Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2019–2020

Single Award Science: Physics

Unit 3

Foundation Tier

[GSA31]

GSA31

FRIDAY 8 NOVEMBER 2019, MORNING

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

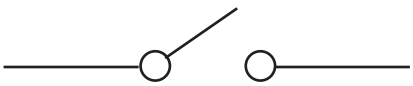
Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer the questions in the spaces provided.
Do not write outside the boxed area on each page or on blank pages.
Complete in black ink only. **Do not write with a gel pen.**
Answer **all nine** questions.

INFORMATION FOR CANDIDATES

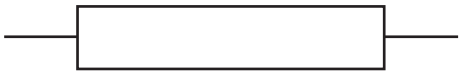
The total mark for this paper is 60.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in Question **9(a)**.

12697

1 **(a)** The diagrams below show two electrical symbols (**X** and **Y**).



X



Y

Name the component represented by these symbols.

X _____

Y _____ [2]

(b) The diagrams below show cells in three different arrangements.

Each cell () provides 1.5 volts.

A

B

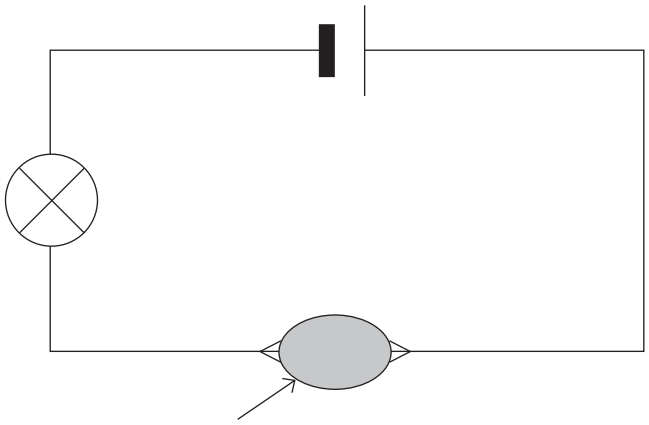
C

Which arrangement (**A**, **B** or **C**) will supply:

4.5 volts? _____

0 volts? _____ [2]

The circuit below can be used to test a material to find out if it conducts electricity.



(c) How will this circuit show that the material conducts electricity?

_____ [1]

(d) Complete the table by classifying the materials given below as electrical conductors or insulators.

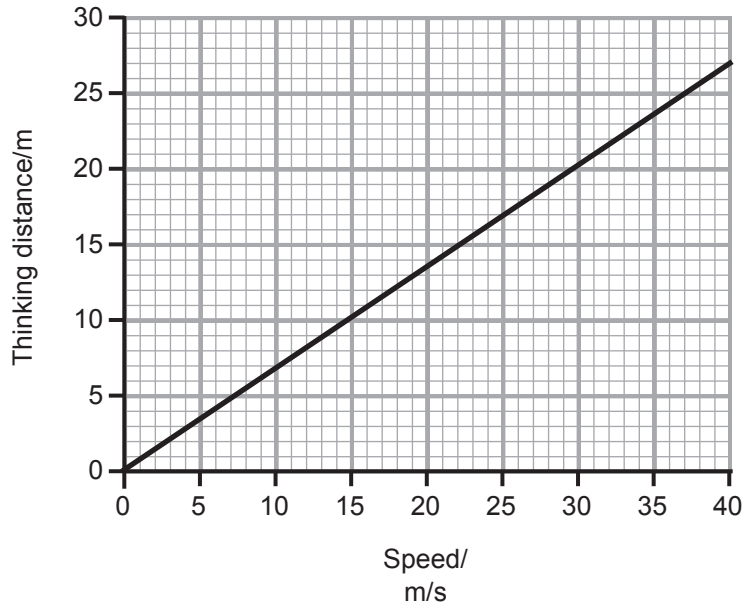
copper **wood** **glass** **aluminium**

Conductor	Insulator

[2]

[Turn over

2 The graph below shows the thinking distance at different speeds.



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

As the speed _____

_____ [1]

(b) **(i)** Use the graph to find the thinking distance at 25 m/s.

_____ m [1]

(ii) The braking distance at 25 m/s is 45 m.
Use this and your answer from part **(i)** to calculate the **stopping** distance at 25 m/s.

_____ m [1]

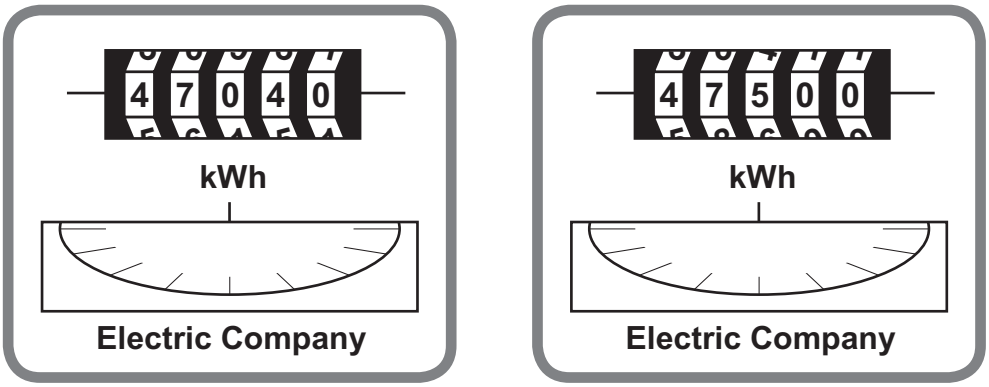
(c) Drinking alcohol slows the reactions of a driver.
Complete the table below, using ticks (✓), to show the effect of alcohol on thinking, braking and stopping distances. One has been done for you.

	Increased	**Decreased**	**No effect**
thinking distance			
braking distance			
stopping distance	✓		

[2]

[Turn over

3 **(a)** The diagram below shows a household electricity meter 3 months ago and now.



3 months ago **Now**

Source: Principal Examiner

(i) Calculate the number of units of electricity used during this 3 month period.

_____ kWh [1]

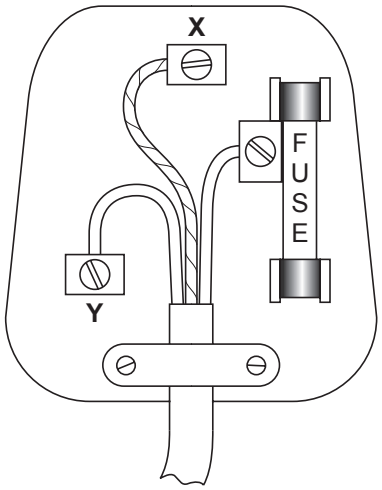
(ii) A unit of electricity (kWh) costs 20 pence.

Use your answer from part **(i)** to calculate the cost of the electricity used in this 3 month period.

(Show your working out.)

_____ [2]

(b) The diagram below shows a 3-pin plug.



Source: Principal Examiner

(i) Name the pins labelled **X** and **Y** in the diagram.

X _____

Y _____ [2]

(ii) What **colour** of wire should be connected to the fuse?

_____ [1]

(iii) Why is it important that the cover of the plug is made from an insulator such as plastic?

_____

_____ [1]

(iv) Complete the following sentence.

Choose from:

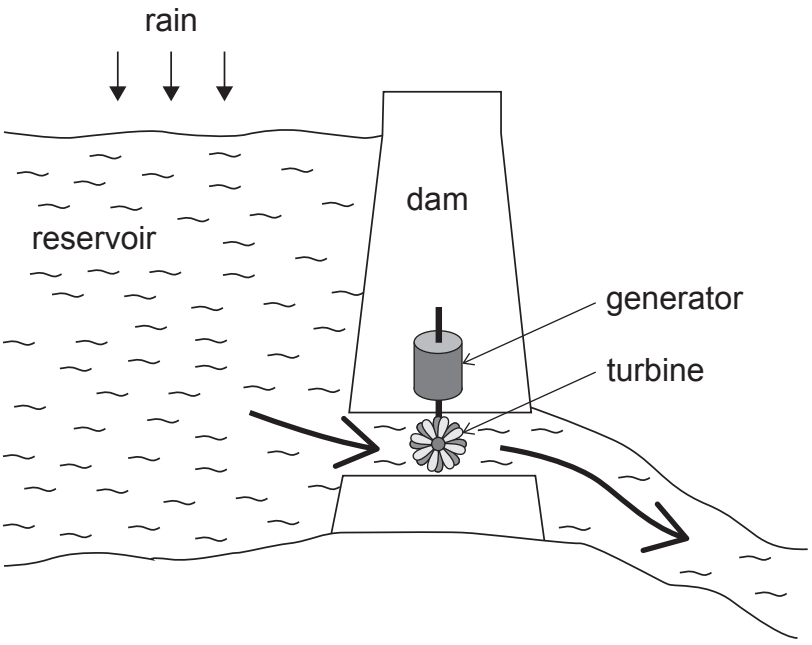
voltage **current** **heat**

A fuse is a safety feature of the plug that prevents too much

_____ going to an appliance. [1]

[Turn over

4 **(a)** The diagram below shows a hydroelectric power (HEP) station. HEP is a method of generating electricity that uses a renewable energy source.



Source: Principal Examiner

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

_____

_____ [1]

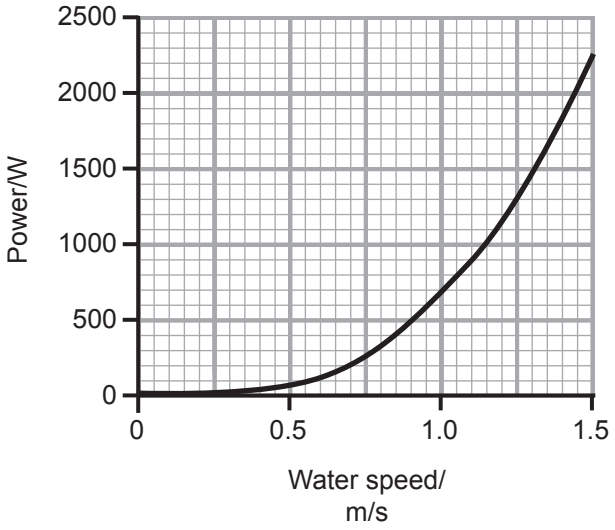
(ii) Name the renewable energy source used by this power station.

_____ [1]

(iii) Suggest **one** reason why hydroelectric power stations are usually built in mountainous areas.

_____ [1]

(b) The graph below shows how the water speed affects the amount of power generated by this HEP station.



(i) State the trend shown by this information.

_____

_____ [1]

(ii) Complete the sentence below to describe how a generator works.

Electricity is produced when a _____ is moved

inside a _____ of wire. [1]

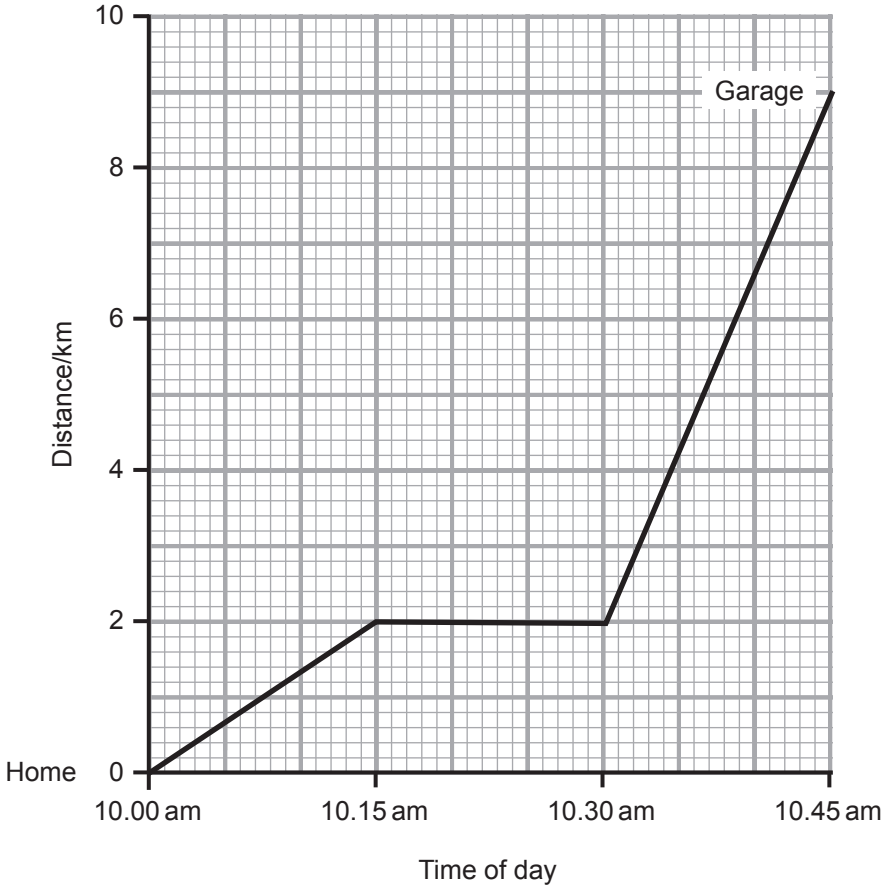
(c) Give **one** reason why the use of renewable energy sources has increased in recent years.

_____

_____ [1]

[Turn over

5 The distance-time graph below shows a journey taken by George from his home to collect his car from a garage. George left home at 10.00 am and arrived at the garage at 10.45 am.



(a) During which period of time was George travelling the fastest?
Circle the correct answer.

10.00 to 10.15 : **10.15 to 10.30** : **10.30 to 10.45**

[1]

(b) During which period of time was George stopped?
Circle the correct answer.

10.00 to 10.15 : **10.15 to 10.30** : **10.30 to 10.45**

[1]

(c) Use the equation:

$$\textbf{average speed} = \frac{\textbf{total distance}}{\textbf{total time}}$$

to calculate the average speed, in kilometres per minute (km/min), for George's journey from home to the garage.

(Show your working out.)

_____ km/min [2]

(d) On the way home George drove on a road that had speed bumps.

(i) Describe fully why speed bumps are used on some roads.

_____

_____

_____ [2]

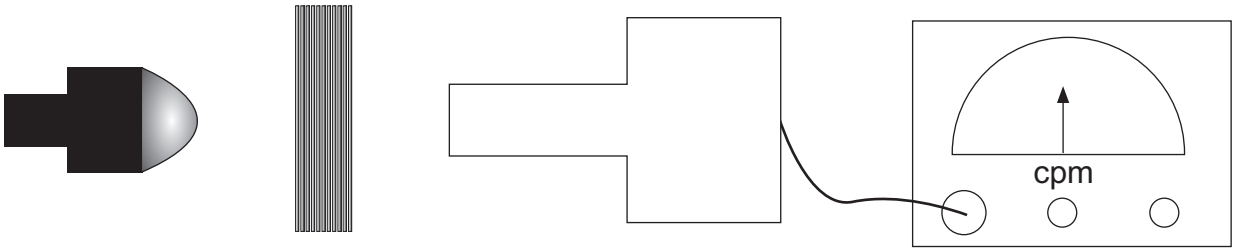
(ii) Suggest **one** disadvantage of using speed bumps.

_____

_____ [1]

[Turn over

6 The apparatus shown below was used to investigate how many sheets of aluminium are needed to stop beta radiation.



beta source | sheets of aluminium | detector | counter

Source: Principal Examiner

The results are given in the table below.

Number of sheets	Activity/cpm
1	1280
2	640
3	320
4	160
5	80
6	40
7	20
8	10
9	10
10	10

(a) Describe fully the conclusion shown by these results.

_____

_____

_____ [2]

(b) Background radiation is always all around us.

(i) Use the table to suggest a value for the activity of background radiation.

_____ cpm [1]

(ii) Name **one** source of background radiation.

_____ [1]

(c) Compared to the activity recorded for one sheet of aluminium (1280 cpm), how would the activity change if one sheet of **lead** was used?

Circle the answer.

increase : **decrease** : **no change**

[1]

[Turn over

7 **(a)** The table below gives some information about the first five planets in our Solar System. The planets are in order of increasing distance from the Sun.

Planet	Average surface temperature/°C	Orbital time/ years	Length of day	Orbital speed/ million km/year
Mercury	350	0.2	0.16 years	1560
Venus	480	0.6	0.67 years	1100
Earth	22	1.0	24 hr	945
Mars	–23	1.9	24 hr 37 min	754
Jupiter	–150	12.0	9 hr 50 min	413

Use information from the table to answer parts **(i)** and **(ii)** below.

(i) Give **one** factor that **increases** as the distance from the Sun increases.

_____ [1]

(ii) Give **one** factor that **decreases** as the distance from the Sun increases.

_____ [1]

(b) There are eight planets in our Solar System. Name the planet that is farthest from the Sun.

_____ [1]

(c) Name the force that keeps the planets in orbit around the Sun.

_____ [1]

(d) An object that orbits the Earth is called a satellite. Many are artificial because they have been put into orbit by humans.

(i) State **one** use of artificial satellites.

_____

_____ [1]

(ii) Name the Earth's only **natural** satellite.

_____ [1]

[Turn over

8 The photograph below shows a toy designed for a pet dog.

Image removed due to copyright

(a) The toy produces ultrasound that only the dog can hear.
What is meant by the term **ultrasound**?

_____

_____

_____ [2]

(b) Sound waves are longitudinal waves.

(i) Describe the movement of the particles in a longitudinal wave.

_____

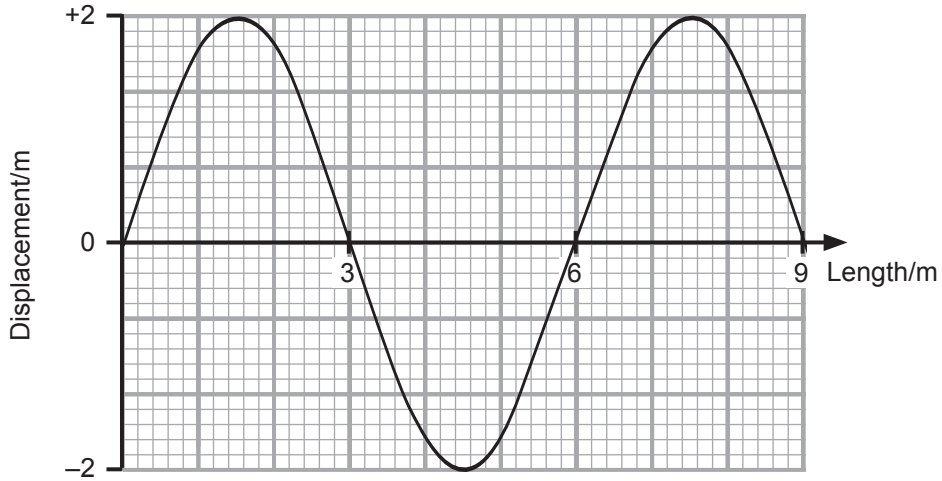
_____

_____ [2]

(ii) Light is an example of another type of wave. Name this other **type** of wave.

_____ [1]

(c) The diagram below represents a water wave.



(i) What is the amplitude of this wave?

_____ m [1]

(ii) What is the wavelength of this wave?

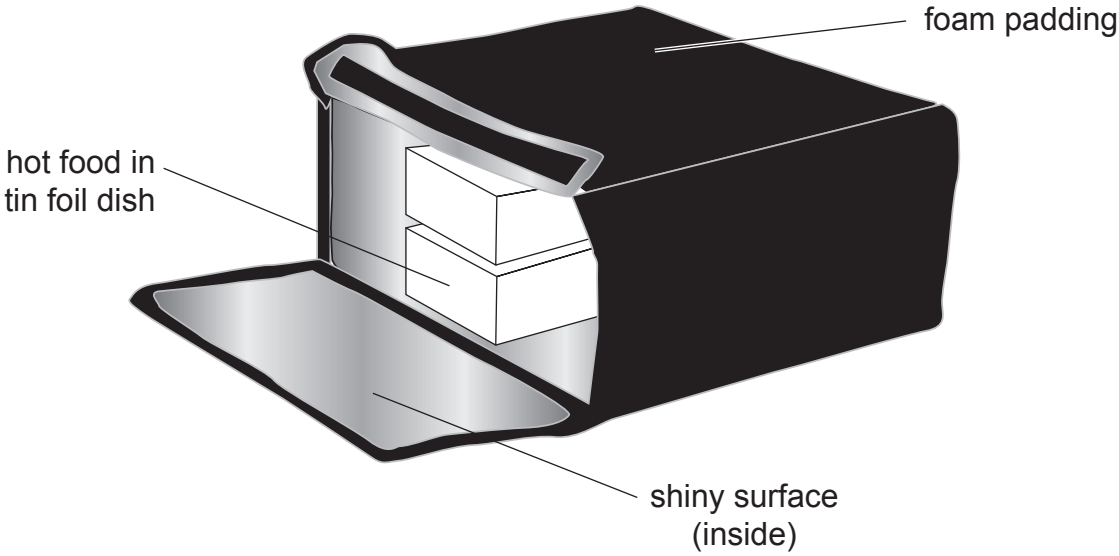
_____ m [1]

(d) Complete the following sentence.

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

[Turn over

9 (a) The diagram below shows a food delivery bag. It is designed to keep food warm.



Source: Principal Examiner

Explain how this type of bag is designed to keep food warm.

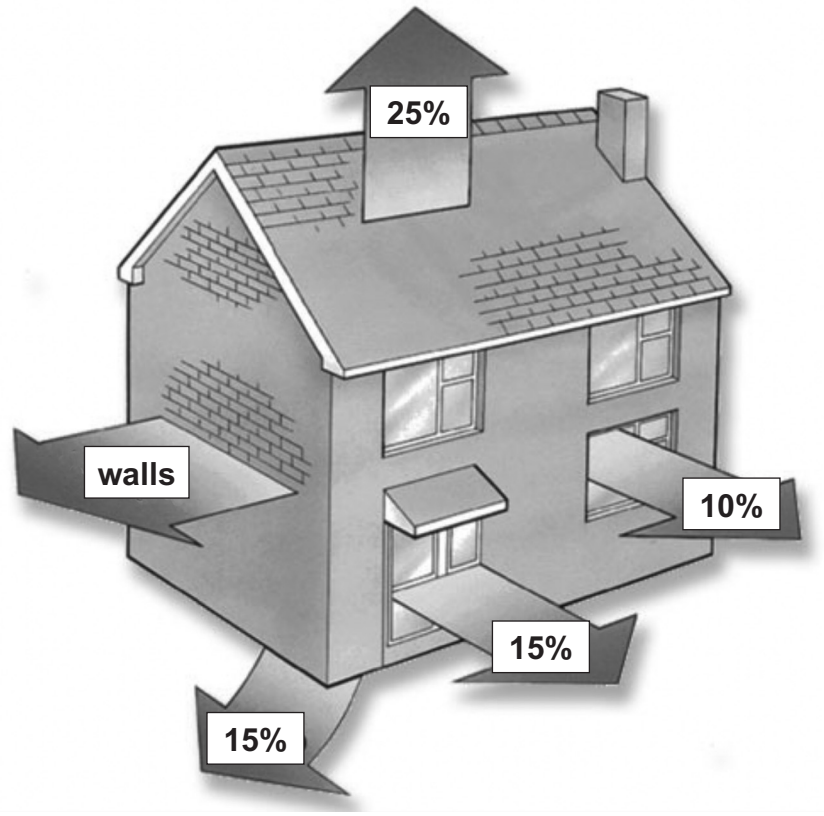
Your answer should include:
- the names of the 3 methods of heat transfer;
- a description of each method of heat transfer; and
- how the different parts of the bag help prevent heat loss.

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

[6]

[Turn over

(b) The diagram below shows how heat is lost from a house.



Source: Principal Examiner

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

_____ % [1]

(ii) Give **one** way that heat loss through the walls can be reduced.

_____ [1]

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For Examiner's use only	
Question Number	Marks
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Total Marks	

Examiner Number