Rewarding Learning

General Certificate of Secondary Education

Centre Number

Candidate Number

Single Award Science: Physics

Unit 3

Foundation Tier

[GSA31]

GSA31

Assessment

TIME

1 hour.

Assessment Level of Control:

Tick the relevant box (✓)

Controlled Conditions	
Other	

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 ten** questions.

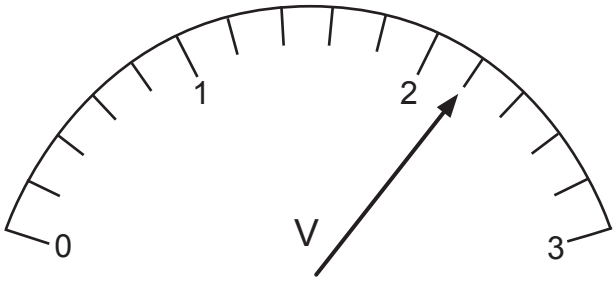
INFORMATION FOR CANDIDATES

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(a)**.

12796

32GSA3101

1 **(a)** The diagram below shows a meter used to measure voltage across a component in an electrical circuit.



Source: Principal Examiner

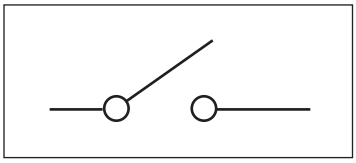
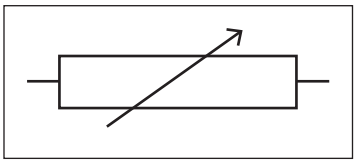
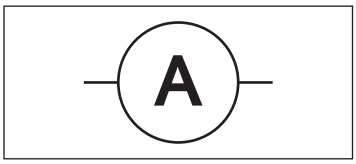
(i) What is the reading on this meter?

_____ V [1]

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

_____ [1]

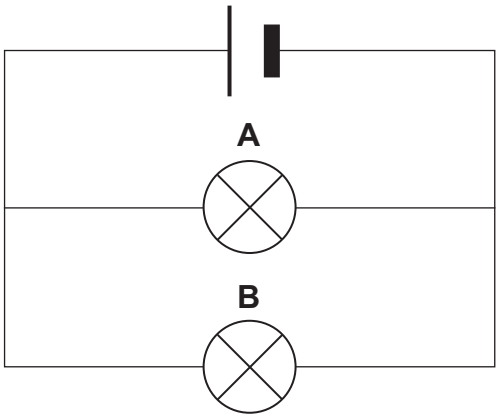
(b) Given below are the names and symbols of some electrical components. Using lines, match each component to its correct symbol.

Electrical component	Symbol
variable resistor	
switch	
	

Source: Principal Examiner

[2]

Shown below is an electrical circuit containing two bulbs, **A** and **B**.



Source: Principal Examiner

(c) Complete the following sentences about the circuit.

Choose from:

series : **stay lit** : **short**

parallel : **stop working**

The bulbs are connected in _____ .

If bulb **B** stops working, bulb **A** will _____ . [2]

[Turn over

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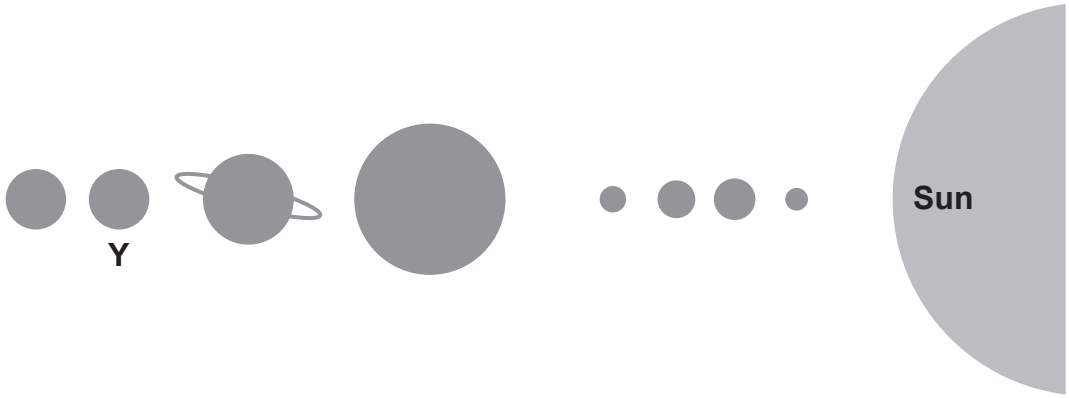
2 **(a)** The diagram below represents our Solar System.



Source: Principal Examiner

(i) Name the planet labelled **Y**.

_____ [1]

(ii) Complete the following sentence.

The Sun produces light and heat and is an example of a _____.
[1]

[Turn over

(b) The table below gives information about some objects in our Solar System.

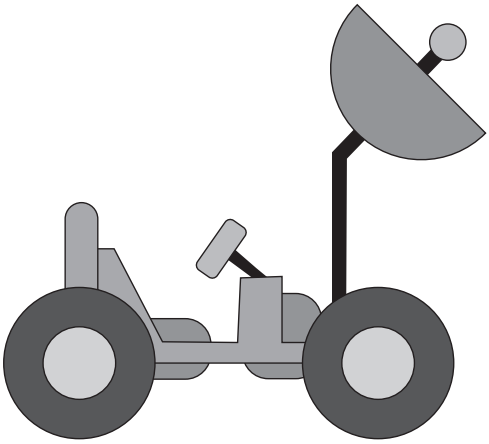
Object	Diameter/km	Gravity/N/kg
Moon	3475	1.6
Mercury	4879	3.7
Venus	12 104	8.9
Earth	12 756	9.8
Neptune	49 528	11.0
Jupiter	142 984	23.1

(i) Complete the following sentence to give a trend shown by this information.

As the diameter _____

_____ [1]

The diagram below shows a buggy used on the Moon.



Source: Principal Examiner

(ii) How will the weight of the buggy on the Moon compare with its weight on Earth?

Circle your answer.

less than on Earth : **the same as on Earth** : **more than on Earth**

[1]

(iii) What is the unit of weight?

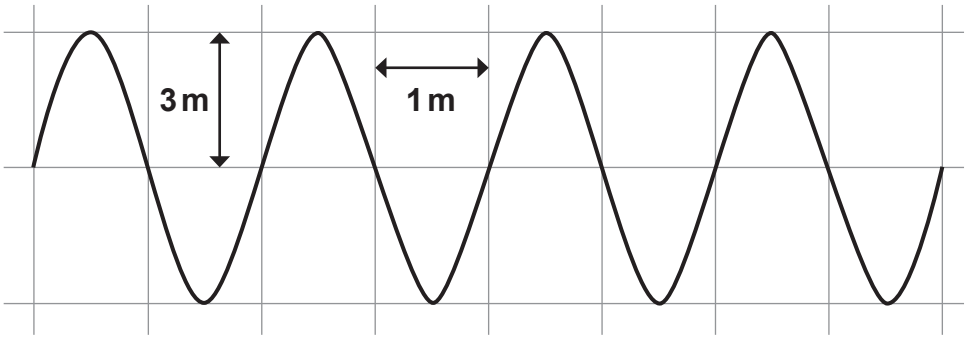
Choose from:

newton **kilogram** **joule**

_____ [1]

[Turn over

3 **(a)** The diagram below represents a wave.



Source: Principal Examiner

(i) What is the wavelength of this wave?

_____ m [1]

(ii) What is the amplitude of this wave?

_____ m [1]

(iii) Complete the following sentence.

All waves carry _____ from one point to another. [1]

(b) Use the equation:

$$\textbf{frequency} = \frac{\textbf{wave speed}}{\textbf{wavelength}}$$

to calculate the frequency of a wave that has a wavelength of 2 m and a speed of 300 m/s.

(Show your working out.)

_____ Hz [2]

[Turn over

4 **(a)** Shown below is part of the electromagnetic spectrum.

radio waves			**visible light**		**X-rays**	**gamma rays**

Source: Principal Examiner

(i) Complete the spectrum above.

Choose from:

infrared **ultraviolet** **microwaves**

[2]

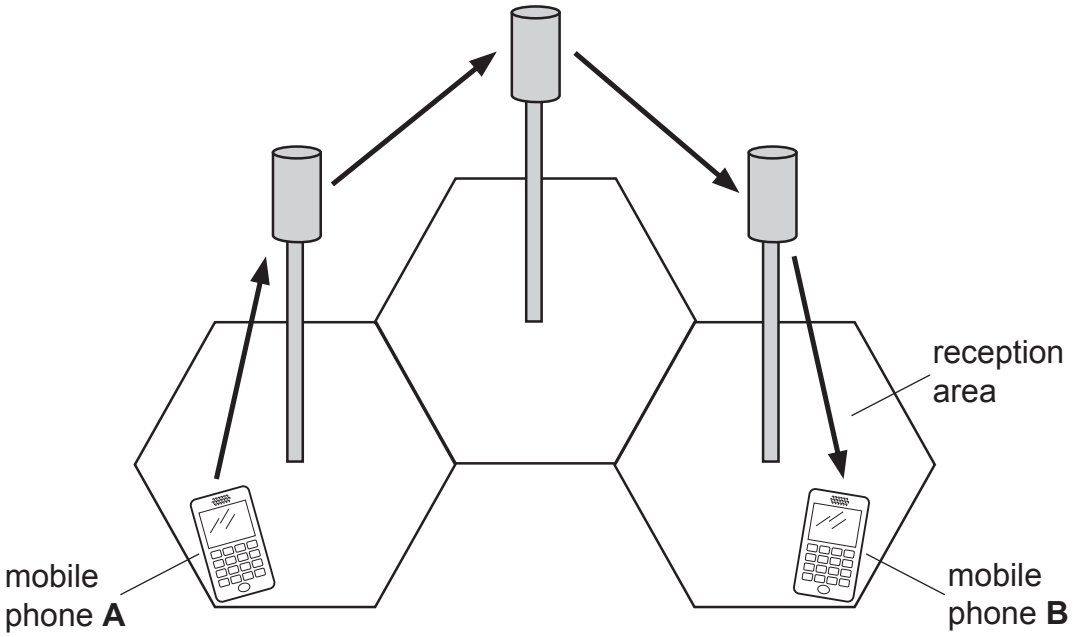
(ii) Give **one** property that is the same for all electromagnetic waves.

_____ [1]

(iii) Give **one** property that is different for all electromagnetic waves.

_____ [1]

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



Source: Principal Examiner

(b) Explain fully how a signal gets from phone **A** to phone **B**

_____

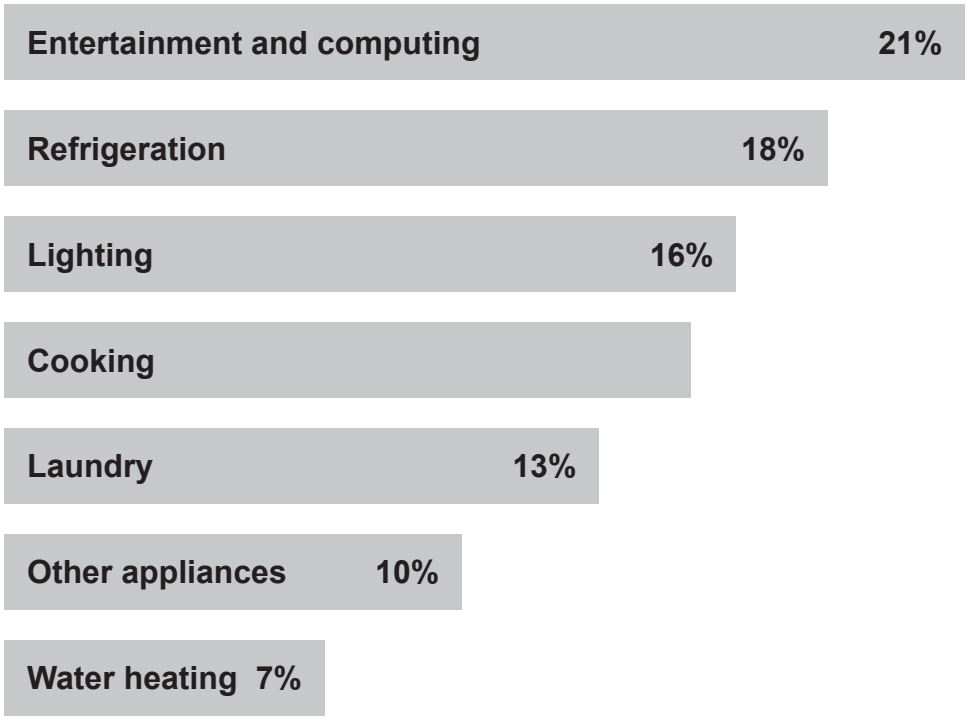
_____

_____

_____ [2]

[Turn over

5 The information below shows how an average household uses electricity in one year.



Source: Principal Examiner

(a) Calculate the percentage of electricity that is used for cooking in one year.

(Show your working out.)

_____ % [2]

(b) The table below shows the percentage of electricity generated using fossil fuels in Northern Ireland in recent years.

Year	Percentage electricity generated using fossil fuels/ %
2013	86
2014	81
2015	80
2016	75
2017	74
2018	64
2019	62

(i) State the trend shown by this information.

_____

_____ [1]

(ii) Fossil fuels are non-renewable sources of energy.

Tick (✓) one statement, in the table below, that is true about **non-renewable** sources of energy.

Statement	True
will not run out	
take millions of years to form	
are replenished in a human lifetime	

[1]

[Turn over

The table below shows information about generating electricity from different sources.

	Fossil fuel	**Wind**	**Tidal**
electricity output/ MW	1600	24	12
lifespan/ years	30	20	15
generating cost per unit/ p	3.33	5.35	6.63

(c) The Government wants to increase the use of alternative renewable sources to generate electricity.
Use this information to describe the **disadvantages** of this approach.

_____

_____

_____

_____ [2]

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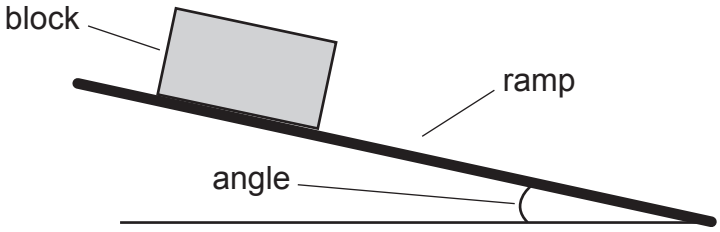
(Questions continue overleaf)

6 **(a)** The apparatus below was used to investigate how different materials affect friction.



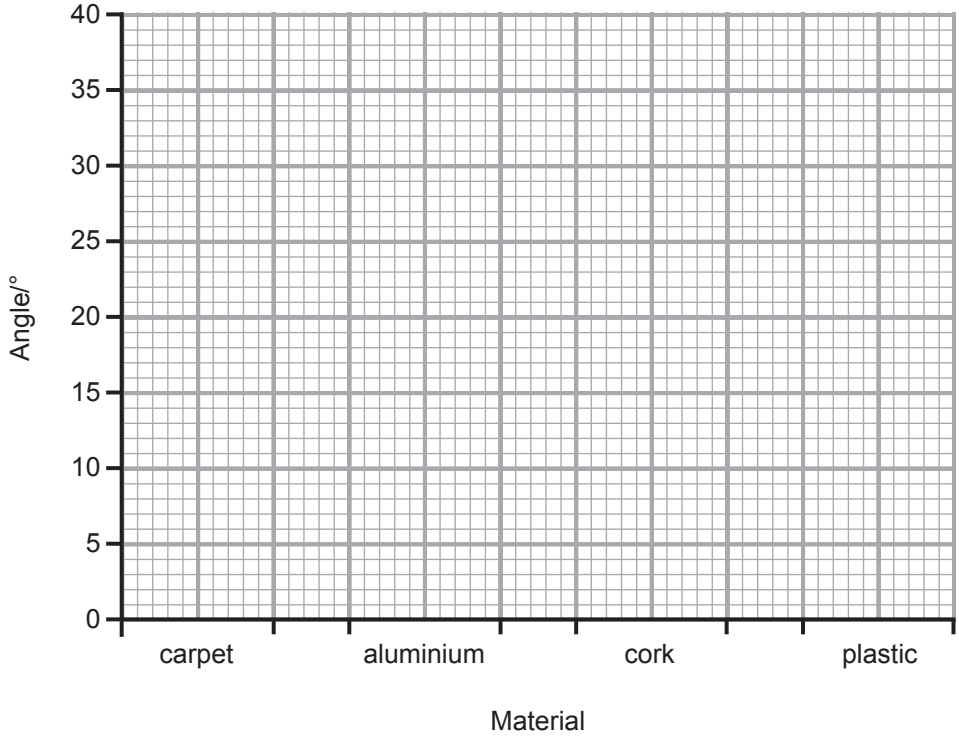
Source: Principal Examiner

The block was covered in four different materials and the angle increased until the block started to slide.

The results are shown below.

Material	**Angle/°**
carpet	35
aluminium	15
cork	28
plastic	20

(i) On the grid below draw a bar chart of these results.



[2]

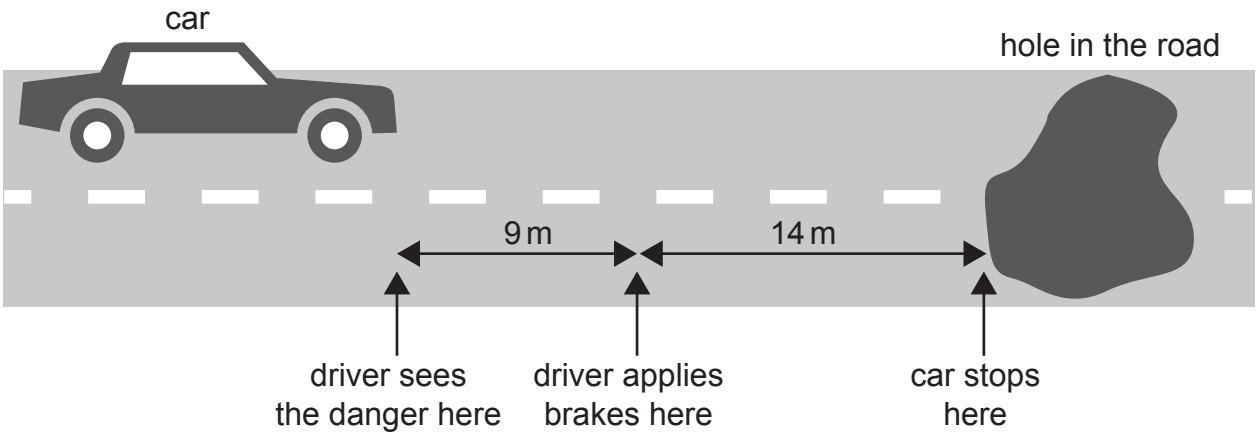
(ii) Name the material which produces the **least** friction.

_____ [1]

[Turn over

A driver travelling at 30 mph in his car sees danger in the road ahead and needs to stop.

The diagram below shows the distance the car takes to stop.



Source: Principal Examiner

(b) Use the diagram and your knowledge to complete the following sentences.

The thinking distance is _____ m.

The stopping distance is _____ m. [2]

Two factors which might **increase** braking and stopping distances are ice on the road or the tiredness of the driver.

(c) Complete the table below using ticks (✓) to show if each of the distances is increased by one or both of these factors.

	Ice on the road	**Tiredness of the driver**
stopping distance		
braking distance		

[2]

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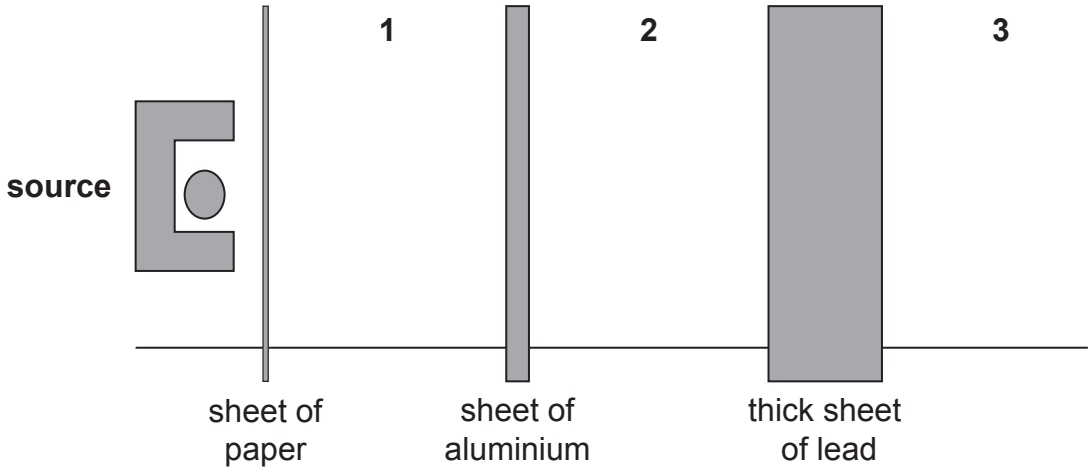
(Questions continue overleaf)

7 **(a)** The apparatus shown below was used to investigate how different materials stop radiation.



Source: Principal Examiner

Detectors were used to measure the radiation, including background radiation at the source and at positions **1**, **2** and **3**.

The results are shown below.

Position	**Activity/cpm**
source	2800
1	2200
2	1300
3	22

The source gives out alpha, beta and gamma radiation.

(i) Which types of radiation were detected at position **1**?

Circle your answer.

alpha and beta : **beta and gamma** : **alpha and gamma**

[1]

(ii) Aluminium stops beta radiation.

Use this information to calculate how much of the source activity is due to beta radiation.

_____ cpm [1]

(iii) Suggest a value for background radiation.

_____ cpm [1]

(b) Complete the following sentence.

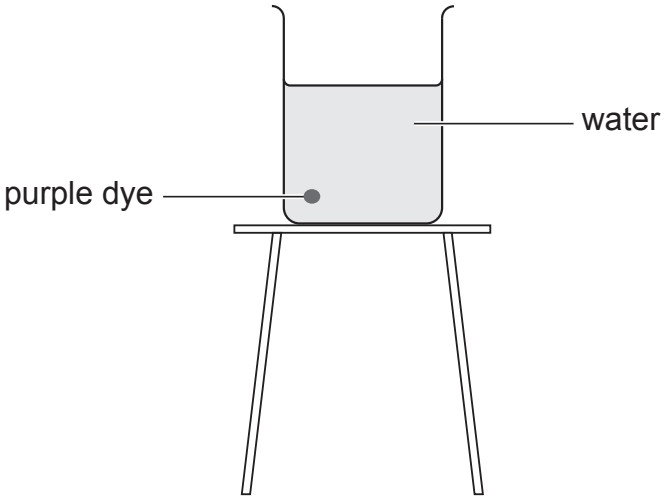
A radioactive nucleus has an unstable combination of neutrons

and _____ . [1]

(c) Give **one** use for radioactive materials in medicine.

_____ [1]

8 The diagram below shows some of the apparatus which can be used to show how heat moves through a liquid.



Source: Principal Examiner

(a) Describe fully how a teacher would use this apparatus to show convection currents in water.

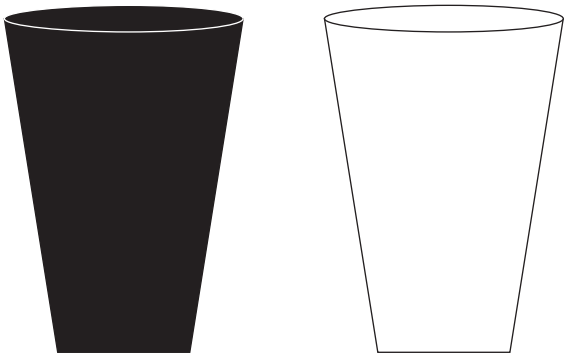
_____

_____

_____ [2]

(b) An investigation was carried out with two cups made from the same material but different colours.

Each cup was filled with an equal volume of boiling water and left for 5 minutes.



black
(dark matt)

white
(light shiny)

Source: Principal Examiner

(i) Complete the following sentence.

After 5 minutes the temperature of water in the black cup

will be _____ than the temperature of the water in the

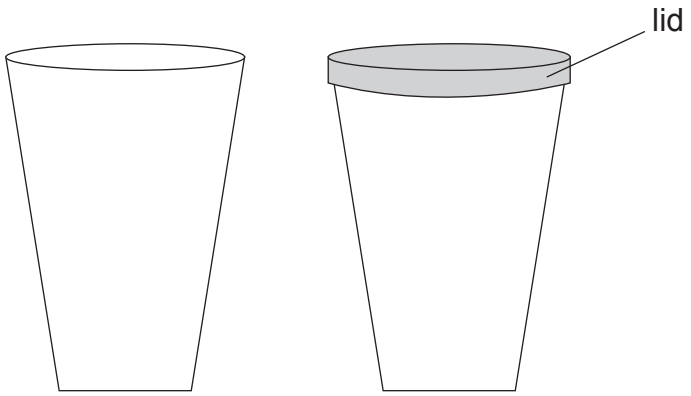
white cup. [1]

(ii) Give **one** thing that was done to make this a fair test.

_____ [1]

Another investigation used two white cups made from the same material but one had a lid.

Equal volumes of boiling water were put in each cup.



A
white

B
white with lid

Source: Principal Examiner

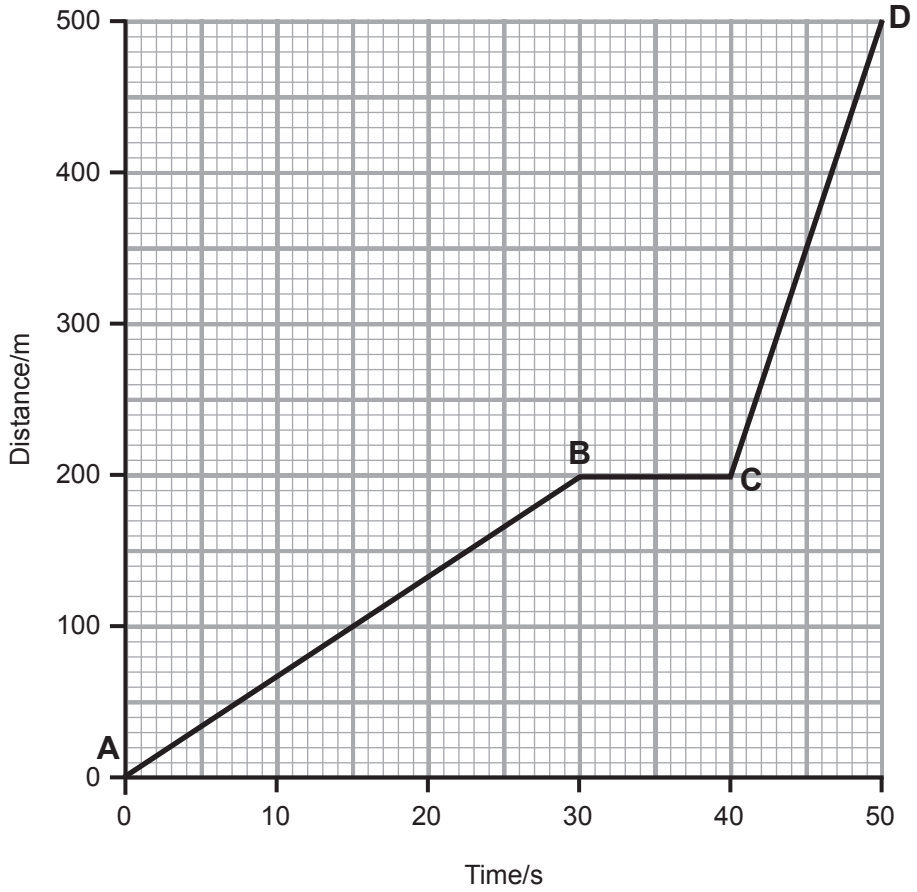
(c) Complete the following sentence.

After 5 minutes the temperature of water in cup **A** will be

_____ than the temperature of the water in cup **B**. [1]

[Turn over

9 Shown below is the distance-time graph for a motorbike travelling along a flat road.



(a) Describe the journey of the motorbike.

Your answer should include:

- a full description of each section, **A**–**B**, **B**–**C** and **C**–**D** including values from the graph; and
- a comparison of section **A**–**B** with section **C**–**D**.

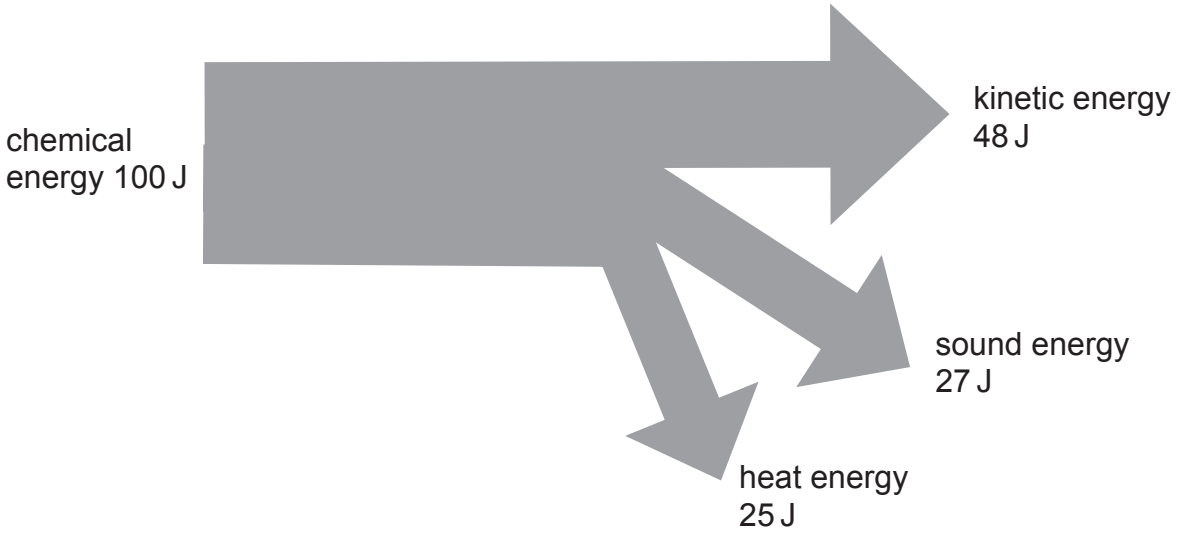
In this question you will be assessed on your written communication skills including the use of specialist scientific terms.

12796

[6]

[Turn over

(b) The diagram below shows how 100 J of chemical energy is used by a motorbike.



Source: Principal Examiner

(i) Use the equation:

$$\textbf{efficiency} = \frac{\textbf{useful energy out}}{\textbf{total energy in}}$$

to calculate the efficiency of the motorbike.

(Show your working out.)

_____ [2]

(ii) State the Principle of Conservation of Energy.

_____

_____

_____ [2]

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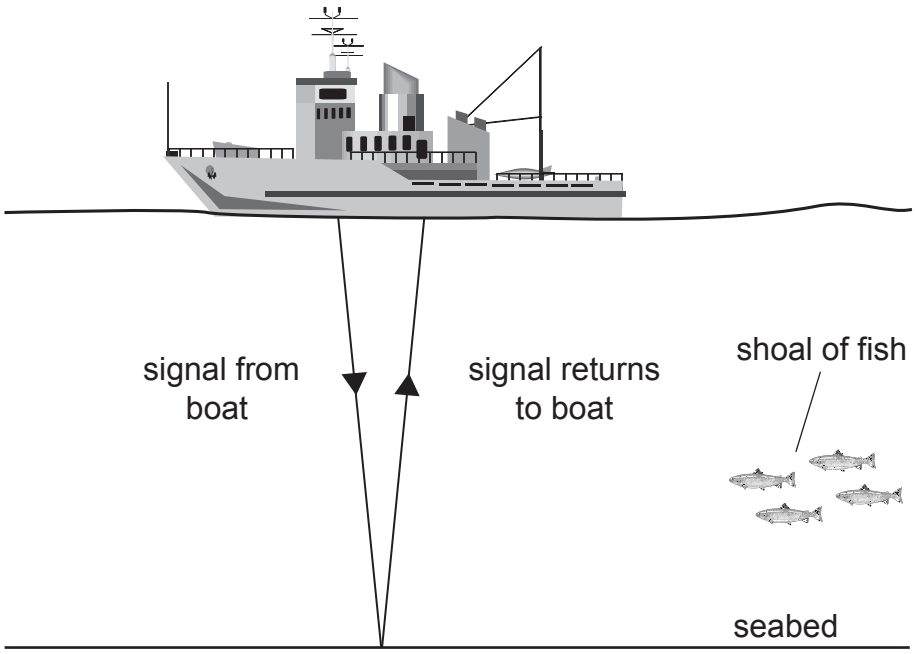
(Questions continue overleaf)

10 **(a)** The diagram below shows a fishing boat using ultrasound to find fish.



Source: Principal Examiner

(i) What is meant by the term **ultrasound**?

_____

_____ [2]

(ii) How will the fishermen know when the shoal of fish is under the boat?

_____

_____ [1]

The table below shows the speed of sound in different materials at different temperatures.

Material	Temperature/ °C	Speed of Sound/ m/s
air	0	331
	20	343
water	0	1410
	20	1480
steel	0	5200
	20	5960

(b) Give **two** conclusions that can be made from this information.

1 _____

_____

2 _____

_____ [2]

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For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
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8	
9	
10	
Total Marks	

Examiner Number

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