Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2016

Double Award Science: Physics

MV18

Unit P2

Foundation Tier

[GSD61]

MONDAY 20 JUNE, MORNING

Time

1 hour 15 minutes, plus your additional time allowance.

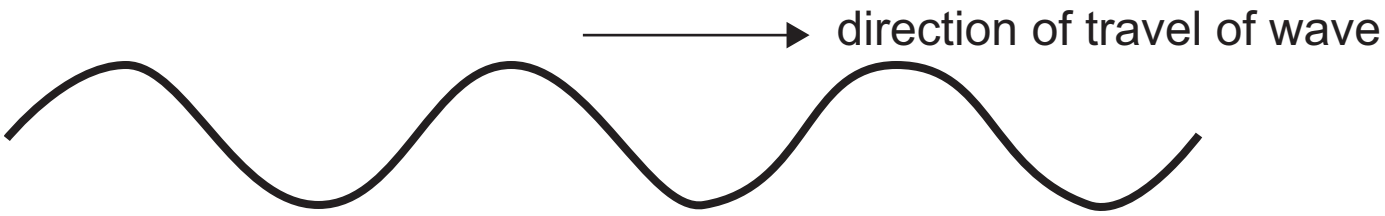
Instructions to Candidates

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.
Complete in blue or black ink only. **Do not write with a gel pen.**
Answer **all ten** questions.

Information for Candidates

The total mark for this paper is 90.
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 **9(b)**.

1 A child jumps into a swimming pool and creates a series of waves.



(a) What do the waves transfer as they cross the pool? [1 mark]

_____

(b) Describe the movement of the water particles. [1 mark]

_____

(c) Which **one** of the following words best describes a water wave? [1 mark]
Circle the correct answer.

Longitudinal

Transverse

Ultrasound

2 Some members of the electromagnetic spectrum are missing from the following list.

Gamma rays	X-rays			Infrared rays		Radio

(a) Fill in the missing radiations. [3 marks]

(b) Which radiation shown in the list has the longest wavelength? [1 mark]

_____

(c) State **one** danger of infrared radiation and **one** danger of gamma rays. [2 marks]

Infrared: _____

Gamma: _____

(d) State **one** use of X-rays. [1 mark]

_____

(e) From the list below, select **three** properties of all electromagnetic waves.
Tick (✔) the correct boxes. [3 marks]

Transverse ☐

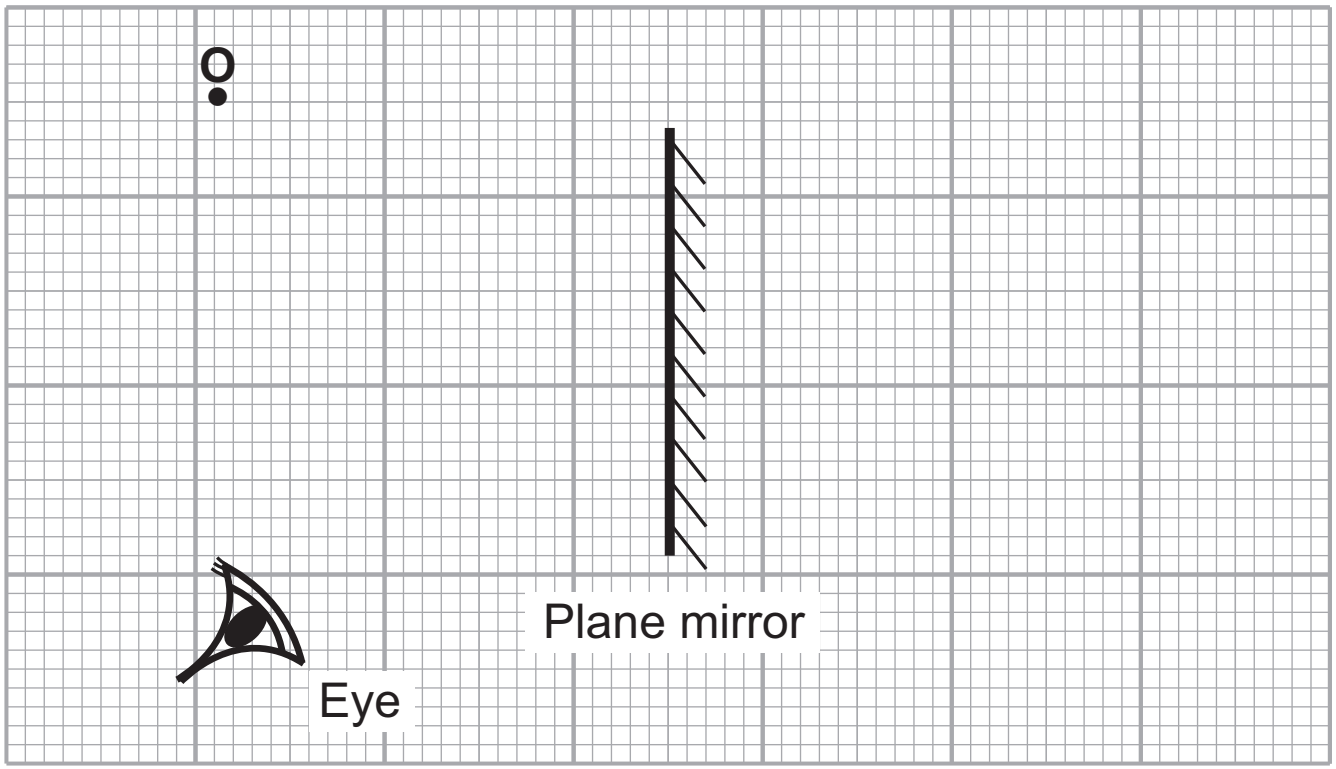
Cannot travel in a vacuum ☐

Travel in a vacuum ☐

Can all be reflected ☐

Longitudinal ☐

3 Jamie looks at an image in a plane mirror.



(a) Draw an incident ray and a reflected ray to show how the image of point **O** is viewed by the eye in the mirror. Draw arrows on your rays. [4 marks]

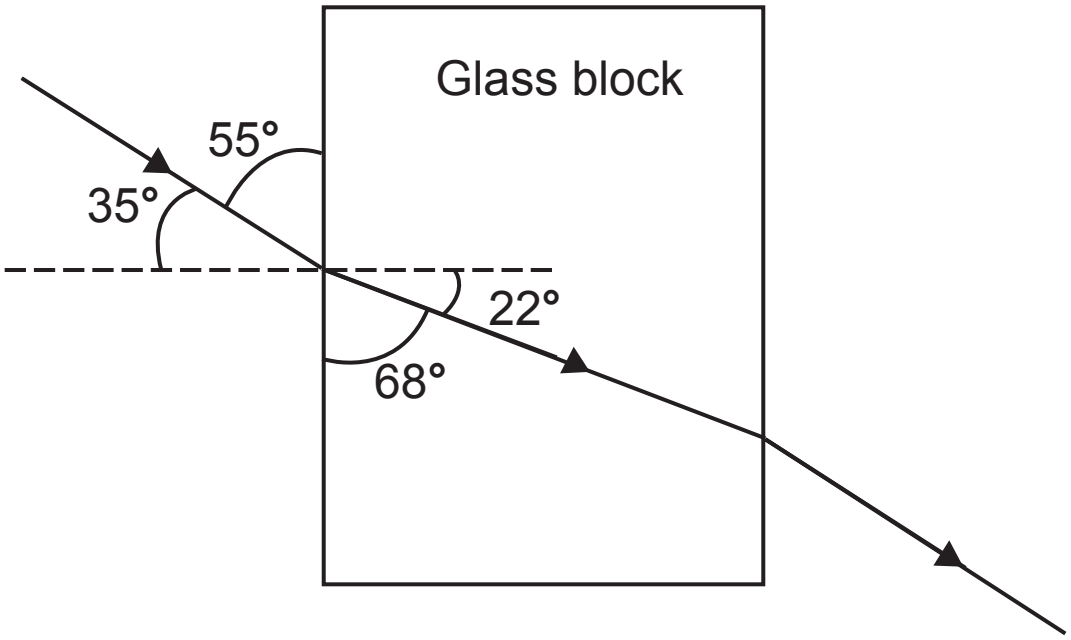
(b) State **three** properties of the image in a plane mirror. [3 marks]

1. _____

2. _____

3. _____

(c) Jamie sends a ray of light through a glass block.



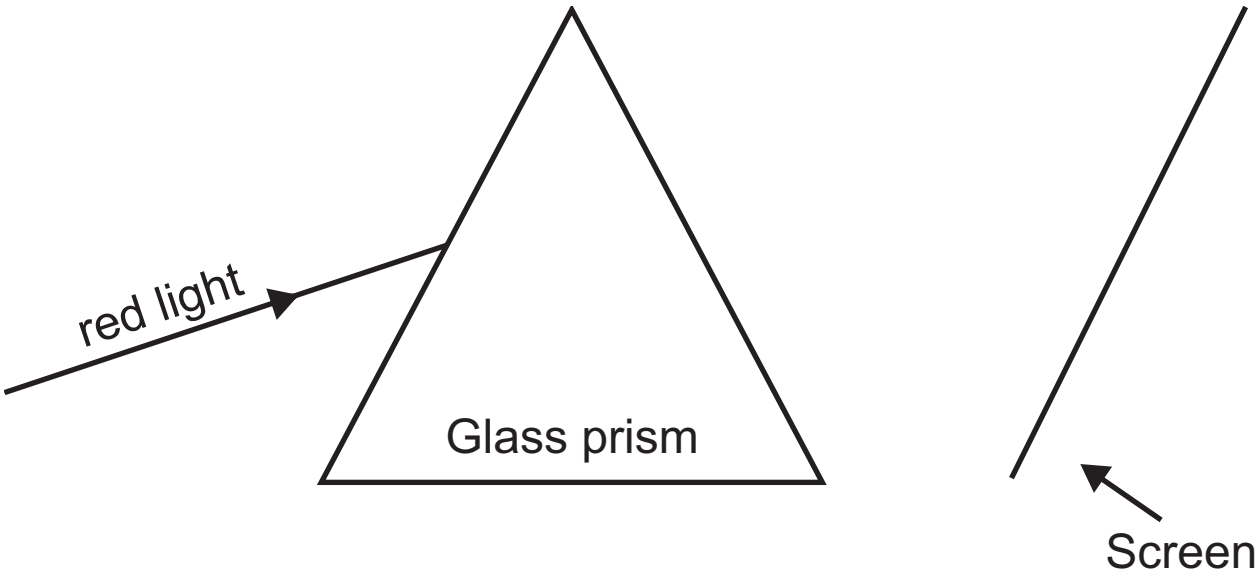
(i) What is the angle of incidence? [1 mark]

_____ °

(ii) What is the angle of refraction of the light ray in the glass block? [1 mark]

_____ °

(d) A ray of red light enters a glass prism.



Continue the ray through the glass prism to the screen.
[2 marks]

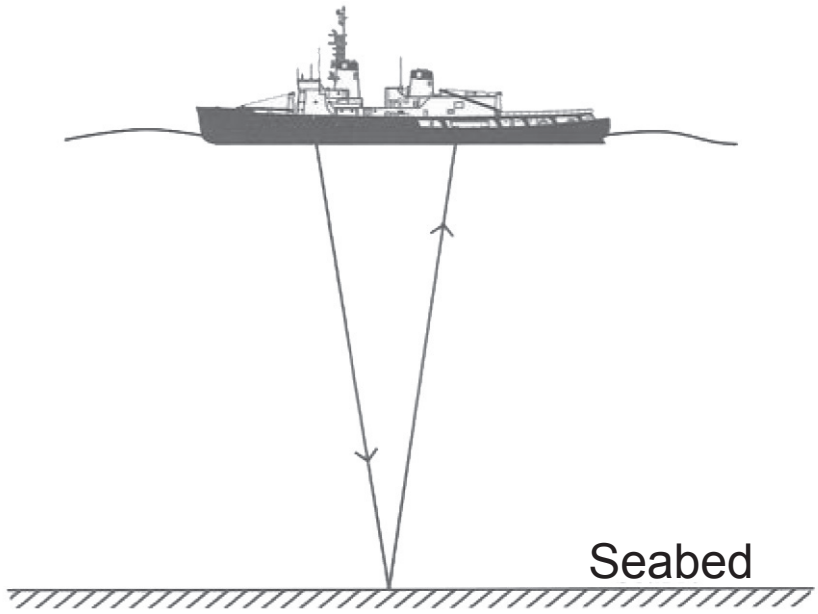
(e) When white light passes through a glass prism it splits into its component colours.
What is this process called? [1 mark]

_____

4 Ultrasound waves are used by fishing trawlers.

(a) A ship sends out a pulse of ultrasound waves and detects the reflection from the seabed 1.6 s later.
The depth of the seabed is 1200 m.
Calculate the speed of ultrasound waves in water.
[4 marks]

You are advised to show your working out.



Speed = _____ m/s

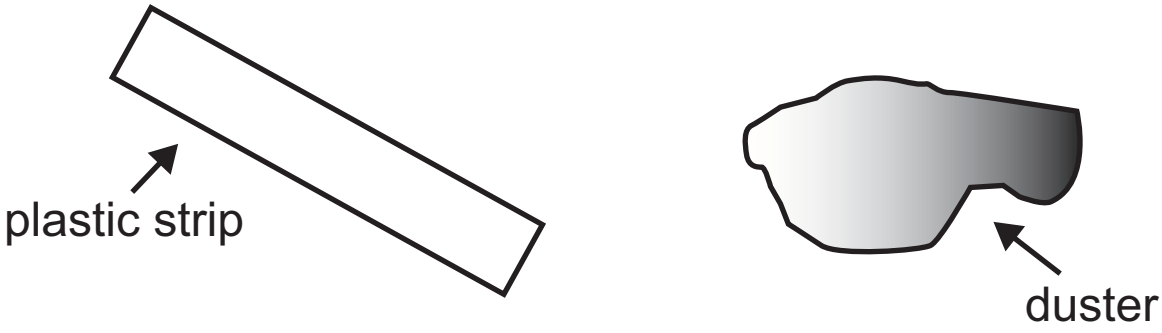
(b) (i) State an industrial use of ultrasound waves.
[1 mark]

_____

(ii) State a medical use of ultrasound waves.
[1 mark]

_____

5 George rubs a plastic strip with a duster and the strip becomes **positively** charged.



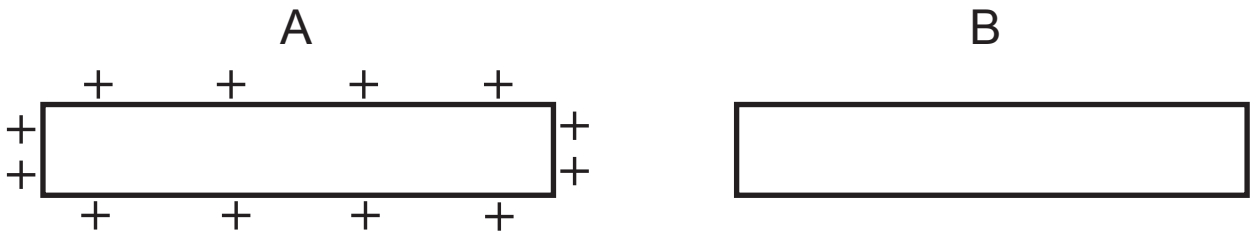
(a) (i) Choose words from the list to complete the sentence below. [3 marks]

protons
duster
electrons
neutrons
plastic

_____ move from the _____

to the _____

The positively charged plastic strip, A, is now brought up to, but not touching, a second **uncharged** plastic strip, B.



(ii) Use + (positive) and – (negative) to show how the charges are arranged on strip B. Insert a charge at each end of B. [2 marks]

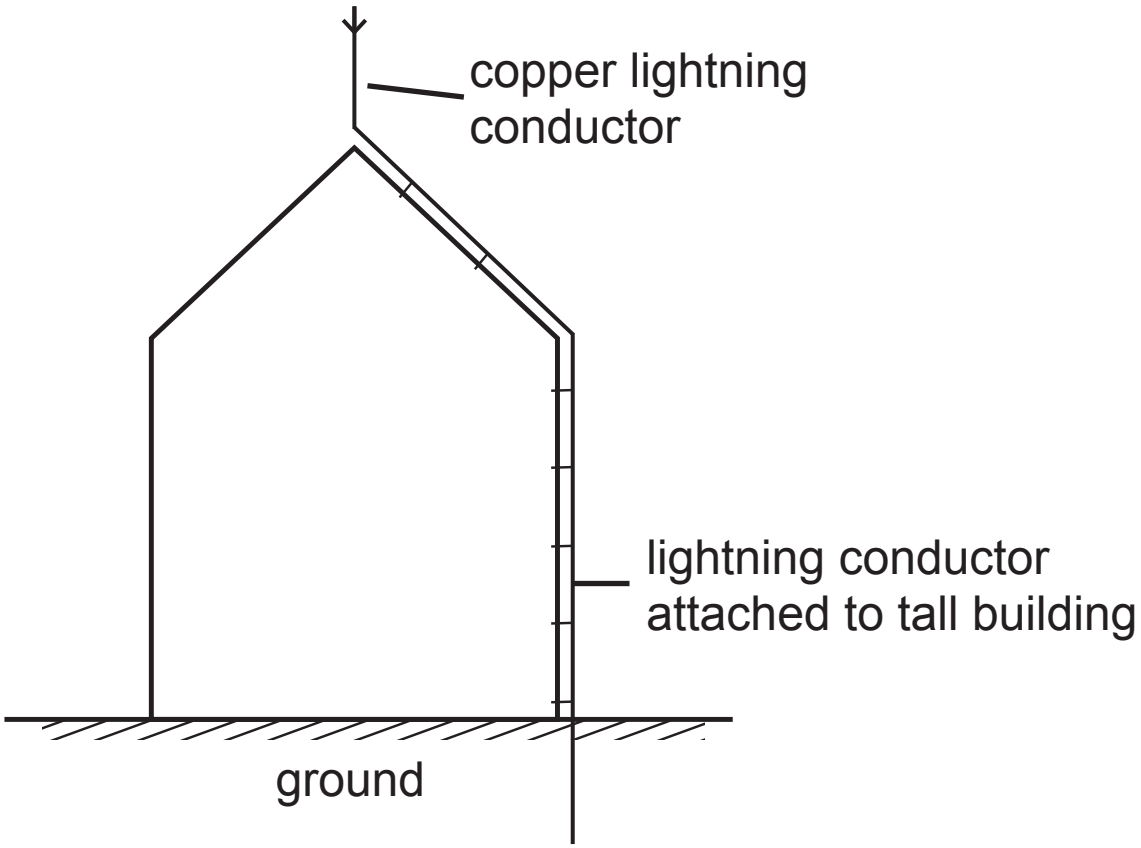
(iii) How would you describe the force, if any, between the two strips? Choose from the statements below by placing a tick (✔) in the correct box. [1 mark]

The strips attract ☐

No force is exerted ☐

The strips repel ☐

Tall buildings such as churches often have a lightning conductor fitted.



(b) (i) Describe fully what could happen if a lightning conductor was **not** fitted. [2 marks]

(ii) Describe how the lightning conductor works if lightning strikes. [2 marks]

Current electricity is really the flow of charge.

(c) (i) Write an equation in the box connecting current, I, charge Q, and time t. [1 mark]

(ii) What unit do we use for the charge, Q? [1 mark]

Write the word _____

6 You are given three identical 6Ω resistors.

(a) In each box below draw an arrangement of resistors to produce the resistance shown in the box.
You may use **two or three** resistors in each case.
[4 marks]

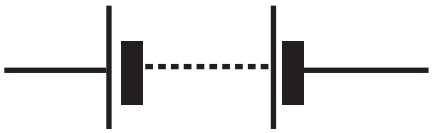
(i) 12Ω

(ii) 18Ω

(iii) 3Ω

(iv) 9Ω

(b) Electrical symbols are used to draw electric circuits.
Identify each of the following symbols. [3 marks]



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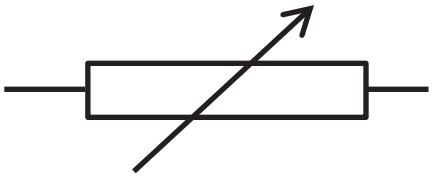


_____

_____

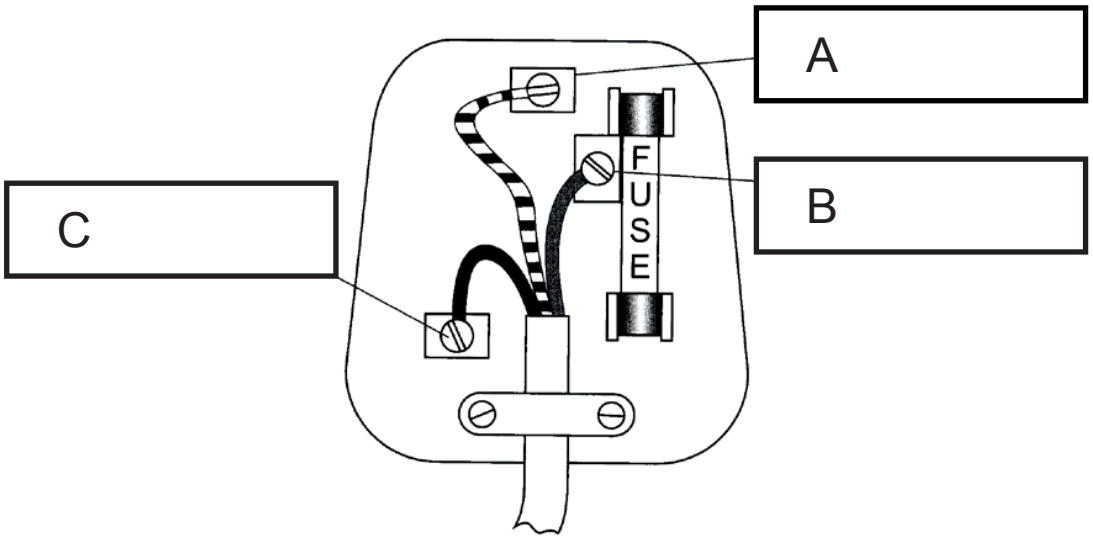
A current of 200 mA flows through a bulb of resistance 4 Ω.
Remember 1 mA = 0.001A.

(c) Calculate the voltage across the bulb. [4 marks]

You are advised to show your working out.

Voltage = _____ V

7 An electric plug is shown.



(a) (i) In the boxes, A, B and C label the terminals live, neutral or earth. [3 marks]

The plug is attached to an appliance which uses a current of 6 A.

(ii) What current flows in the wire connected to [3 marks]

the live terminal? current = _____ A

the neutral terminal? current = _____ A

the earth terminal? current = _____ A

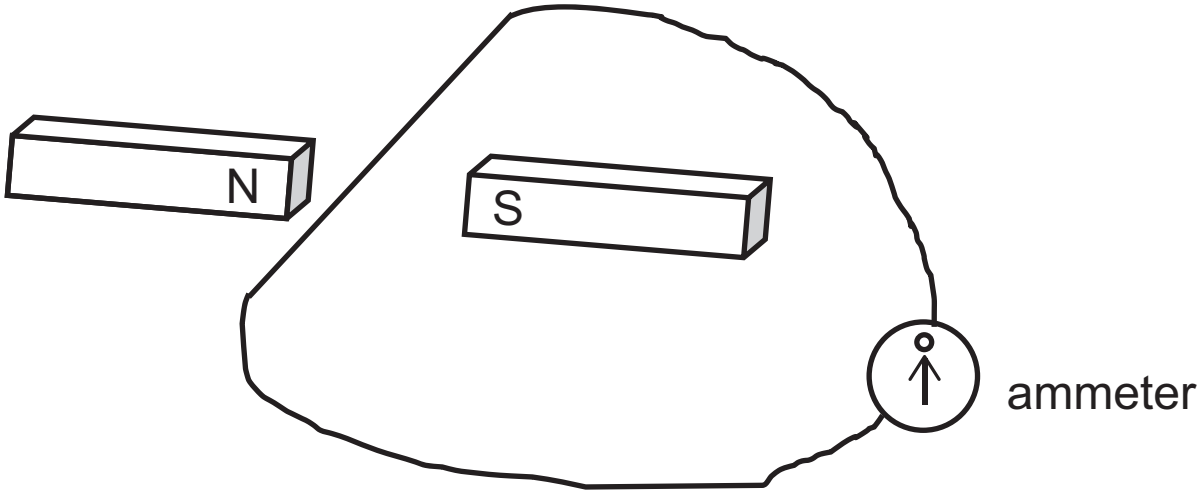
(b) An appliance rated at 840 W is connected to the mains electricity supply of 240 V.

Calculate the current flowing through the appliance.
[3 marks]

You are advised to show your working out.

Current = _____ A

8 The arrangement below is set up in a school laboratory. The wire is held stationary between the poles of the magnet.



(a) (i) Explain why the reading on the ammeter is zero, when the wire is stationary. [1 mark]

_____

(ii) Describe how to get a deflection while keeping the wire stationary. [1 mark]

_____

Two types of electric current are a.c. and d.c.

(b) (i) Describe a.c. [2 marks]

_____

_____

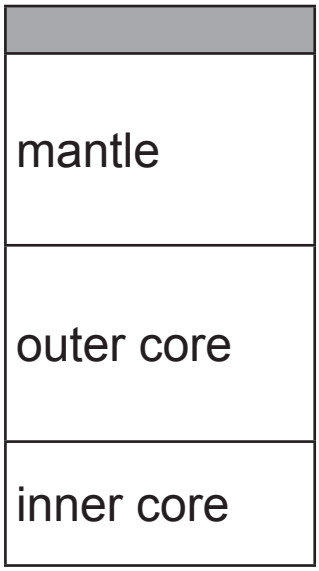
(ii) Name a piece of apparatus which produces a.c. [1 mark]

_____

(iii) What type of current **cannot** be used in a transformer? [1 mark]

_____

9 The diagram shows a cross section of the Earth.



(a) (i) Name a section which is completely liquid.
[1 mark]

Answer _____

(ii) Name a section which is part solid and part liquid.
[1 mark]

Answer _____

(iii) Name the shaded layer in the diagram above.
[1 mark]

Answer _____

(b) Describe how a star is formed. [6 marks]

Your answer should include

- the main element involved at the start;
- the force involved;
- a full description of the process.

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

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(Questions continue overleaf)

10 Temperature is measured in degrees Celsius (°C).
An older temperature scale is called Fahrenheit (°F).

The table below gives temperatures in °C and the corresponding temperatures in °F.

Temp/°C	0	20	40	60	80	100
Temp/°F	32	68	104	140	176	212

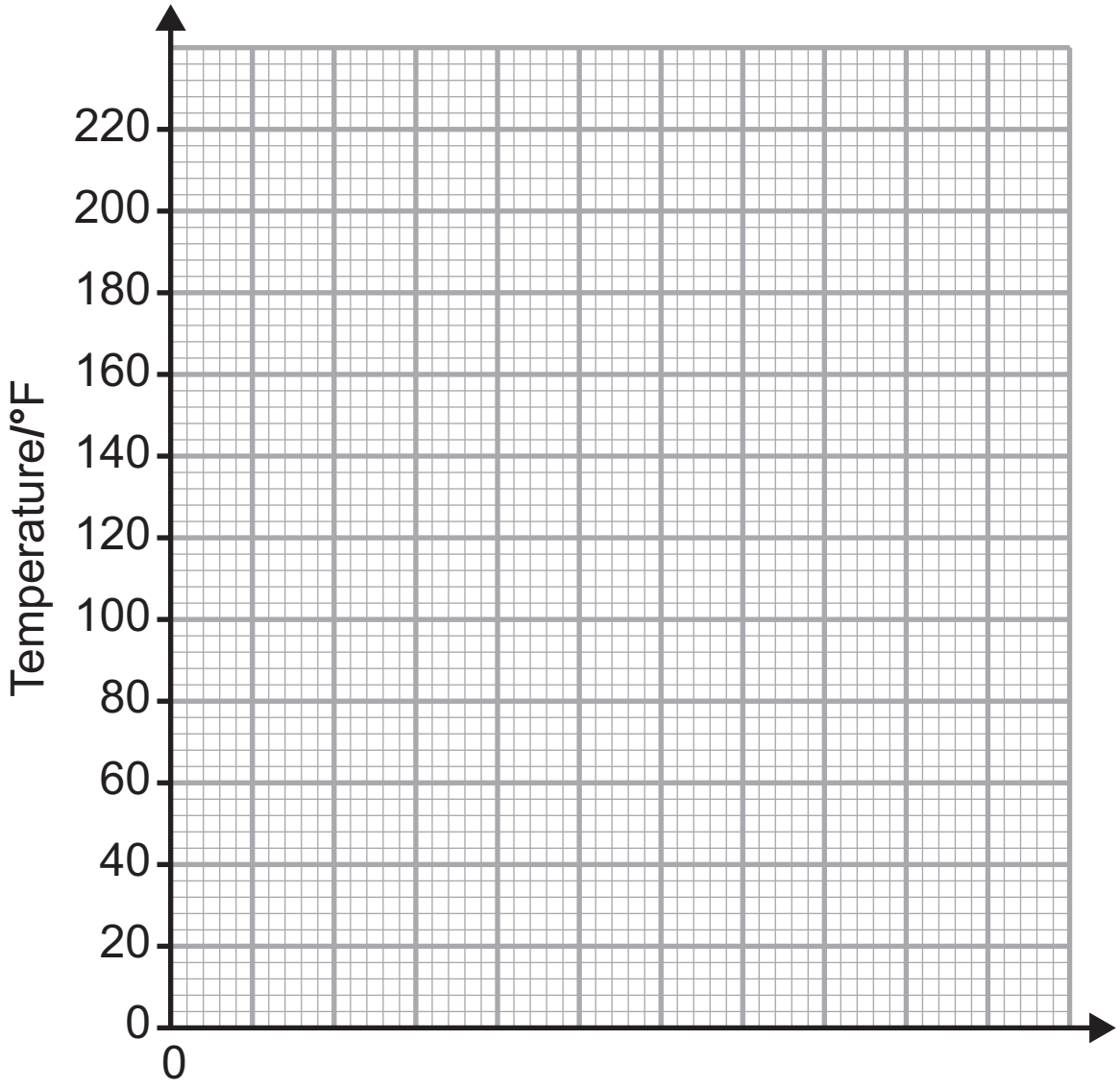
The two temperature scales are related.

You are asked to plot a graph opposite of temperature in Fahrenheit against temperature in Celsius.

(i) Choose a suitable scale for the horizontal axis and label it. [2 marks]

(ii) Plot the points on the grid. [2 marks]

(iii) Draw the best fit line. [1 mark]



Use your graph to answer the following questions:

(iv) The intercept on the vertical axis gives the temperature of melting ice.

What is this temperature in °C? [1 mark]

Temperature of melting ice _____ °C

(v) A type of alcohol boils at 194 °F. What is this temperature in °C? [1 mark]

_____ °C

(vi) Calculate the gradient of your graph. [3 marks]

Remember to include the unit. [1 mark]

You are advised to show your working out.

Gradient = _____

Unit = _____

(vii) Does your graph show direct proportion?

_____

Give a reason for your answer. [1 mark]

_____

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Question Number	**Marks**
1	
2	
3	
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Total Marks	

Examiner Number