Rewarding Learning

Centre Number

71

Candidate Number

General Certificate of Secondary Education
2013

Double Award Science: Physics

Unit P2

Foundation Tier

[GSD61]

MV18

THURSDAY 13 JUNE, MORNING

TIME

1 hour 15 minutes, plus your additional time allowance.

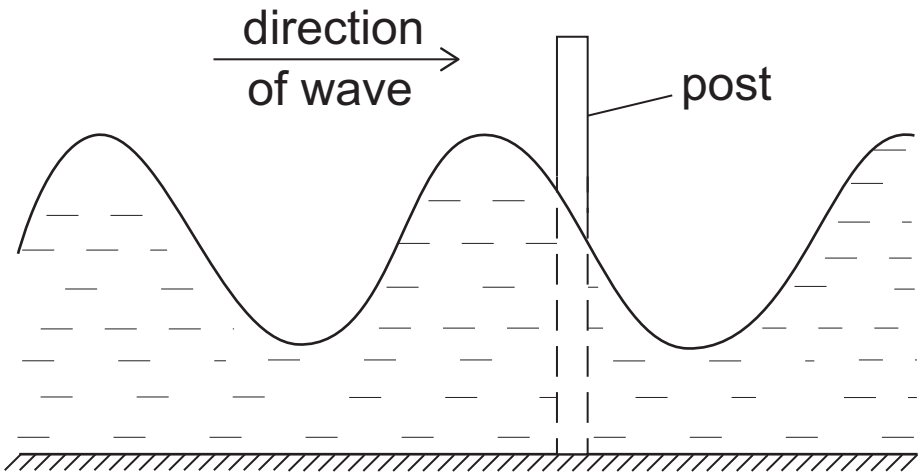
INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all eight** 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 **7(b)**.

1 A stone is thrown into a pond and water waves are produced. These waves pass a post which projects out of the water.



In 4 seconds 12 waves pass the post.

(i) What piece of apparatus would be needed to measure how long it takes twelve waves to pass the post? [1]

_____

(ii) What is the frequency of the wave?
Remember to include the unit. [2]

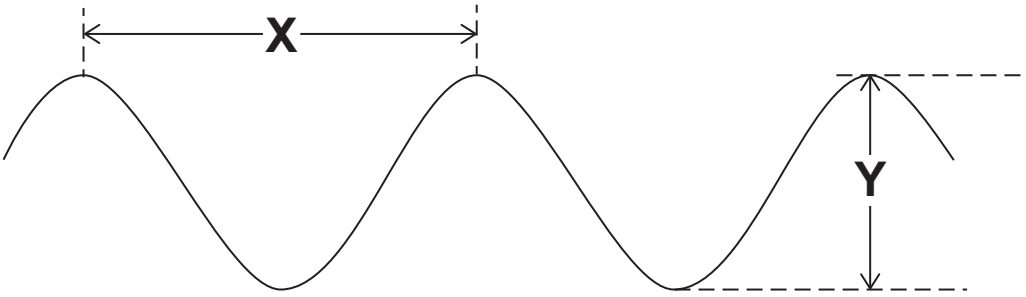
Frequency = _____

(iii) What do the waves carry, from the point where the stone entered the water, to the post? Choose from the list below by placing a tick (✓) in the correct box. [1]

water	☐
sound	☐
energy	☐

(iv) The amplitude of the wave is 3 cm and its wavelength is 5 cm. A part of the wave is illustrated below.

What are the distances "X" and "Y" marked on the diagram? [2]



Distance X = _____ cm

Distance Y = _____ cm

(v) Use your answer to part **(ii)** to calculate the speed of the water wave in cm/s. Remember the wavelength of the wave is 5 cm. [3]

You are advised to show your working out.

Speed = _____ cm/s

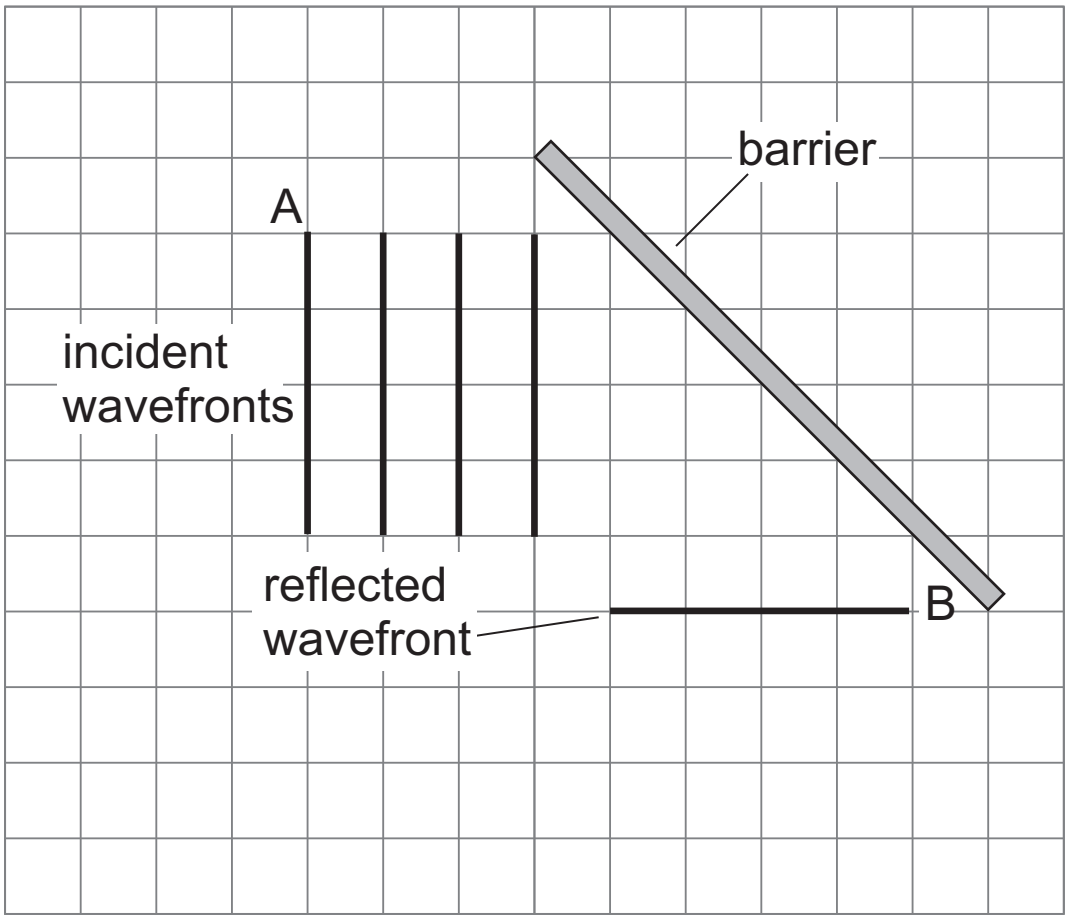
(vi) Water waves belong to a family of waves called transverse waves. Give two other examples of transverse waves. [2]

1. _____

2. _____

2 Ripple tanks are sometimes used in the laboratory to show how water waves behave.

In one experiment plane waves strike a barrier which is set at an angle to the wavefronts as shown.



(a) (i) Draw an arrow on wavefront A to show its direction. [1]

(ii) Reflected wavefront B is shown in the diagram. Draw **two** further wavefronts below wavefront B. [3]

(b) (i) Fill in the missing word in the sentence below.

Radio waves, infrared radiation and X-rays are all part of a family of waves called

the _____ spectrum. [1]

(ii) Arrange the waves, referred to in **(b)(i)** in order of wavelength beginning with the **smallest** wavelength. [1]

_____

_____

_____

(iii) Name a wave, **other than the three mentioned above**, which has a wavelength smaller than the wavelength of visible light. [1]

_____

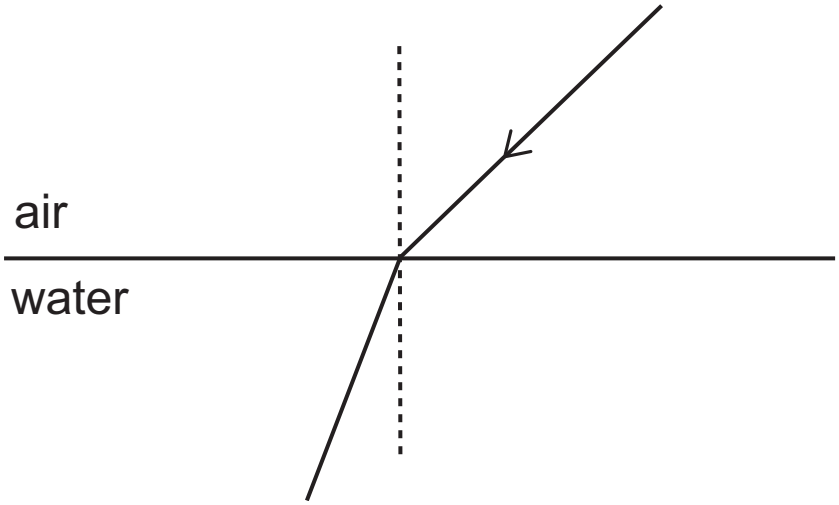
(c) State **one** use and **one** danger of infrared radiation. [1]/[1]

Use _____

Danger _____

_____

3 The diagram shows a ray of light passing from air into water.

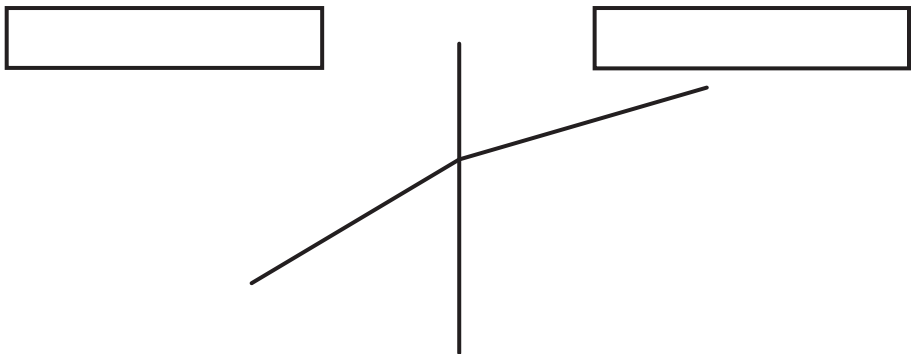


(a) (i) Label the angle of incidence with the letter i. [1]

(ii) Label the angle of refraction with the letter r. [1]

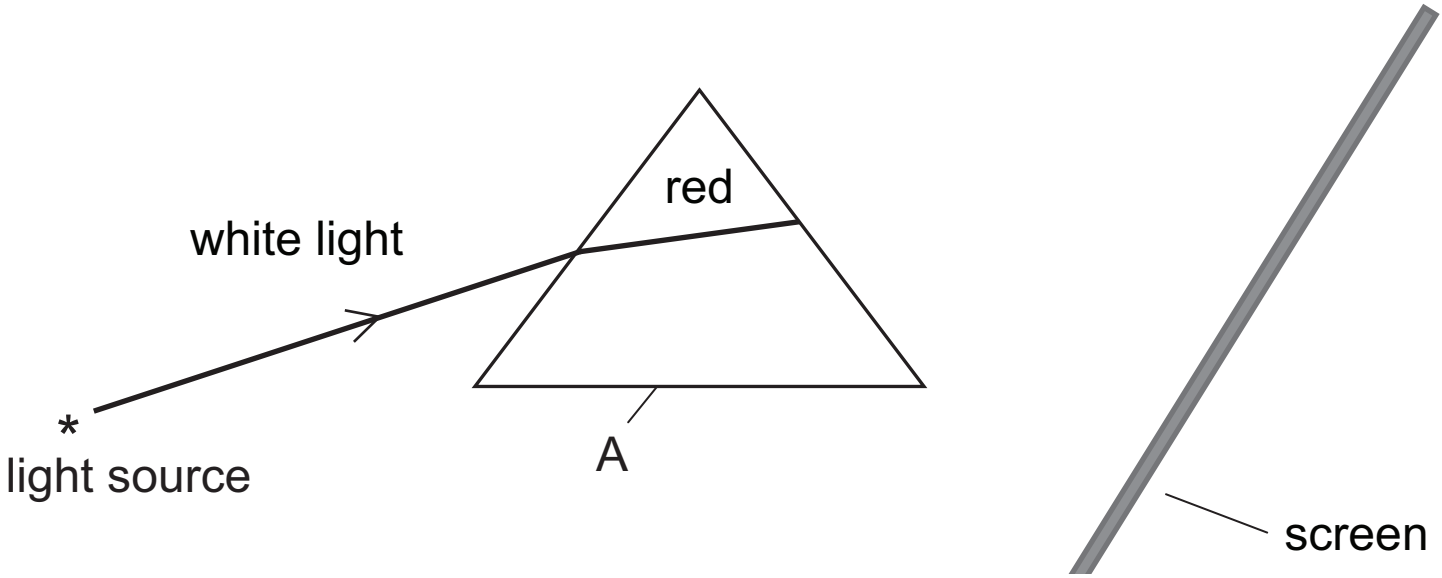
(iii) What is the dotted line called? [1]

(b) In another example of refraction a ray of light passes from glass into air.



In the boxes label the air and the glass. [1]

The diagram below shows an arrangement which will allow white light to be split up into its different colours.



(c) (i) What is the name of component A? [1]

A _____

(ii) Complete the path of the red ray to the screen. [1]

(iii) Draw the path for the violet ray through component A to the screen. [2]

(iv) Explain why white light is split by component A. [2]

_____

_____

_____

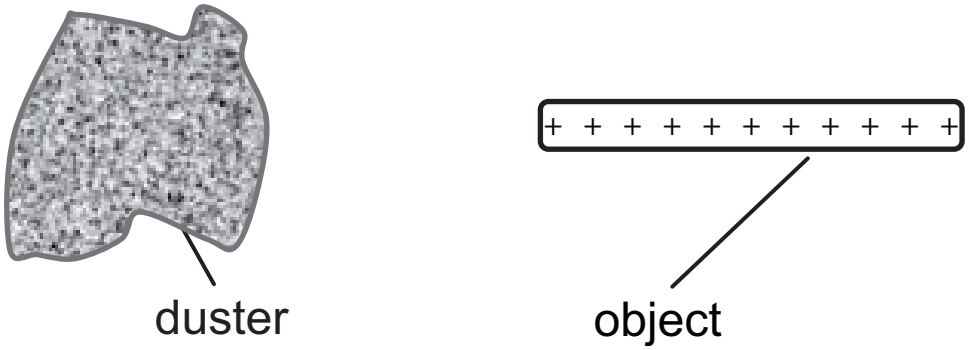
(v) What name do we give to the splitting of white light? [1]

_____

BLANK PAGE

(Questions continue overleaf)

4 Julie charges an object by rubbing it with a duster. The object becomes positively charged.



(a) (i) Choose words from the list to complete the sentence below. [2]

duster	**protons**	
atoms	**electrons**	**object**

The object becomes positively charged because

_____ have moved from the

_____.

(ii) What charge is left on the duster? [1]

Charge on the duster is _____.

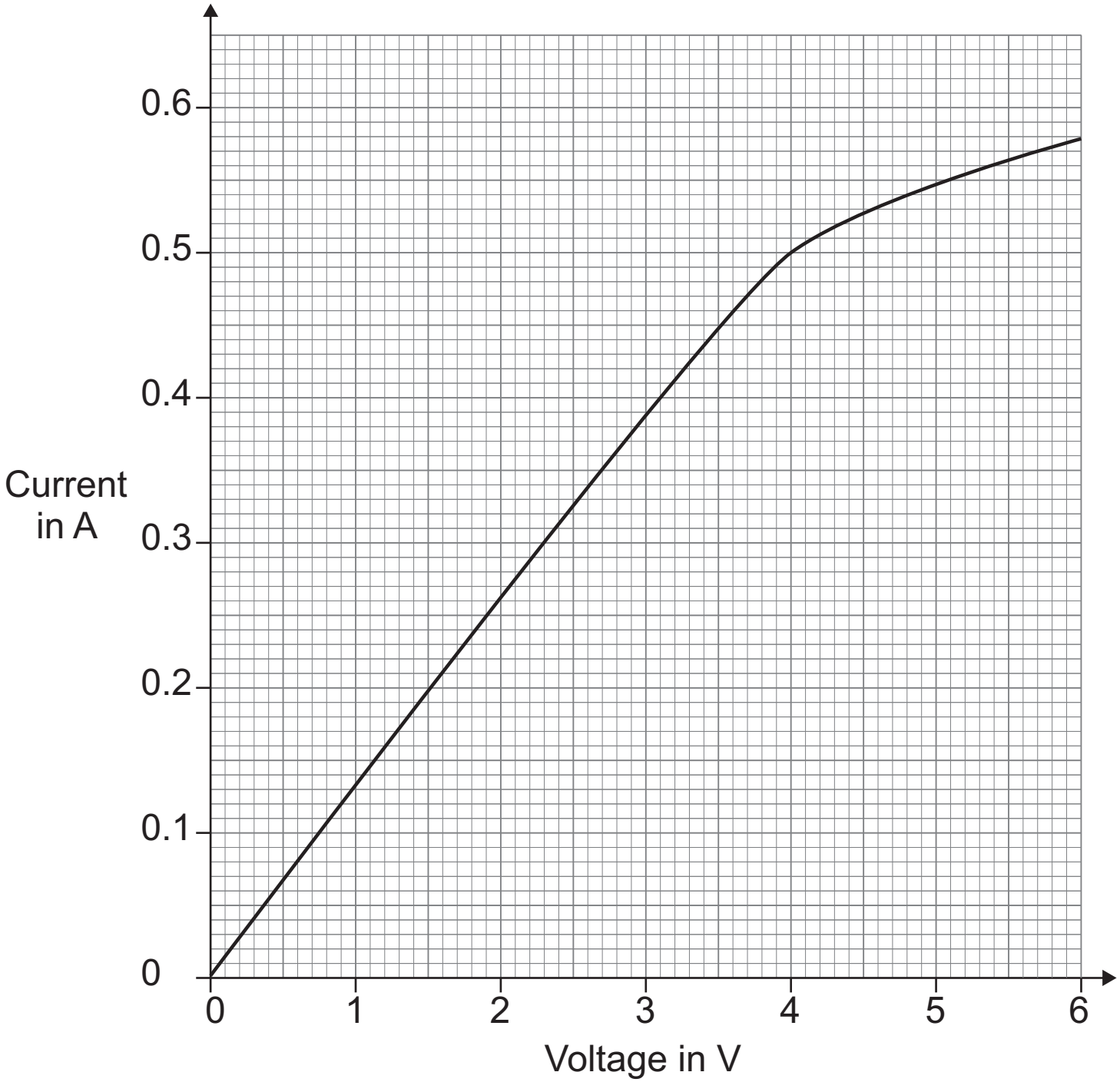
(iii) Give the name of a suitable material from which the object could be made. [1]

_____

Julie wants to investigate how the current through a filament lamp depends on the voltage across the lamp.

(b) (i) In the space below draw the circuit diagram of the apparatus she would use. [5]

Julie uses her results to plot a graph of current against voltage and this is shown below.



(ii) Use the graph to find the voltage across the lamp when the current is 0.5A. [1]

Voltage = _____ V

(iii) Use your answer to part **(ii)** to find the resistance of the lamp when a current of 0.5A flows. Remember to include the unit. [4]

You are advised to show your working out.

Resistance = _____

5 **(a)** A boy uses an electric iron for 2 hours. The power rating of the iron is 3.0 kW.

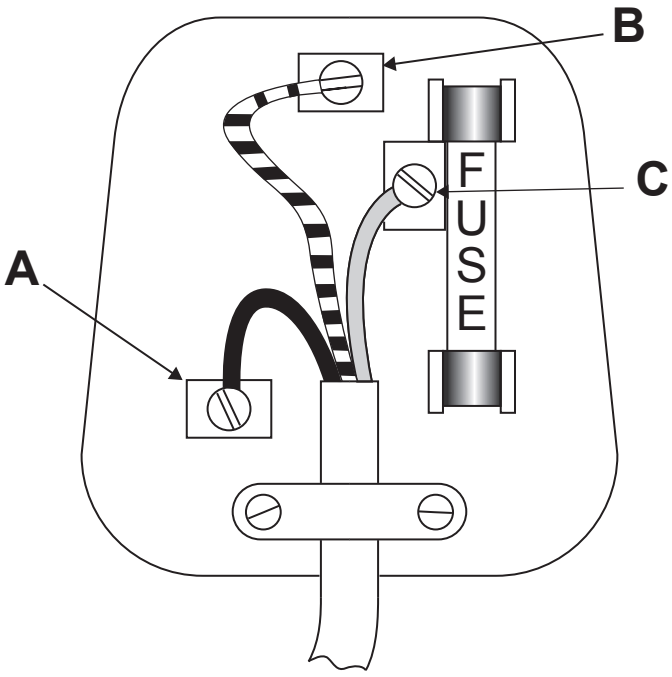
(i) How much electrical energy, in kWh, does the iron use in 2 hours? [1]

Energy = _____ kWh

(ii) How much does it cost to use the iron for 2 hours if one unit of electricity costs 13 p? [1]

Cost = _____ p

(b) The diagram shows a three-pin plug.



(i) Which pin A, B or C is the earth pin? [1]

_____

(ii) What is the colour of the live wire? [1]

_____

(iii) What is the colour of the neutral wire? [1]

_____

(c) The electric kettle has a metal casing.

The wiring inside the kettle is faulty and the live wire is touching the metal casing.

(i) Explain fully what will happen when the kettle is switched on. [3]

(ii) A hairdryer does not have an earth connection. Why is it still safe to use? [1]

(d) Another electric kettle has a power rating of 2800 W.

(i) What current flows through this kettle when it is plugged into the 250 V mains? [3]

You are advised to show your working out.

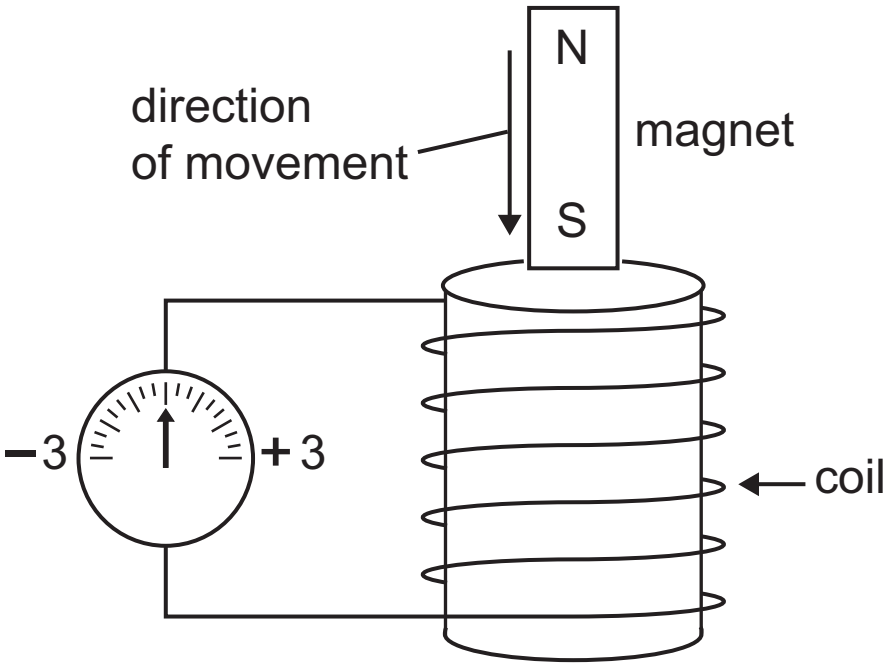
Current = _____ A

The following fuses are available: 1 A, 3 A, 5 A and 13 A.

(ii) Which fuse should be used for this kettle? [1]

Fuse _____ A

6 A bar magnet is moved in the direction shown relative to a coil. The ends of the coil are connected to a centre-zero ammeter.



(a) When a pupil moves the magnet into the coil the needle on the ammeter moves to +2 and then returns to zero.

(i) What happens when the pupil removes the magnet from the coil? [1]

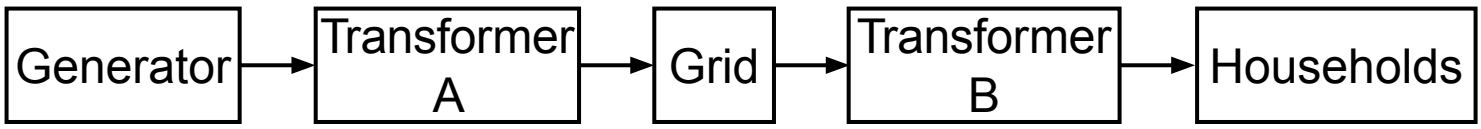
_____

(ii) What would the pupil observe on the ammeter if the magnet is at rest inside the coil? [1]

_____

(b) A transformer uses an alternating current.
Describe what is meant by an alternating current. [2]

(c) Transformers are used in the generation and transmission of electricity.

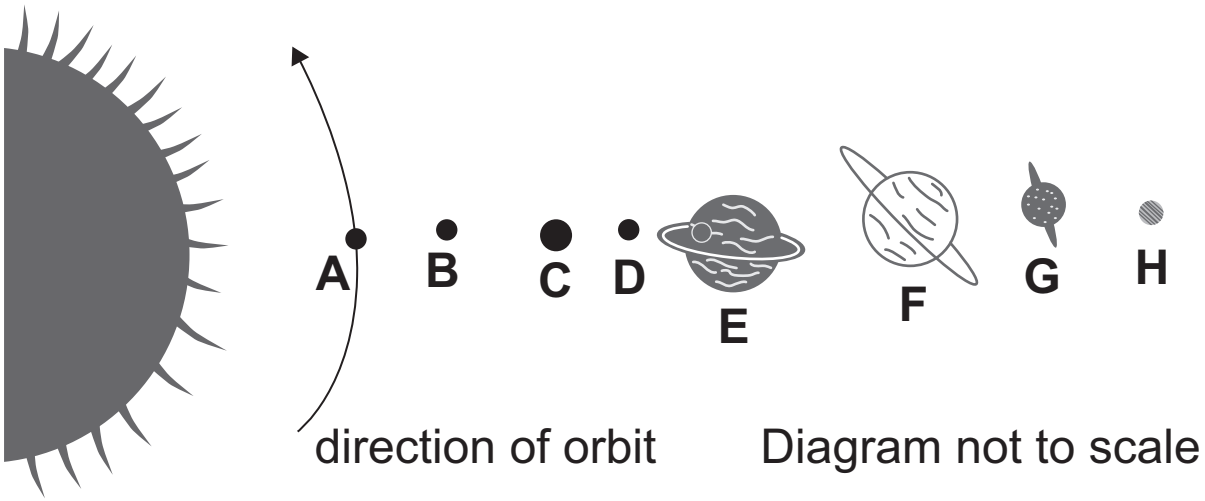


(i) What does transformer A do to the voltage from the generator? [1]

(ii) Describe fully the advantage of using transformer A. [2]

(iii) Describe fully the use of transformer B. [2]

7 The following diagram shows the planets in our Solar System.



(a) (i) Name planets C and D. [1]/[1]

Planet C _____

Planet D _____

(ii) Use a curved arrow to indicate the direction of orbit of planet E. [1]

(iii) State the name of one of the gas planets. [1]

_____

(b) Scientists believe that the Solar System was formed from a cloud of gas and dust.

Describe the different stages in the formation of the Solar System. [6]

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

(c) An artificial satellite orbits the Earth.

(i) Name the attractive force which keeps the satellite in orbit. [1]

_____

(ii) State two uses of artificial satellites. [2]

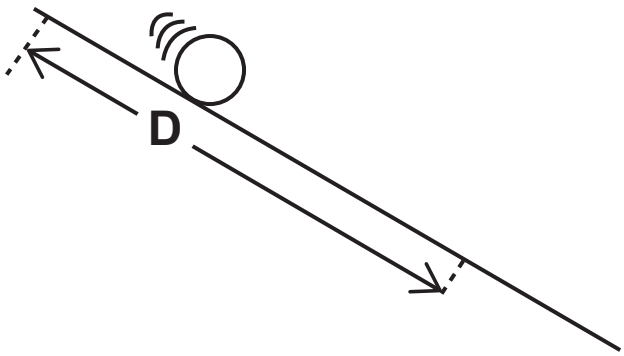
1. _____

2. _____

BLANK PAGE

(Questions continue overleaf)

8 A pupil timed a ball moving down a slope.



The time taken for the ball to travel a distance D was measured on three occasions and the average time T was recorded. This was then repeated for different distances.

Distance D in m	0.0	0.5	1.0	1.5	2.0	2.5
Average time T in s	0.0	1.4	2.0	2.5	2.8	3.2
T^2 in s^2	0.0			6.3		

The pupil is told that distance D is related to time T by the equation

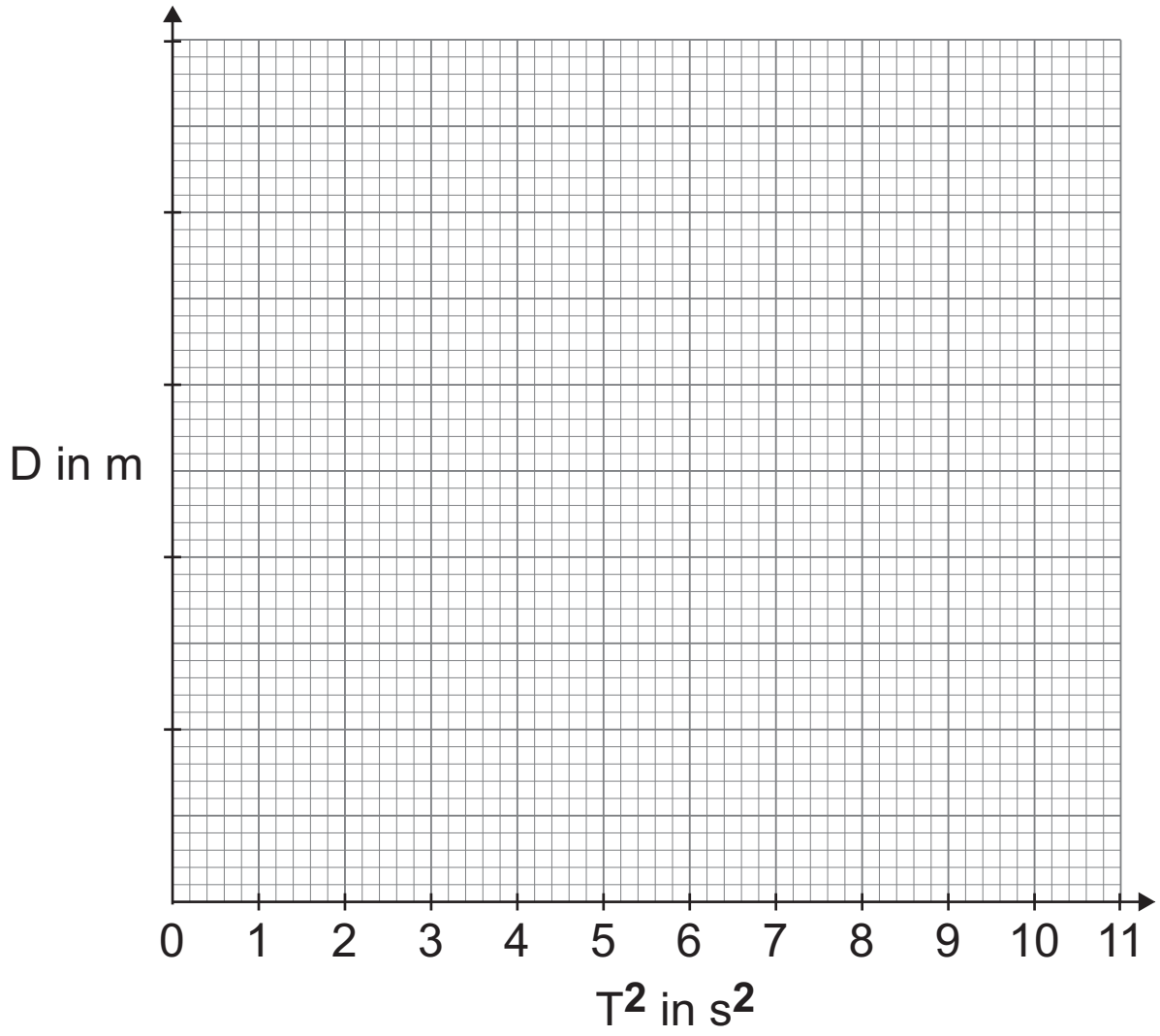
$$D = kT^2$$

where k is a constant.

(i) Complete the table by entering the missing values of T^2 to 1 decimal place. [2]

(ii) Choose a suitable scale and plot a graph of D on the vertical axis versus T^2 on the horizontal axis. [3]

(iii) Draw a straight line of best fit. [1]



(iv) Use your graph to determine the constant k.

Remember to include the units for k. [4]

You are advised to show your working out.

k = _____

Units = _____

SOURCES

Q5(c) - - - Source: CCEA – Copyright: John Boyd

For Examiner's use only	
Question Number	**Marks**
1	
2	
3	
4	
5	
6	
7	
8	
Total Marks	