



General Certificate of Secondary Education  
2024–2025

Centre Number

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Candidate Number

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# Single Award Science: Physics

Unit 3  
Foundation Tier



[GSA31]

\*GSA31\*

**THURSDAY 22 MAY 2025, 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 and use a dark HB pencil for drawings and graphs.

**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.

You may use a scientific calculator.

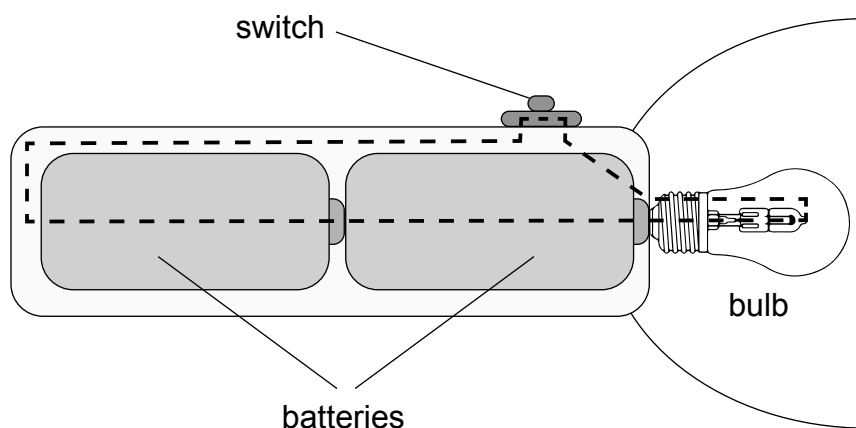
Quality of written communication will be assessed in Question 9.

14907



\*20GSA3101\*

- 1 The torch shown below consists of batteries, a switch, and a bulb.



- (a) (i) Use lines to match the part to its useful energy change.

| Part    | Useful energy change   |
|---------|------------------------|
| battery | chemical to electrical |
| bulb    | chemical to light      |
|         | electrical to light    |

[2]

- (ii) Name **one** form of waste energy produced by a torch.

\_\_\_\_\_

[1]



(b) Complete the sentence below stating the Principle of Conservation of Energy.

Energy cannot be \_\_\_\_\_ or \_\_\_\_\_,  
it can only \_\_\_\_\_ from one form to another. [2]

(c) Name the unit of energy.

Circle your answer.

**Volt**

**Watt**

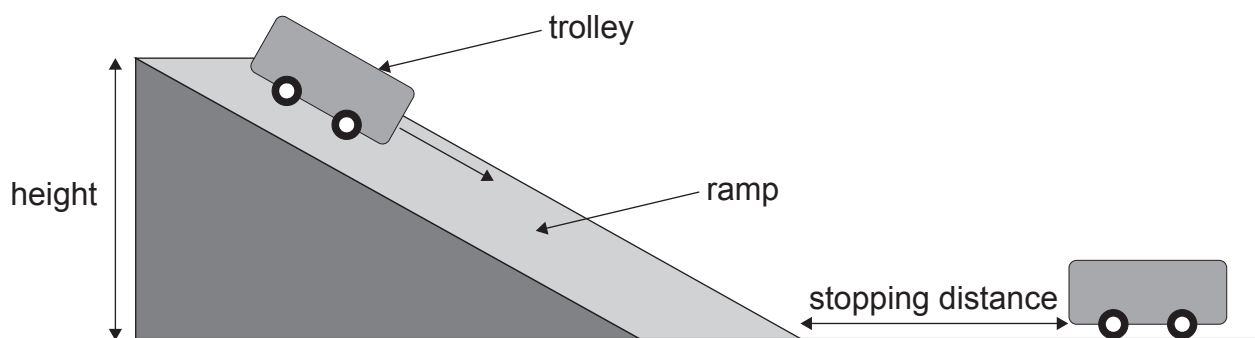
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[1]

[Turn over



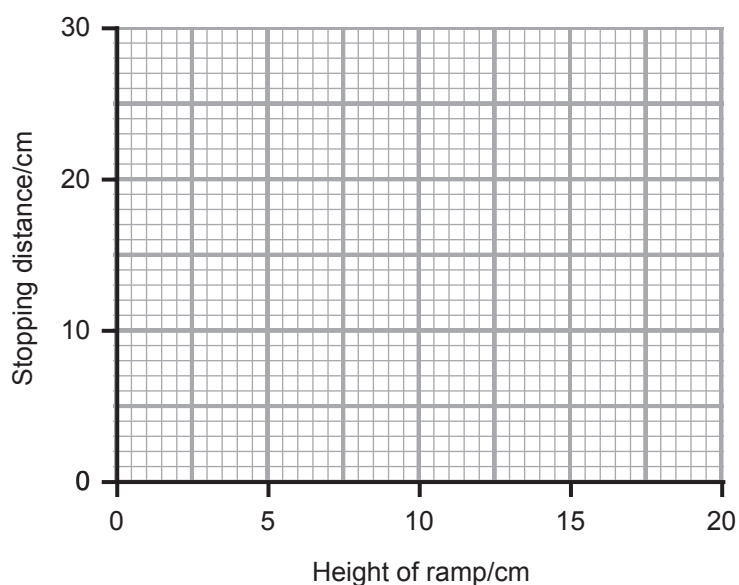
- 2 (a) The diagram below shows the apparatus used to investigate how the height of a ramp affects the stopping distance of a trolley.



The results of the investigation are given below.

| Height of ramp/cm | Stopping distance/cm |
|-------------------|----------------------|
| 5                 | 0                    |
| 10                | 8                    |
| 15                | 16                   |
| 20                | 24                   |

- (i) Plot and draw a line graph for these results on the grid below.



[3]



(ii) Why were the **same** ramp and trolley used during the investigation?

Circle your answer.

**to get accurate results**

**to make it a fair test**

**to get reliable results**

[1]

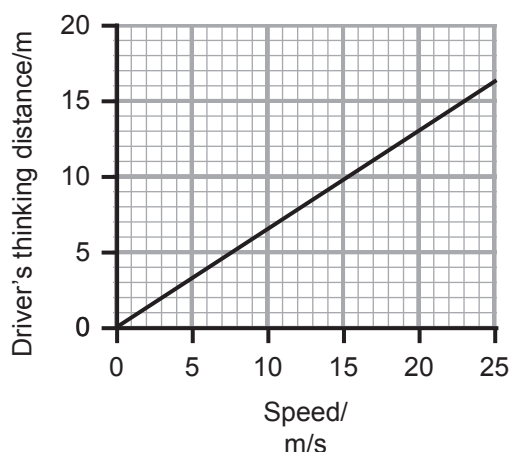
(iii) Name the force that causes the trolley to slow down.

[1]

[Turn over



(b) The graph below shows how speed affects a driver's thinking distance.



(i) Describe the effect speed has on a driver's thinking distance.

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[1]

(ii) Draw a line on the grid above to show how the thinking distance would change with speed if a driver was **tired**.

[2]

(iii) Give **one** other factor, apart from tiredness or speed, that would affect thinking distance. Describe this effect.

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[2]

(c) Which mathematical symbol is missing in the equation below?

Choose from:

+

−

×

÷

stopping distance = thinking distance  braking distance

[1]





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**(Questions continue overleaf)**

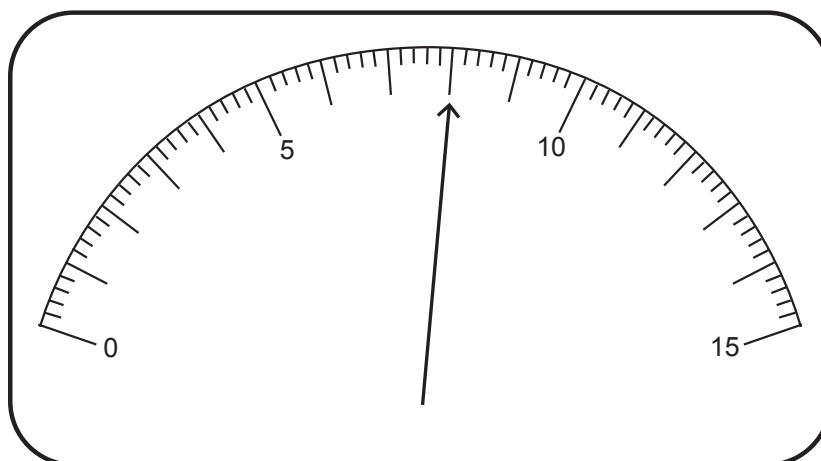
14907

**[Turn over**



**\*20GSA3107\***

- 3 (a) The diagram below shows an ammeter scale.



- (i) What is the reading on this ammeter?

\_\_\_\_\_ A [1]

- (ii) What is an ammeter used to measure?

Circle your answer.

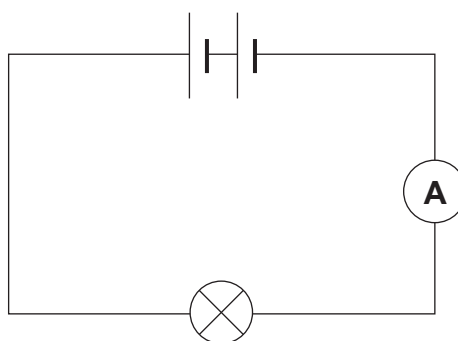
**resistance**

**current**

**voltage**

[1]

The diagram below shows an ammeter connected in a simple electrical circuit.

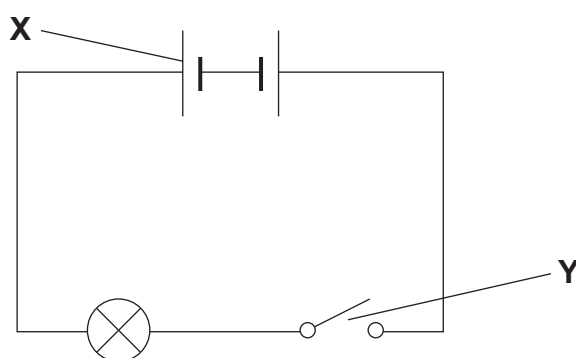


- (iii) What term describes how the ammeter is connected in this circuit?

\_\_\_\_\_ [1]



(b) The circuit diagram below shows another simple electrical circuit.



(i) Name the two symbols labelled **X** and **Y** in the circuit diagram.

**X** \_\_\_\_\_

**Y** \_\_\_\_\_ [2]

(ii) Give **two** reasons why the lamp in this circuit will **not** light.

1 \_\_\_\_\_

\_\_\_\_\_

2 \_\_\_\_\_

\_\_\_\_\_ [2]

[Turn over



- 4 The diagram below shows a tuning fork.

256 Hz



This tuning fork produces sound with a frequency of 256 Hz and wavelength of 1.3 m.

- (a) Use the equation:

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

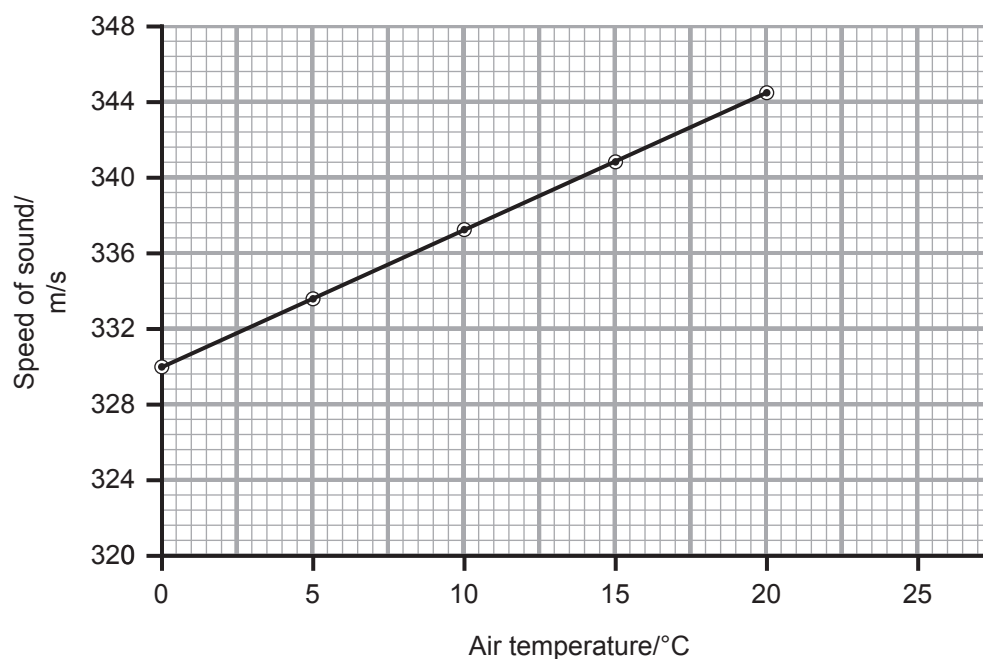
to calculate the speed of sound.

**Show your working out.**

\_\_\_\_\_ m/s [2]



(b) The graph below shows how the speed of sound changes with air temperature.



(i) What conclusion can be drawn from this graph?

\_\_\_\_\_ [1]

(ii) Use the graph to find the air temperature when the speed of sound is 338 m/s.

\_\_\_\_\_ °C [1]

(c) Complete the sentence below about sound waves.

Choose from:

**frequency**

**energy**

**movement**

**vibrations**

Sound waves transfer \_\_\_\_\_ from one point to another  
through \_\_\_\_\_ . [2]

[Turn over



- 5 Shown below are some of the planets in the Solar System in order of distance from the Sun.

|         |  |       |  |         |  |        |         |
|---------|--|-------|--|---------|--|--------|---------|
| Mercury |  | Earth |  | Jupiter |  | Uranus | Neptune |
|---------|--|-------|--|---------|--|--------|---------|

- (a) Complete the table by inserting the names of the missing planets in their correct position. [2]

- (b) Name **one** gas planet.

\_\_\_\_\_ [1]

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

\_\_\_\_\_ [1]

- (d) Which planet will take the longest to orbit the Sun?

\_\_\_\_\_ [1]

- (e) Earth has both natural and artificial satellites orbiting it.

- (i) Name Earth's natural satellite.

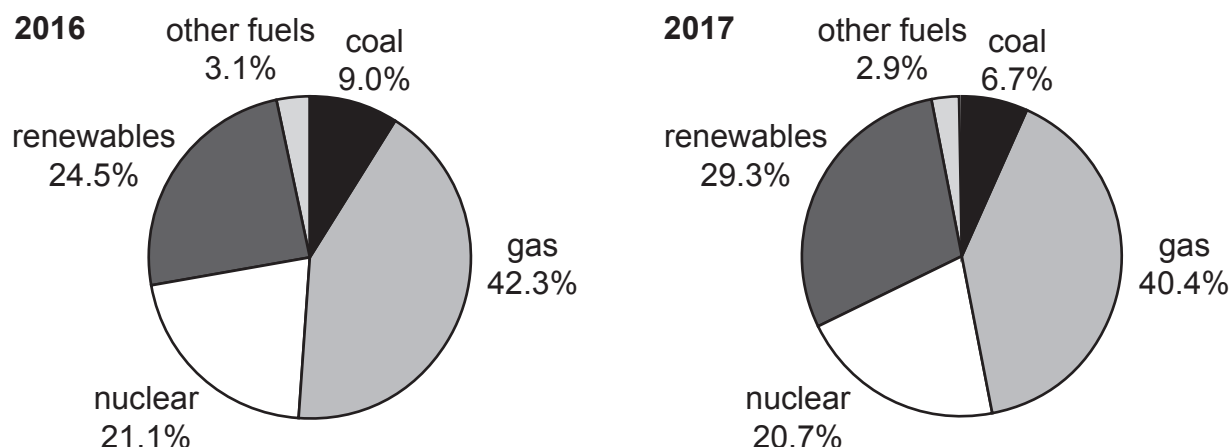
\_\_\_\_\_ [1]

- (ii) Give **one** use of artificial satellites.

\_\_\_\_\_  
 \_\_\_\_\_ [1]



- 6 (a) The pie charts below compare the energy sources used to make electricity in 2016 and 2017.



- (i) Which energy source **decreased** in use the most from 2016 to 2017?

\_\_\_\_\_ [1]

- (ii) Name the fossil fuel **not** shown in the pie charts.

\_\_\_\_\_ [1]

- (iii) Calculate the percentage increase in the use of renewables to generate electricity.

\_\_\_\_\_ % [1]

- (b) (i) What is meant by the term renewable energy source?

\_\_\_\_\_  
 \_\_\_\_\_ [1]

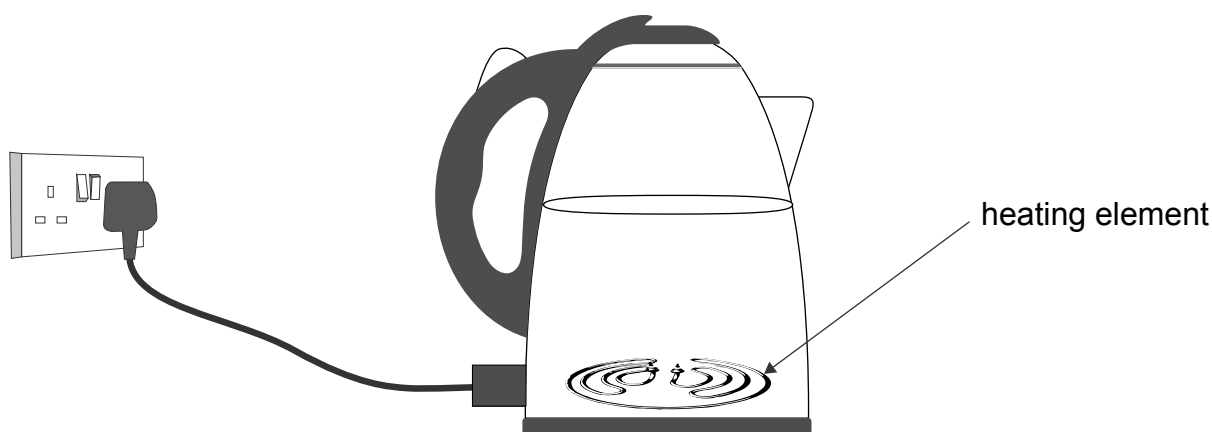
- (ii) Name **one** renewable energy source.

\_\_\_\_\_ [1]

[Turn over]



7 The diagram below shows the inside of an electric kettle.



(a) What method of heat transfer is used to heat all the water inside the kettle?

\_\_\_\_\_ [1]

(b) The table below shows how long a kettle took to boil different volumes of water. For each volume of water, the kettle was boiled twice within five minutes so that an average time could be calculated.

| Volume of water/<br>ml | First time to<br>boil/s | Second time to<br>boil/s | Average time<br>to boil/s |
|------------------------|-------------------------|--------------------------|---------------------------|
| 250                    | 46                      | 42                       | 44                        |
| 500                    | 84                      | 78                       | 81                        |
| 750                    | 117                     | 109                      |                           |
| 1000                   | 155                     | 143                      | 149                       |
| 1250                   | 208                     | 196                      | 202                       |
| 1500                   | 256                     | 238                      | 247                       |



- (i) Calculate the average time for the kettle to boil **750 ml** of water.

**Show your working out.**

\_\_\_\_\_ s [2]

- (ii) Suggest why the times were shorter when the kettle was boiled for the second time.

\_\_\_\_\_  
\_\_\_\_\_ [1]

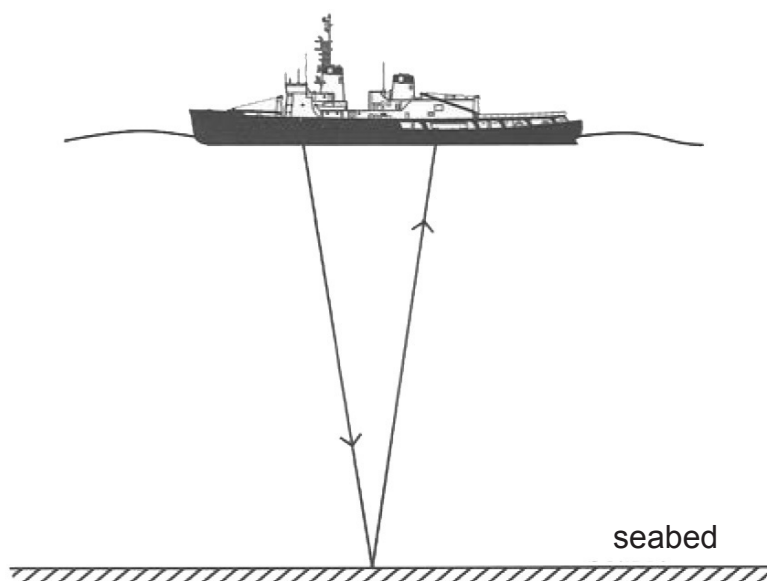
- (iii) What effect, if any, does the volume of water have on the time to boil?

\_\_\_\_\_  
\_\_\_\_\_ [1]

[Turn over



- 8 (a) The diagram below shows a ship sending out a pulse of ultrasound which is reflected from the seabed and detected 0.8 s later. Ultrasound travels at a speed of 1500 m/s through water.



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

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[2]

- (ii) Use the equation:

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

to calculate the depth of the seabed below the ship.

Show your working out.

\_\_\_\_\_ m [3]



(b) The diagram below shows the electromagnetic spectrum.

|               |       |             |                  |          |           |                |
|---------------|-------|-------------|------------------|----------|-----------|----------------|
| gamma<br>rays | X-ray | ultraviolet | visible<br>light | infrared | microwave | radio<br>waves |
|---------------|-------|-------------|------------------|----------|-----------|----------------|

(i) Give **one** property that is the **same** for each of these waves.

\_\_\_\_\_ [1]

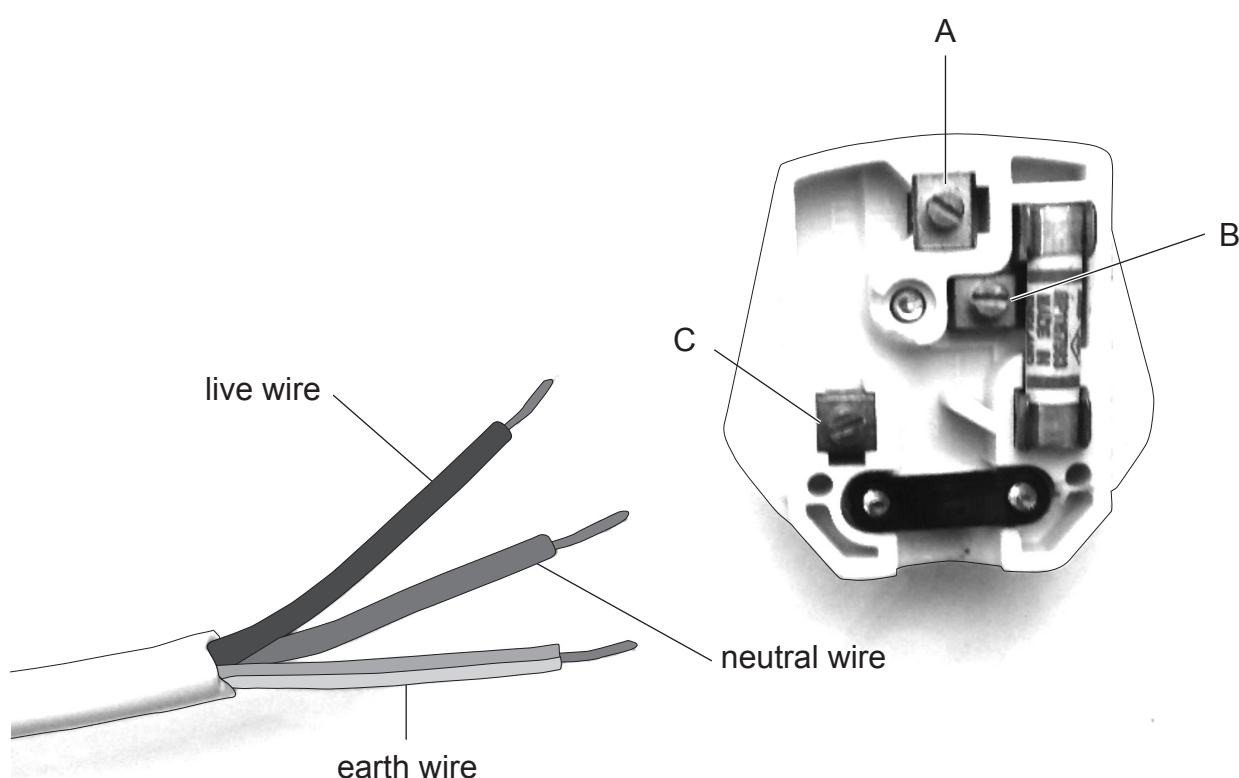
(ii) Give **one** property that is **different** for each of these waves.

\_\_\_\_\_ [1]

[Turn over



9 The picture below shows an open three-pin plug about to be wired.



Describe how this plug should be correctly wired.

Your answer should include:

- the names of the pins **A**, **B** and **C**;
- the colour of the wires that should be connected to each pin; and
- **two** safety features.

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

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[6]

**THIS IS THE END OF THE QUESTION PAPER**



Sources:

Question 1 . . . . . Chief Examiner  
 Question 2(a). . . . . Chief Examiner  
 Question 2(a)(i). . . . . Chief Examiner  
 Question 2(b). . . . . Chief Examiner  
 Question 3(a). . . . . Chief Examiner  
 Question 3(a)(iii) . . . . . Chief Examiner  
 Question 3(b). . . . . Chief Examiner  
 Question 4 . . . . . Chief Examiner  
 Question 4(b). . . . . Chief Examiner  
 Question 6(a). . . . . Chief Examiner  
 Question 7 . . . . . Chief Examiner  
 Question 8(a). . . . . Chief Examiner  
 Question 9 . . . . . Chief Examiner

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| For Examiner's use only |       |
|-------------------------|-------|
| Question Number         | Marks |
| 1                       |       |
| 2                       |       |
| 3                       |       |
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Examiner Number

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