Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2018–2019

Single Award Science: Physics

Unit 3
Foundation Tier

ML

[GSA31]

FRIDAY 1 MARCH 2019, MORNING

TIME

1 hour, plus your additional time allowance.

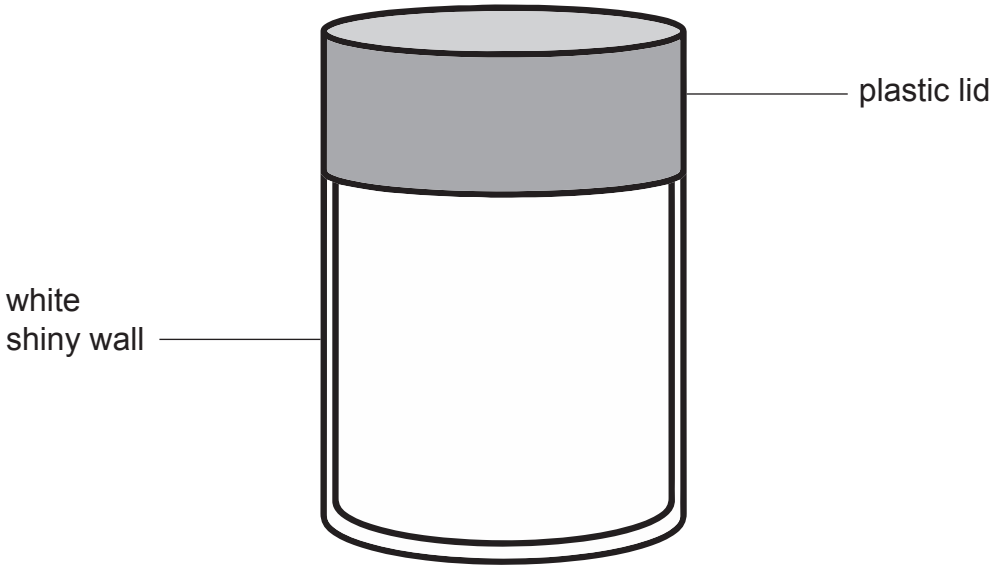
INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
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.
Answer **all nine** 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 **9(b)**.

1 Look at the diagram below. It shows a container used to keep a hot drink warm.



Source: Principal Examiner

(a) Complete the following sentences. They tell us how the container helps to keep a hot drink warm.

Choose from:

insulator **radiator** **conductor**

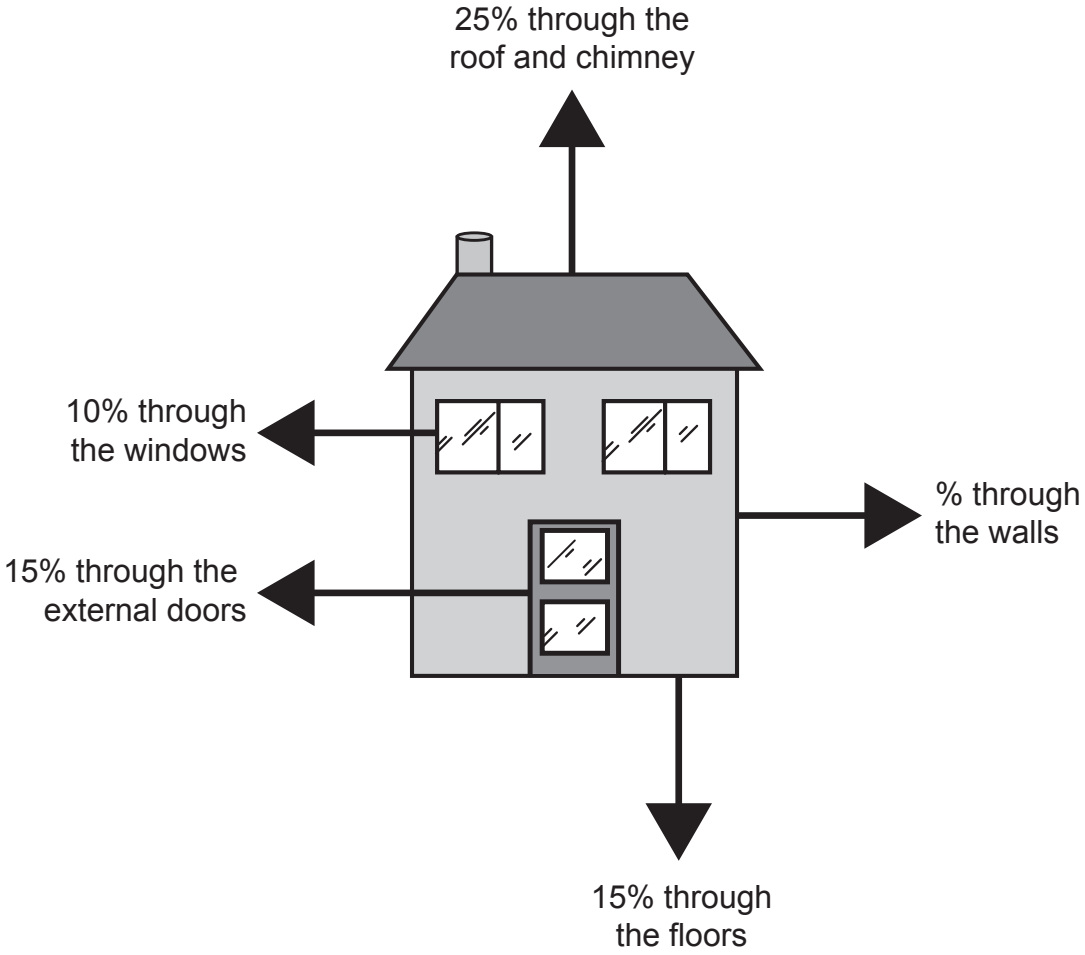
The plastic lid reduces heat loss because it is a good

_____ of heat.

The white shiny wall helps to reduce heat loss because it is a poor

_____ of heat. [2]

(b) Look at the diagram below. It shows the percentage of heat lost through different parts of a house with no insulation.



Source: Principal Examiner

(i) Calculate the percentage of heat lost through the walls.

(Show your working out.)

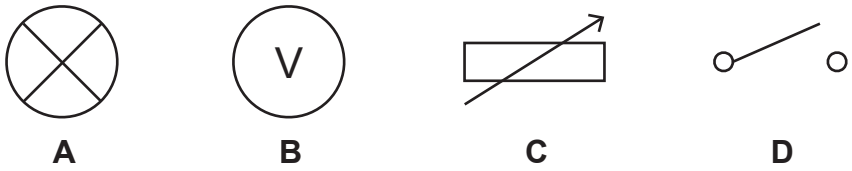
Answer _____ % [2]

(ii) Write about **one** way that the heat lost through the windows of this house could be reduced.

_____ [1]

[Turn over

2 Look at the symbols below. They are four standard electrical symbols.



(a) Which symbol (**A**, **B**, **C** or **D**) is used to show:

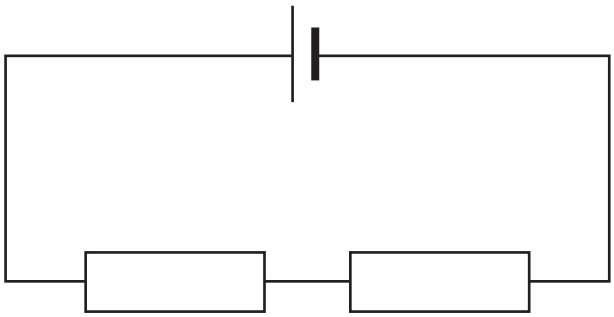
(i) a bulb? _____ [1]

(ii) a switch? _____ [1]

(iii) Write down **one** reason why standard symbols are used when we draw electrical circuits.

_____ [1]

Look at the diagram below. It is a simple electrical circuit with two resistors.



(b) Complete the following sentence to describe this circuit.

The resistors are connected in _____ with each other. [1]

(c) (i) Resistance can be found by measuring the voltage and current in a circuit. The resistance is then calculated by using these values in the correct equation.

Circle the correct equation below.

$$\textbf{resistance} = \frac{\textbf{voltage}}{\textbf{current}}$$

$$\textbf{resistance} = \textbf{voltage} \times \textbf{current}$$

$$\textbf{resistance} = \frac{\textbf{current}}{\textbf{voltage}}$$

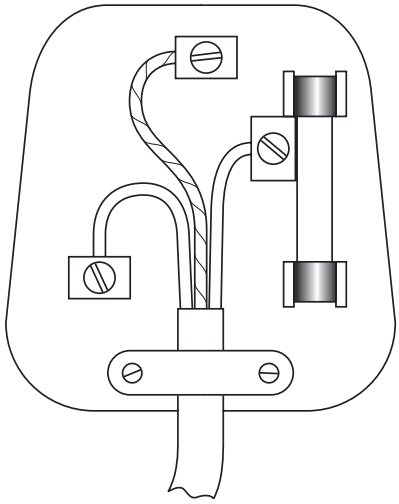
[1]

(ii) Name the unit of resistance.

_____ [1]

[Turn over

3 Look at the diagram below. It shows a three-pin plug.



Source: Principal Examiner

(a) Look at the descriptions below of some parts of the three-pin plug.

Draw a line from each description to **one** named part.

Description	Name
holds the wires securely in place	earth wire
protects the user from electric shock	fuse
protects the appliance from high currents	cable grip

[2]

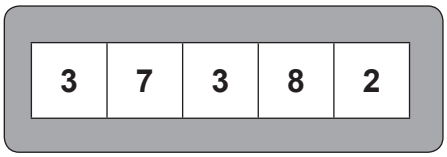
(b) A lamp using a current of 1.5 A is connected to the mains.
What size of fuse should be used?

Put a circle around the correct answer.

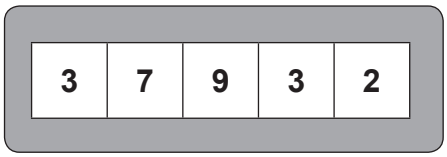
1 A **3 A** **5 A** **13 A**

[1]

(c) Look at the two diagrams below. They show electricity meter readings taken at the start and end of January.



start



end

(i) Calculate the number of units of electricity used during January.

Answer _____ units [1]

The electricity company charges 20p per unit of electricity.

(ii) Calculate how much will be charged for the units of electricity used during January.

Answer _____ [1]

[Turn over

4 **(a)** Look at the table below. It shows the electromagnetic spectrum. One part is missing.

Radio waves	Microwaves	Infrared	Visible light	Ultraviolet		Gamma rays

(i) Name the electromagnetic wave missing from the table.

_____ [1]

(ii) Mobile phones use some of these waves to carry signals.

Name the electromagnetic wave used to:

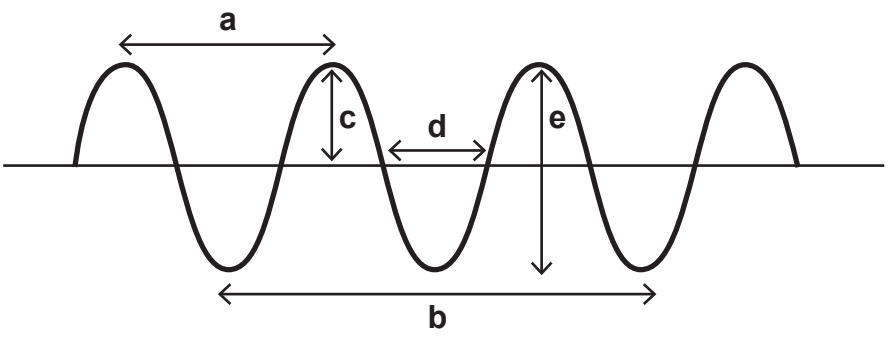
1. carry images from the screen to the user's eyes.

_____ [1]

2. carry information from one mobile phone to another.

_____ [1]

(b) The diagram below shows a wave.



(i) Which letter (**a**, **b**, **c, d** or **e**) represents the amplitude of the wave?

_____ [1]

(ii) Which letter (**a**, **b**, **c, d** or **e**) represents the wavelength of the wave?

_____ [1]

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(Questions continue overleaf)

5 **(a)** Look at the table below. It gives information about the gas planets in our Solar System.

Gas planet	Distance from the Sun/ million km	Time to orbit Sun/ year	Average surface temperature/ °C	Gravity/ N/kg
Jupiter	778	11.86	–150	26.0
Saturn	1427	29	–170	11.1
Uranus	2870	84	–200	10.7
	4497	164.8	–220	14.1

(i) There is one planet missing.

Write down the name of the missing gas planet in the box. [1]

(ii) Explain the **two** trends shown by the information in the table.

1. _____

_____

2. _____

_____ [2]

(iii) On which gas planet would your weight be the greatest?

_____ [1]

(iv) NASA has sent space probes to these planets. Write down one reason why the probes would **not** be able to land on the surface of these planets.

_____

_____ [1]

(b) A planet has been discovered orbiting a star, similar to our Sun, at a distance of **2000 million km**.

Use the information in the table to calculate:

(i) the time taken for this planet to orbit its star.

_____ years [1]

(ii) the average surface temperature of this planet.

_____ °C [1]

(c) The Solar System contains the Sun, planets, asteroids and **other features**.

(i) Name **one other feature** of the Solar System.

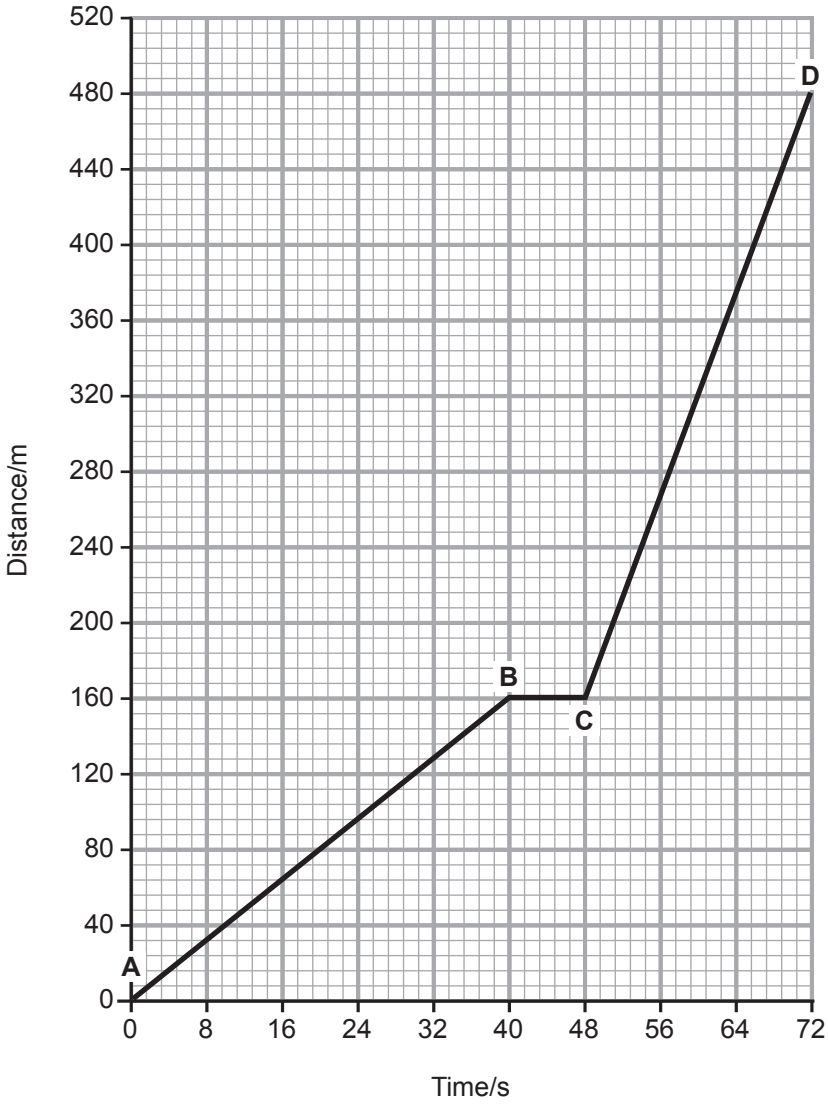
_____ [1]

(ii) The Earth has been struck by asteroids in the past. Write about the evidence for this.

_____ [1]

[Turn over

6 Look at the graph below. It shows a distance-time graph for a car.



(a) How far did the car travel in the first 48 s?

Answer _____ m [1]

(b) Use the equation:

$$\textbf{average speed} = \frac{\textbf{distance travelled}}{\textbf{time taken}}$$

to calculate the average speed of the car for the total journey from **A** to **D**.

(Show your working out.)

Answer _____ m/s [2]

(c) When is the car travelling the fastest?

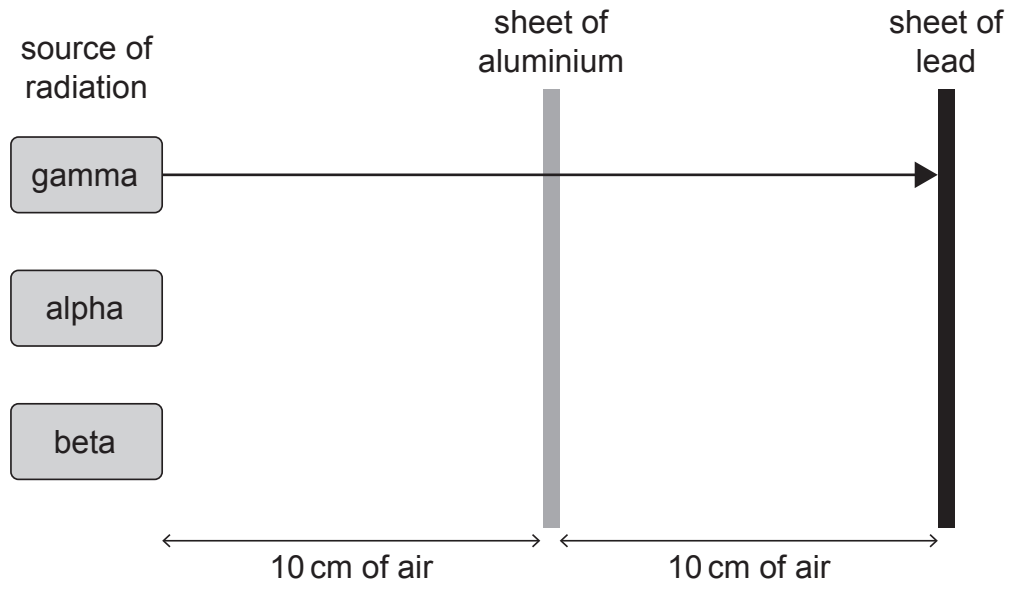
Circle the correct answer.

A to B : **B to C** : **C to D**

[1]

[Turn over

7 Look at the diagram below. It shows how gamma radiation can penetrate air and aluminium, but is stopped by lead.



(a) Complete the diagram using arrows, to show the penetration you would expect for alpha and beta radiation. [2]

(b) Explain fully why some elements, such as radon, are radioactive.

_____

_____

_____ [3]

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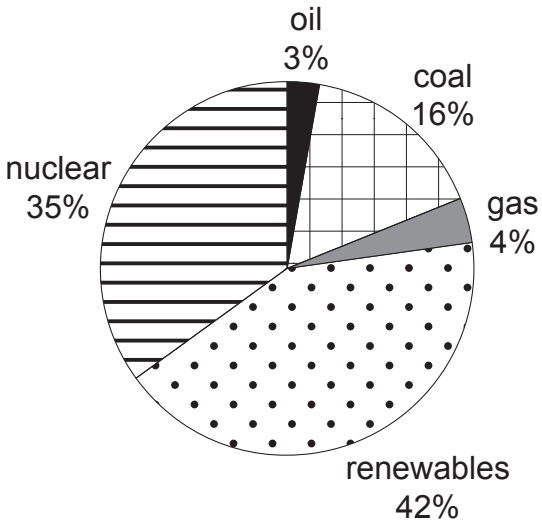
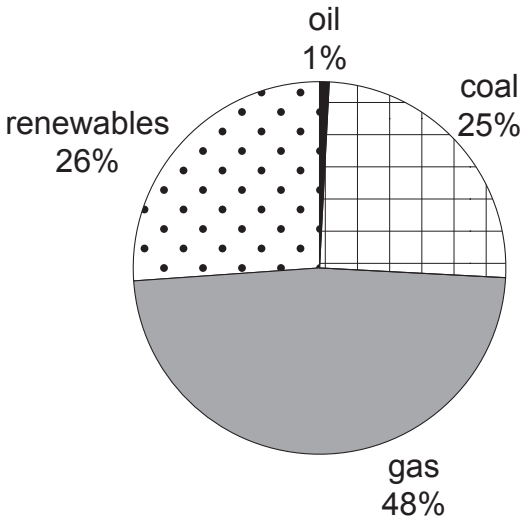
(Questions continue overleaf)

8 Look at the pie charts below. They show the energy sources used in Scotland and Northern Ireland to generate electricity.



Scotland



Northern Ireland

(a) Name **one** energy source that is used **more** in Northern Ireland than Scotland.

_____ [1]

(b) The nuclear energy source used in Scotland is non-renewable.

(i) What is meant by the term **non-renewable**?

_____

_____ [1]

(ii) Name **one** non-renewable nuclear fuel.

_____ [1]

(iii) Name the process that releases energy from this nuclear fuel.

_____ [1]

(c) Look at the pie chart to calculate the percentage of fossil fuels used in Scotland.

Answer _____ % [1]

(d) The table below shows the percentage of electricity generated in Northern Ireland using renewable resources.

Year	Electricity generated/%
2012	15.9
2013	19.5
2014	21.9
2015	26.0

(i) Write about the trend shown by this information.

_____

_____ [1]

(ii) Name **one** renewable energy source.

_____ [1]

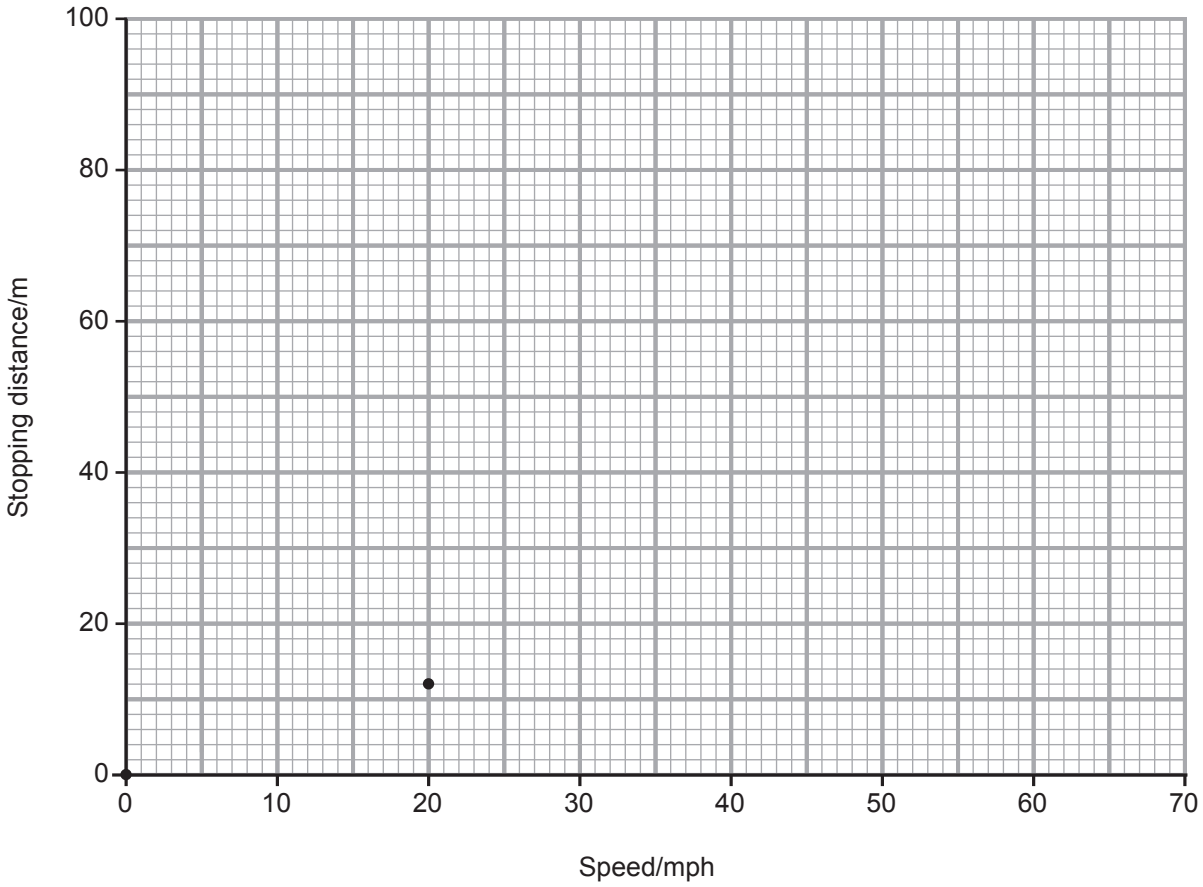
[Turn over

9 **(a)** Look at this table carefully. It shows the braking distance of a car and the thinking distance of a driver.

Speed/ mph	Thinking distance/ m	Braking distance/ m	Stopping distance/ m
0	0	0	0
20	6	6	12
30	9	14	23
40	12	24	36
50	15	38	53
60	18	55	73
70			96

(i) Complete the table to give the thinking distance and braking distance at a speed of 70 mph. [2]

(ii) On the grid below, plot and draw a line graph to show how **stopping distance** changes with speed.
The first two points have been plotted for you.



[3]

(iii) Use your graph to find the stopping distance at 45 mph.

Answer _____ m [1]

(iv) These stopping distances are for dry roads. On the same grid, draw another line to show the stopping distances for **wet** roads. [2]

[Turn over

(b) The thinking distance depends on a driver's reactions.
Describe an experiment using a metre stick or ruler, that can be used to compare the reactions of two people.

Your answer should include:

- how to make the results reliable
- **two** factors that would slow a driver's reactions.

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

[6]

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For Examiner's use only	
Question Number	Marks
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Examiner Number