



Centre Number

71

Candidate Number

General Certificate of Secondary Education  
2013

## Double Award Science: Physics

Unit P2

Foundation Tier

[GSD61]

ML

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 down the right-hand side of pages indicate the marks awarded to each question or part question.

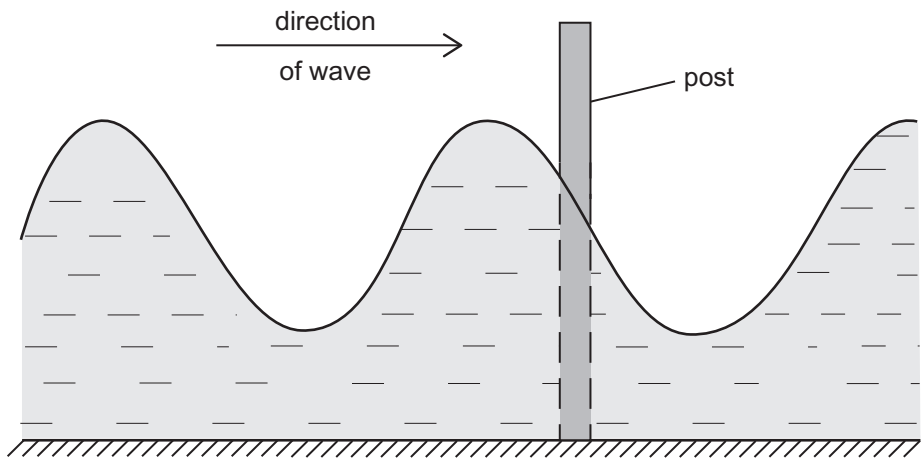
Quality of written communication will be assessed in Question **7(b)**.

For Examiner's  
use only

Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	

Total  
Marks

- 1 A stone is thrown into a lake. This makes water waves. These waves pass a post which sticks out of the water.



In 4 seconds, 12 waves pass the post.

- (i) What piece of apparatus is needed to measure how long it takes twelve waves to pass the post?

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

- (ii) What is the frequency of the wave?  
Remember to write the unit in your answer.

Frequency = \_\_\_\_\_ [2]

- (iii) The waves go from where the stone enters the water, past the post. What do the waves carry?

Choose from the list below and put a tick (✓) in the correct box.

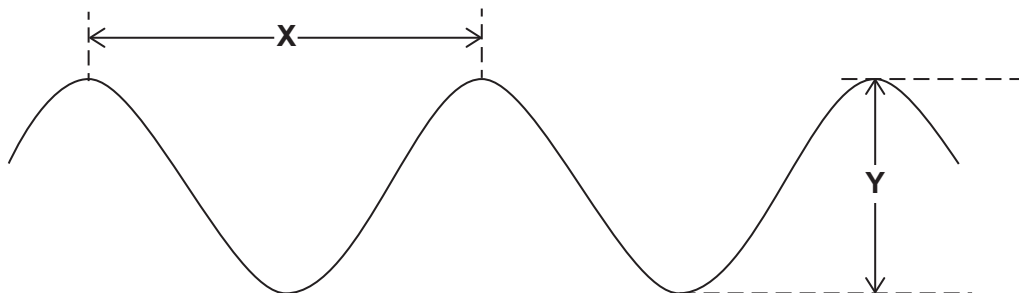
- water
- sound
- energy

[1]

Examiner Only	
Marks	Remark
○	○

- (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?



Distance **X** = \_\_\_\_\_ cm

Distance **Y** = \_\_\_\_\_ cm [2]

- (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.

Show your working out.

Speed = \_\_\_\_\_ cm/s [3]

- (vi) Water waves are transverse waves. Give two other examples of transverse waves.

1. \_\_\_\_\_

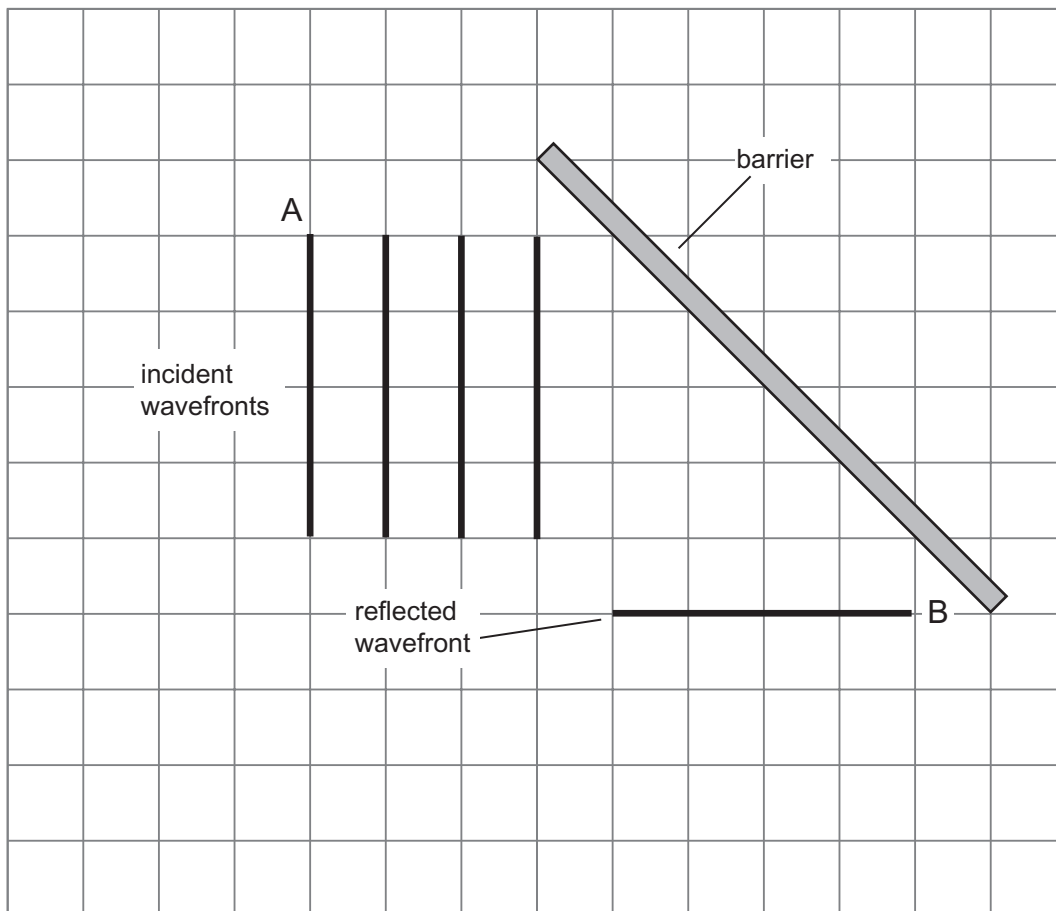
2. \_\_\_\_\_ [2]

Examiner Only

Marks Remark

2 Look at the diagram below. 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** more wavefronts below wavefront B. [3]

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Marks	Remark
○	○

(b) (i) Write the missing word to complete 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. Start with the **smallest** wavelength.

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

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

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

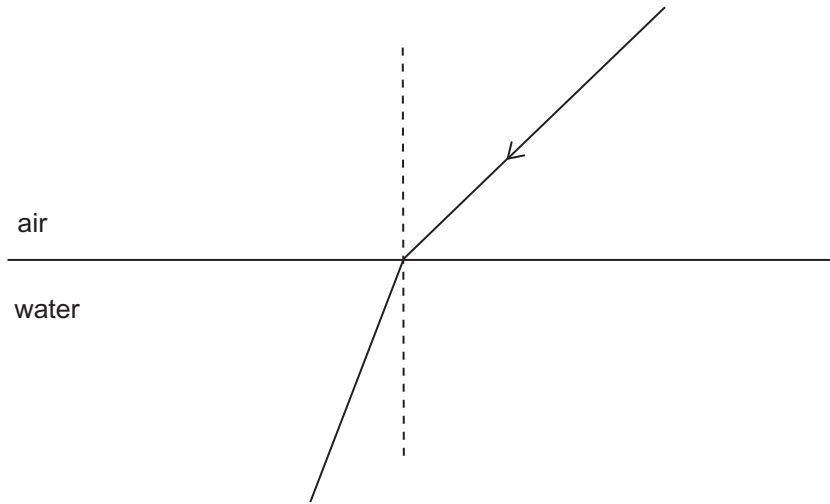
(c) Write down **one** use and **one** danger of infrared radiation.

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

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

Examiner Only	
Marks	Remark

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

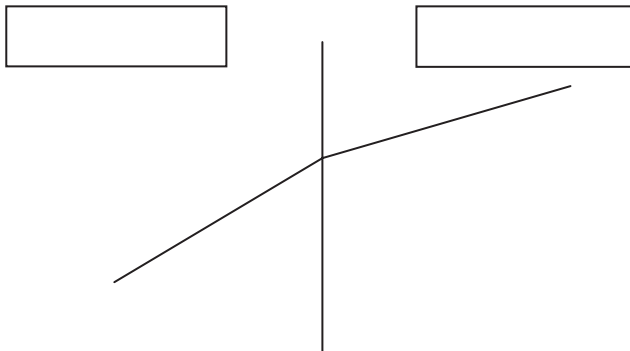


(a) (i) Label the angle of incidence with the letter *i*. [1]

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

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

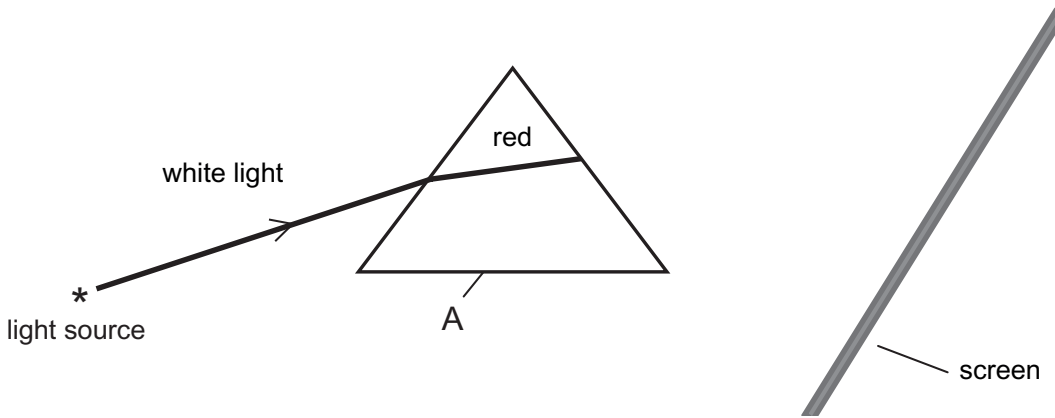
(b) In another example of refraction, a ray of light passes from **glass** into **air**.



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

Examiner Only	
Marks	Remark
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Look at the diagram below. It shows apparatus which is used to split white light into its different colours.



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

Component A is \_\_\_\_\_ [1]

(ii) On the diagram, complete the path of the red ray to the screen. [1]

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

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

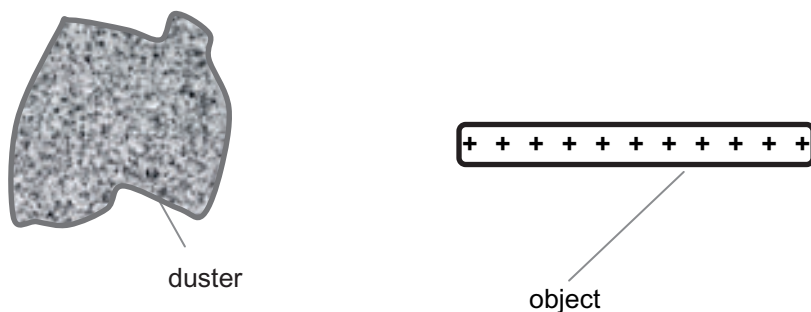
\_\_\_\_\_  
 \_\_\_\_\_ [2]

(v) What is the splitting of white light called?

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

Examiner Only	
Marks	Remark

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



- (a) (i) Choose words from the box to complete the sentence below.

duster	protons	
atoms	electrons	object

The object becomes positively charged because

\_\_\_\_\_ have moved from the \_\_\_\_\_.

[2]

- (ii) What charge is left on the duster?

The charge on the duster is \_\_\_\_\_.

[1]

- (iii) Write the name of a material the object could be made of.

\_\_\_\_\_

[1]

Examiner Only	
Marks	Remark



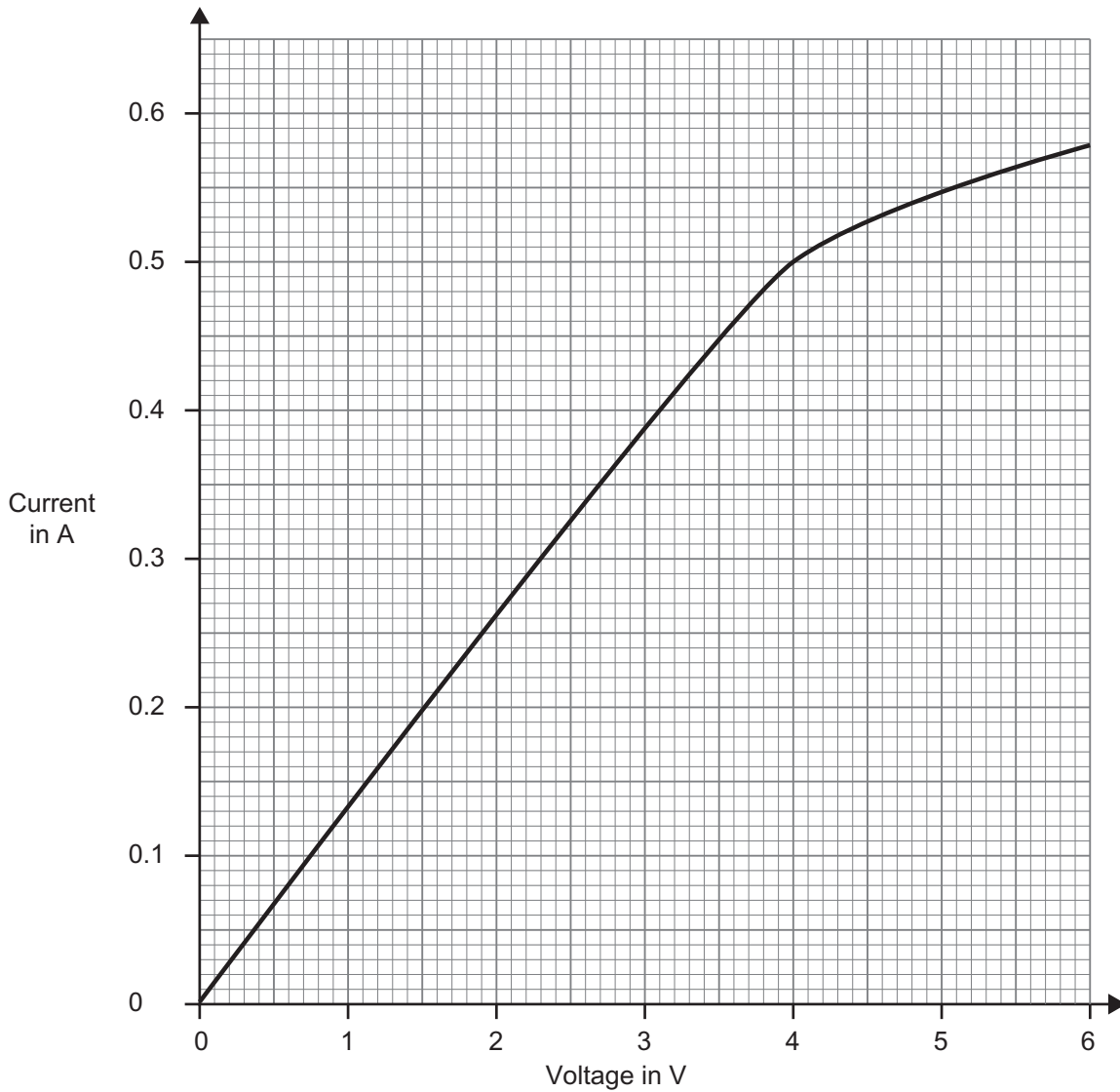
Julie wants to investigate how the current through a filament lamp depends on the voltage across the lamp.

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

[5]

Examiner Only	
Marks	Remark

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



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

Voltage = \_\_\_\_\_ V [1]

(iii) Use your answer to part (ii) to find the resistance of the lamp when a current of 0.5A flows.

Remember to write the unit in your answer.

**Show your working out.**

Resistance = \_\_\_\_\_ [4]

Examiner Only	
Marks	Remark

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**(Questions continue overleaf)**

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

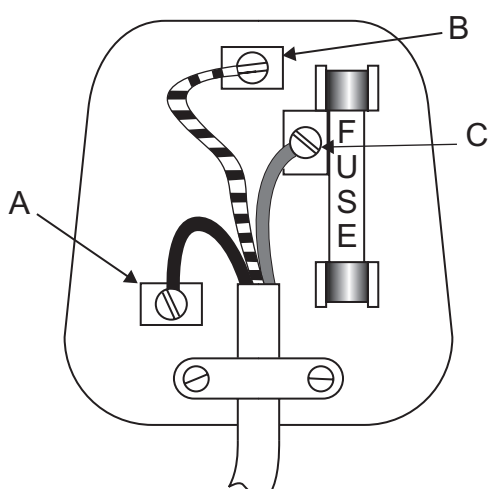
(i) How much electrical energy, in kWh, does the iron use in 2 hours?

Energy = \_\_\_\_\_ kWh [1]

(ii) One unit of electricity costs 13 p. How much does it cost to use the iron for 2 hours?

Cost = \_\_\_\_\_ p [1]

(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]

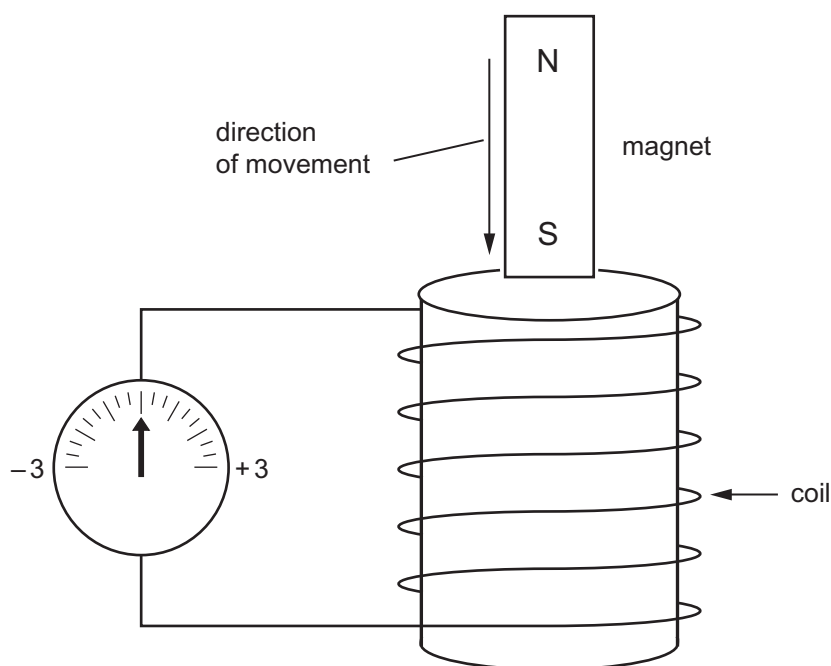
(iii) What is the colour of the neutral wire?

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

Examiner Only	
Marks	Remark
○	○



- 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) When the pupil removes the magnet from the coil, what happens to the ammeter?

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

- (ii) If the magnet is at rest inside the coil, what happens to the ammeter?

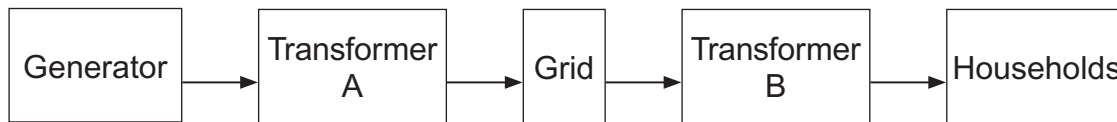
\_\_\_\_\_ [1]

- (b) A transformer uses an alternating current. What is an alternating current?

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

Examiner Only	
Marks	Remark
○	○

(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.

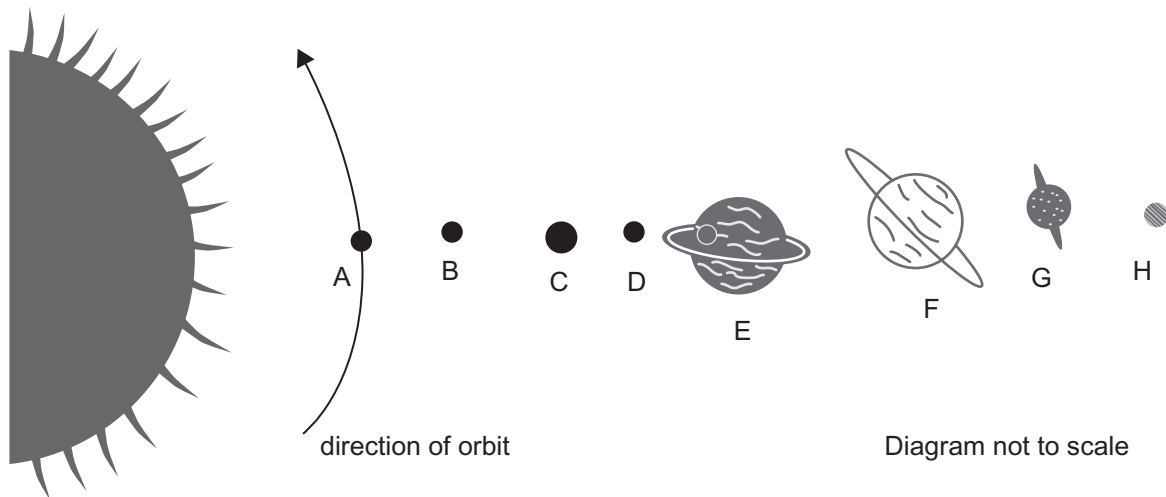
\_\_\_\_\_  
\_\_\_\_\_ [2]

(iii) Describe fully the use of transformer B.

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

Examiner Only	
Marks	Remark

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



(a) (i) Name planets C and D.

Planet C \_\_\_\_\_ [1]

Planet D \_\_\_\_\_ [1]

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

(iii) Write the name of one of the gas planets.

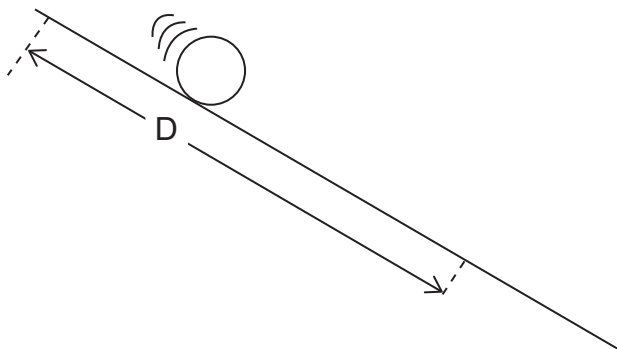
\_\_\_\_\_ [1]

Examiner Only	
Marks	Remark
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8 Look at the diagram below. A pupil timed a ball moving down a slope.



The pupil measured the time taken for the ball to travel a distance D on three occasions. The pupil recorded the average time T. 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		

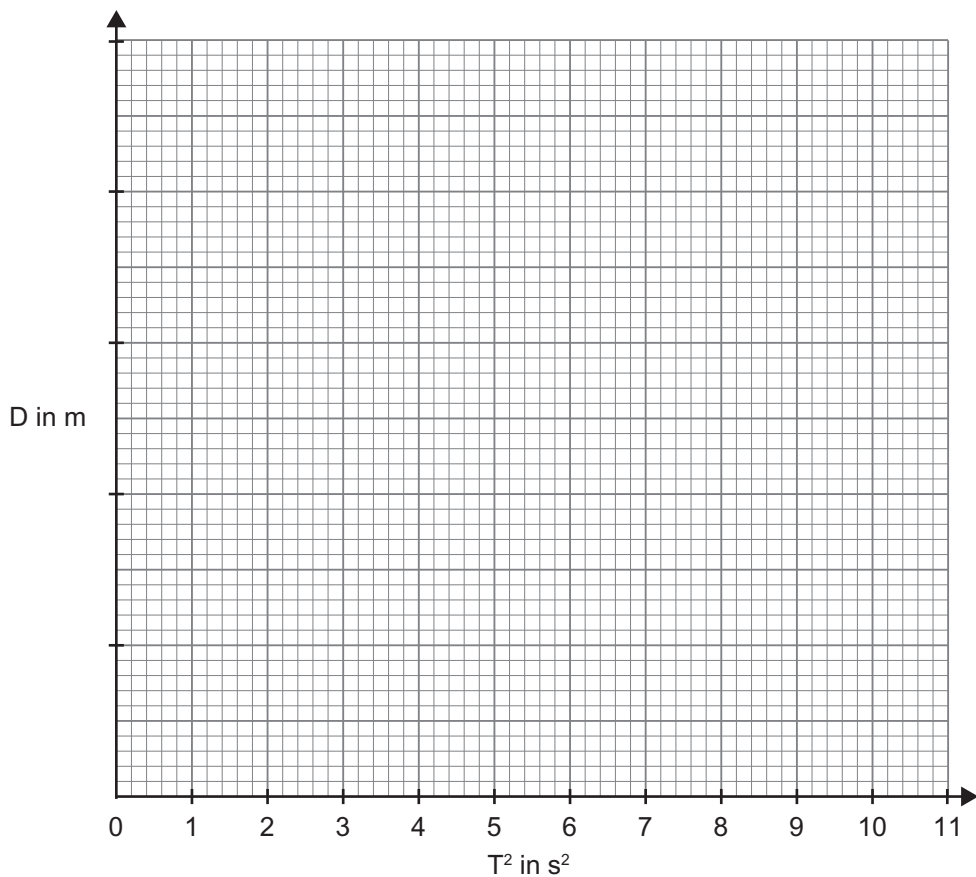
Distance D is related to time T by the equation

$$D = kT^2$$

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 against  $T^2$  on the horizontal axis. [3]
- (iii) Draw a straight line of best fit. [1]

Examiner Only	
Marks	Remark
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Examiner Only	
Marks	Remark

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

In your answer remember to include the units for  $k$ .

**Show your working out.**

$k =$  \_\_\_\_\_

Units = \_\_\_\_\_ [4]

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

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