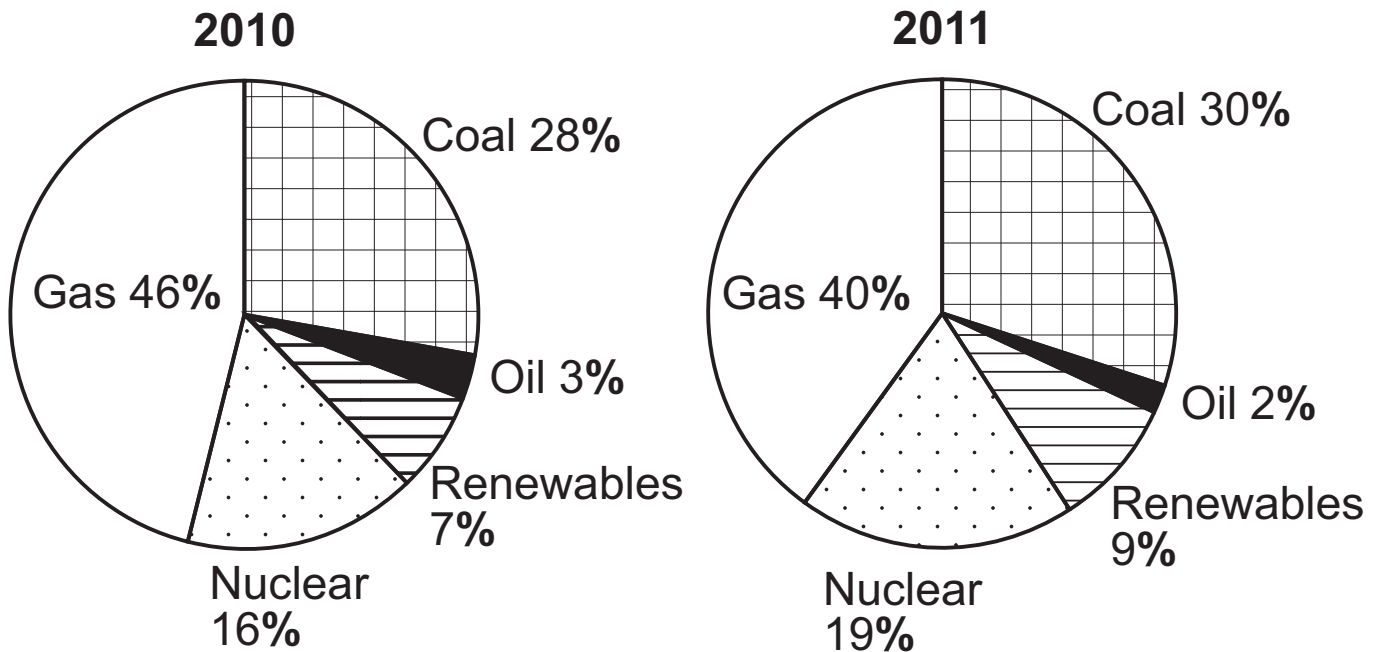
**(iii)** What is the minimum (smallest) thickness of lead needed to stop all the gamma radiation from this source? [1]

Answer \_\_\_\_\_ mm

**(c)** Give **one** use for gamma radiation. [1]

---

3 The pie charts below show the energy sources used to produce the UK's electricity in 2010 and 2011.



(a) (i) Name **one** fossil fuel that was used less in 2011 than in 2010. [1]

Answer \_\_\_\_\_

(ii) Calculate by how much the percentage use of this fossil fuel has fallen. [1]

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

(b) The percentage of renewable energy sources used has increased between 2010 to 2011.

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

\_\_\_\_\_

(ii) Give **one** example of a renewable energy source. [1]

\_\_\_\_\_

(c) Below are the number of units shown by an electricity meter 3 months ago and today.

6 4 3 9 0

3 months ago

6 5 3 6 5

today

(i) Calculate the number of units used in these 3 months. [1]

Answer \_\_\_\_\_ mm

(ii) Use the equation:

**cost = number of units used × cost per unit**

to calculate the cost of using electricity over these 3 months.

Each unit of electricity costs 20p. [2]

(Show your working out.)

Answer \_\_\_\_\_



(iii) Suggest **two** ways that any household can reduce the amount of electricity used. [2]

1. \_\_\_\_\_

\_\_\_\_\_

2. \_\_\_\_\_

\_\_\_\_\_

- 4 (a) The table below gives advice on how a person can prevent damage due to ultraviolet (UV) radiation.

UV Index	Safe time in Sun/mins	Protection
1–2	120	Hat
3–4	90	Hat + sunglasses
5–6	60	Hat, sunglasses and factor 10 sunscreen
7–9	40	Hat, sunglasses, factor 20 sunscreen and T-shirt
10+	30	Hat, sunglasses, factor 30 sunscreen, T-shirt and shady area

- (i) Name the condition caused by too much exposure to UV radiation. [1]

\_\_\_\_\_

- (ii) During her summer holidays, Jane is leaving an area of UV Index 8 and travelling to an area of UV Index 12. From the table give **two** extra things she should do to help prevent damage due to UV radiation. [2]

1. \_\_\_\_\_

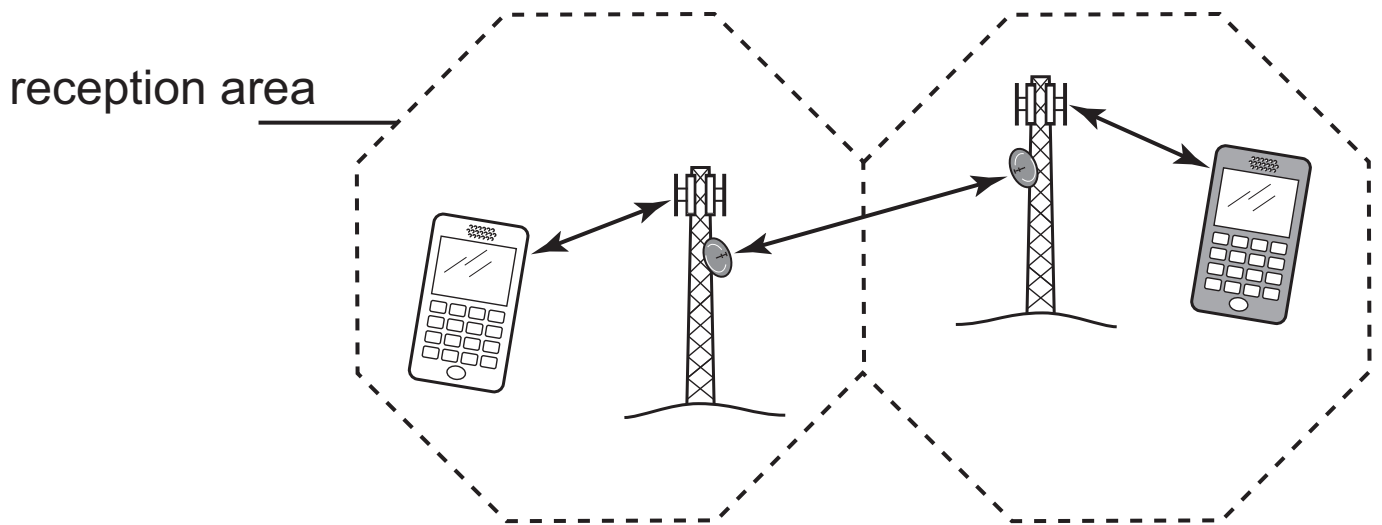
2. \_\_\_\_\_

\_\_\_\_\_

**BLANK PAGE**

**(Questions continue overleaf)**

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



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

---

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

---

(c) Below are some electromagnetic waves and their uses. Using lines match each wave with its use. [2]

**Wave**

**Use**

Radio waves

Pictures of broken bones

Preserving food

X-rays

Television broadcasting

(d) Give **one** feature that is the same and **one** feature that is different between electromagnetic waves. [2]

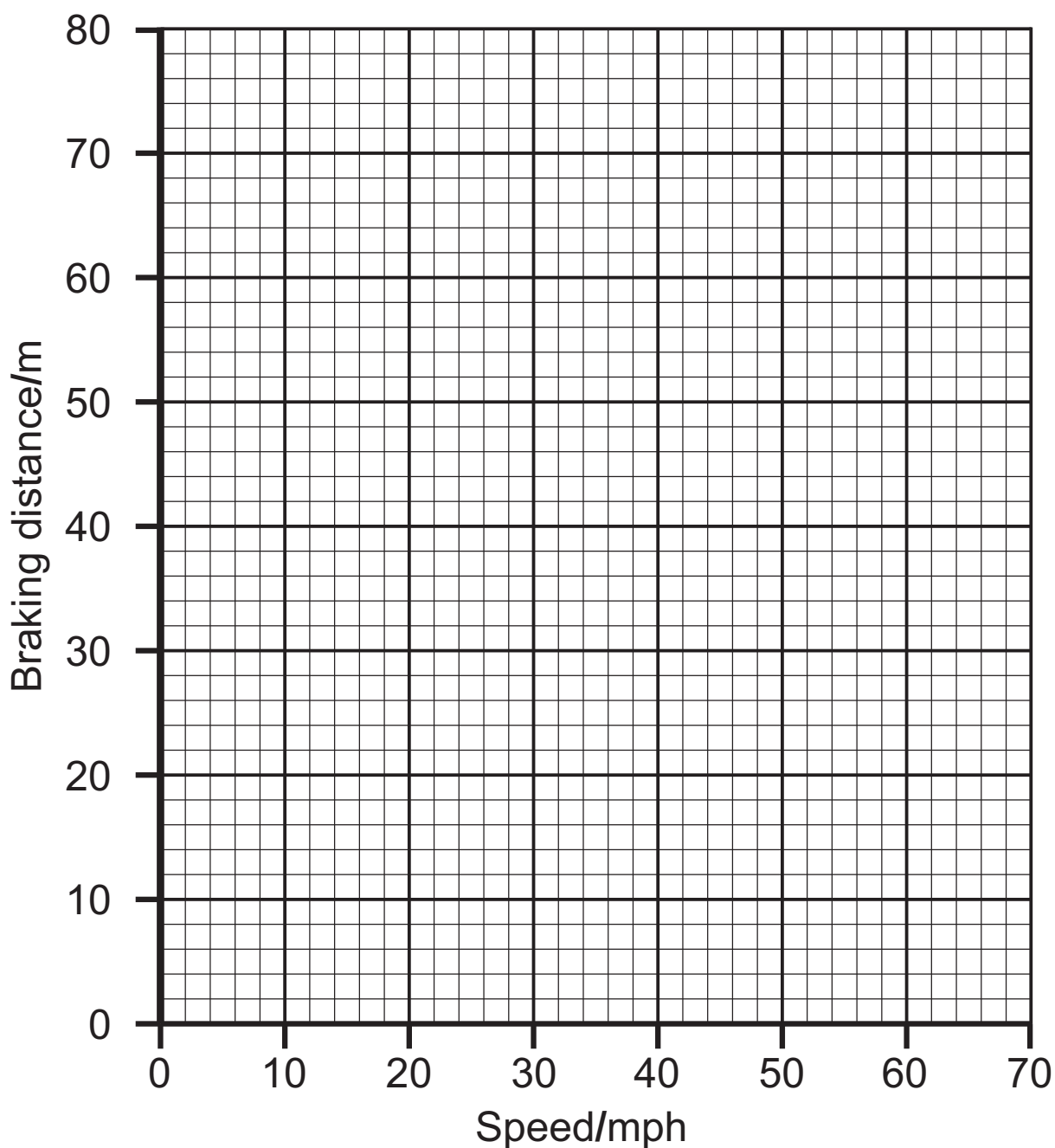
Same \_\_\_\_\_

Different \_\_\_\_\_

- 5 (a) The table below shows the braking distance for a car at different speeds.

Speed/mph	Braking distance/m
0	0
20	6
30	14
50	38
70	75

- (i) Plot and draw a line graph for these results. [3]



(ii) State the trend shown by these results. [1]

---

---

(iii) These results are for a dry road. On the same grid on page 14, sketch the line you would expect if the road was wet. [1]

(b) The table shows the increased risk that drivers will crash as their Blood Alcohol Content (BAC) rises.

<b>BAC/mg/100 ml</b>	<b>Increased risk of having a crash</b>
40	1.4
80	3.8
120	14.7
160	32.2

The legal limit for a driver's BAC is 80 mg/100 ml. Using the information and your knowledge, describe and explain fully the effect that alcohol has on driving and why many road safety campaigners suggest that the current limit is too high. [3]

---

---

---

---

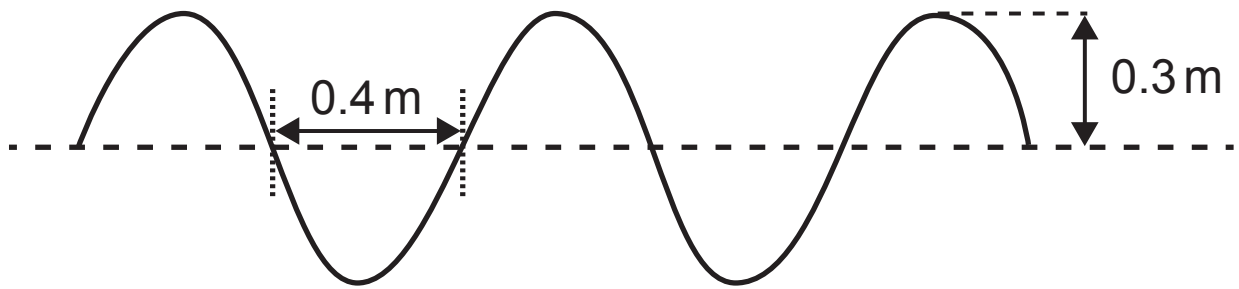
---

---

---

---

6 The diagram below represents a sound wave.



(a) What is the wavelength of this sound wave? [1]

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

(b) (i) Use the equation:

$$\text{speed} = \text{wavelength} \times \text{frequency}$$

to describe how wavelength changes as frequency increases. [1]

(Assume speed remains the same.)

---

---

(ii) State the units of frequency. [1]

Answer \_\_\_\_\_



(c) The device below is used to measure distance.



To find the length of a hall the device measures the time taken for an ultrasound wave to travel to a wall and back.

(i) Describe fully why we cannot hear the sound produced by this measuring device. [2]

---

---

---

---

- (ii) A signal takes 0.4 s to travel from one wall of a hall to the opposite wall and back. The speed of sound in air is 330 m/s.

Use the equation:

$$\text{distance} = \text{speed} \times \text{time}$$

to calculate the length of the hall. [3]

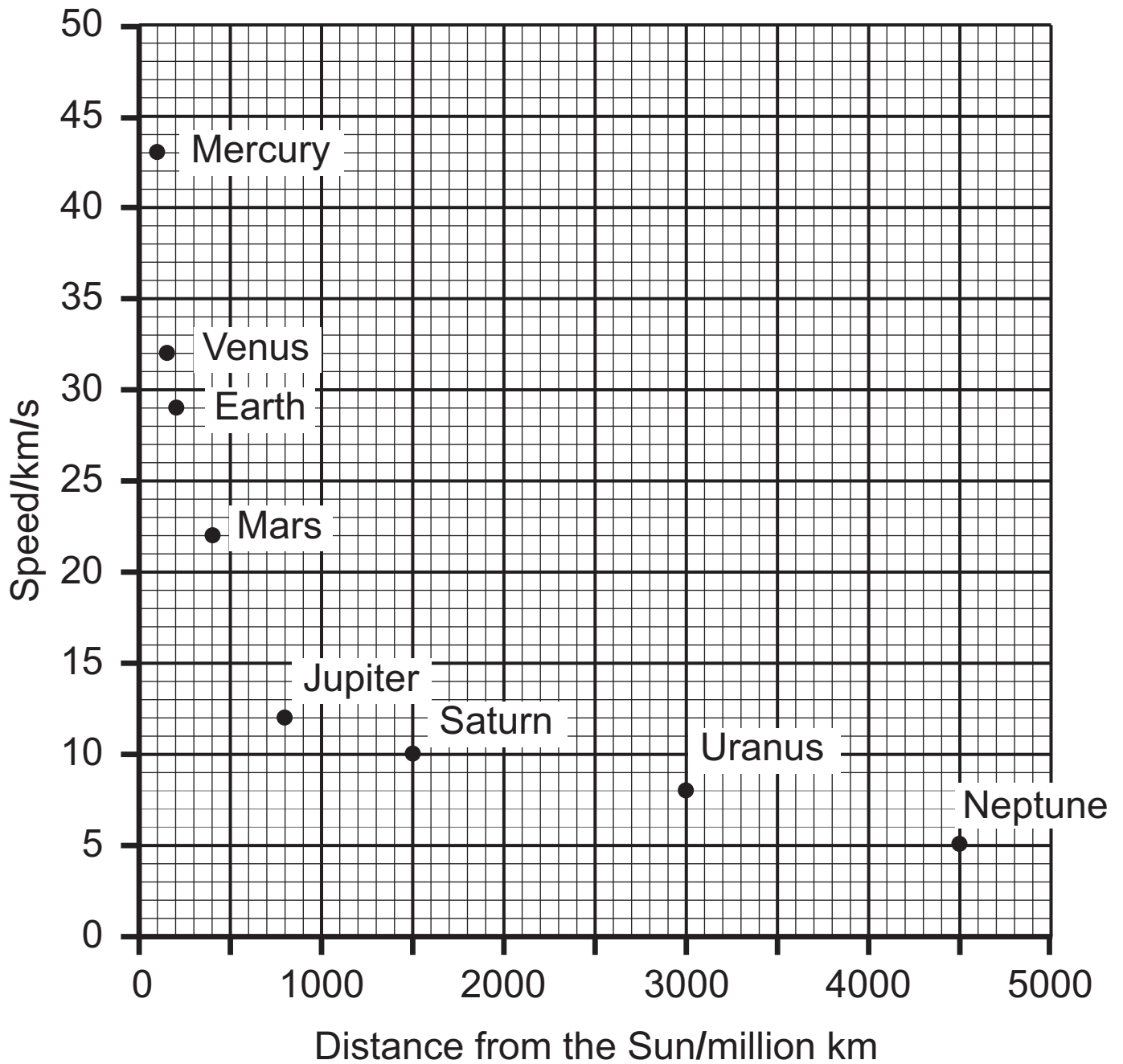
(Show your working out.)

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

**BLANK PAGE**

**(Questions continue overleaf)**

- 7 (a) The graph below shows how the (orbital) speed of a planet relates to its approximate distance from the Sun.



- (i) Use the graph to find how far Venus is from the Sun. [1]

Answer \_\_\_\_\_ million km

(ii) Using information from the graph on page 20, compare the speed and distance from the Sun of Mercury and Neptune. [3]

---

---

---

---

---

---

---

(b) This information describes the Heliocentric model of the Solar System.

Give **two** differences between this model and the Geocentric model. [2]

1. \_\_\_\_\_

---

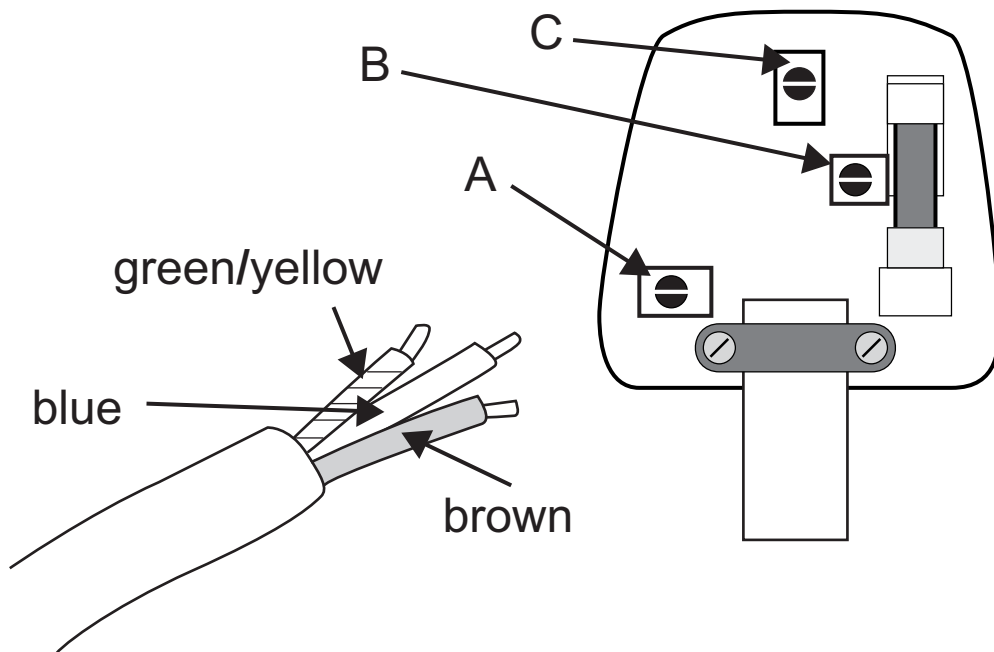
2. \_\_\_\_\_

---

---

8 The picture below shows a 3-pin plug about to be wired.

The colours of each wire and the plug pins are labelled.



Describe fully how the plug should be wired correctly, naming and explaining one safety feature found in the plug. [6]

Your answer should:

- use the labels provided
- name the labelled parts.



## SOURCES

Pg 2, Q1(a) Sources: Kettle photo, © iStock / Thinkstock  
Microphone photo, © Ryan McVay / Photodisc / Thinkstock  
Loudspeaker photo, © iStock / Thinkstock  
Television photo, © iStock / Thinkstock

Pg 7, Q3, Pie chart energy sources, © Crown copyright

Pg 12, Q4(b), Mobile phones transmitting signals - diagram, © CCEA GCSE Single Award in Science Foundation Tier by Alyn McFarland, Colin Murphy & James Napier, published by Hodder Education, 2009. Reproduced by permission of Hodder Education

Pg 17, Q6(c), Device used to measure distance, © Victor De Schwanberg / Science Photo Library

Pg 22, Q8, Plug diagram, Source: Principal Examiner

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
<b>Total Marks</b>	

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.