



General Certificate of Secondary Education  
2014

Centre Number

71

Candidate Number

## Double Award Science: Physics

Unit P2

Foundation Tier

[GSD61]

ML

THURSDAY 12 JUNE 2014, 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 nine** questions.

### INFORMATION FOR CANDIDATES

The total mark for this paper is 90.

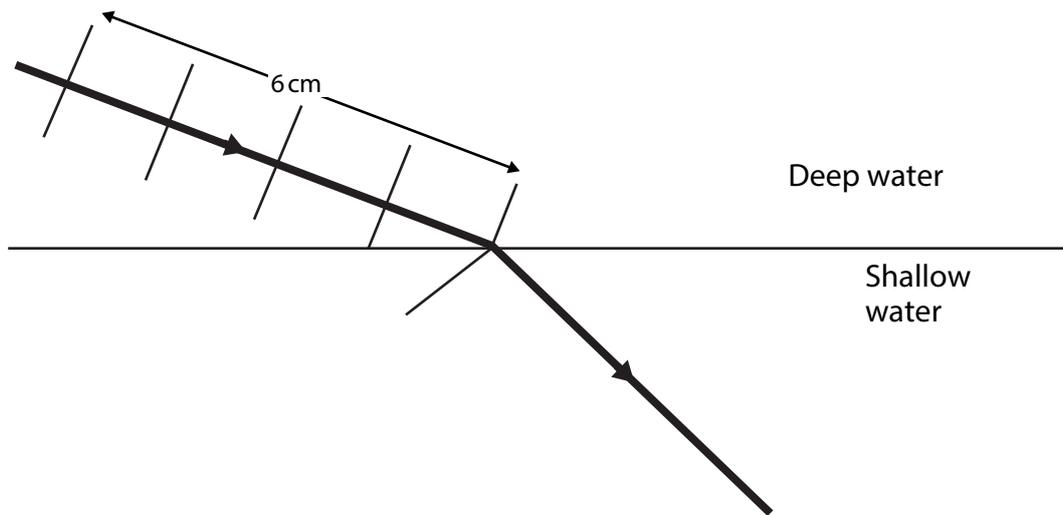
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

Quality of written communication will be assessed in Question **4(c)(ii)**.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	

<b>Total Marks</b>	
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- 1 The following diagram (not to scale) shows water waves travelling through deep water.



- (a) (i) Use the diagram to find the wavelength of the waves in deep water. Remember the diagram is not to scale.

Wavelength = \_\_\_\_\_ cm [1]

- (ii) 10 waves are produced every 5 seconds. What is the frequency of the waves? Remember to include the correct unit.

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

- (iii) Use your answers to parts (a)(i) and (a)(ii) to calculate the speed of waves in deep water in cm/s. **Show your working out.**

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

Examiner Only	
Marks	Remark
○	○



- 2 Ultrasound waves have frequencies which are too high to be detected by the human ear.

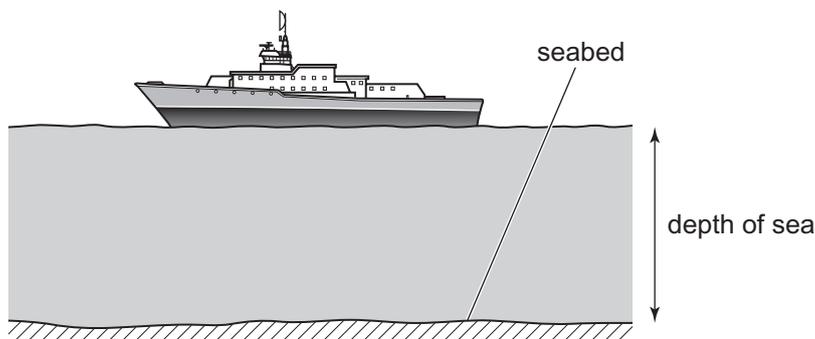
(a) What type of waves are sound and ultrasound waves?

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

(b) Describe a medical application of ultrasound waves.

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

Ultrasound waves are used to measure the depth of the sea.



The speed of ultrasound waves in water is 1500 m/s. The ship sends out a pulse of ultrasound and detects the reflection from the seabed 0.8 s after it is transmitted from the ship.

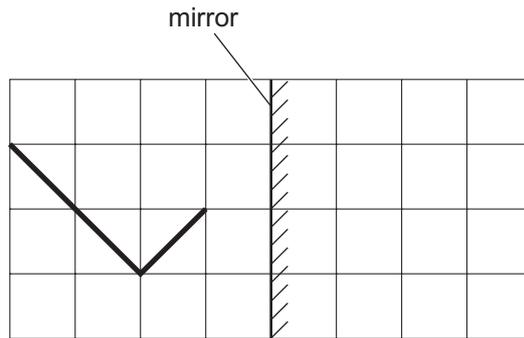
(c) Calculate the depth of the sea.  
**Show your working out.**

Depth of the sea = \_\_\_\_\_ m [4]

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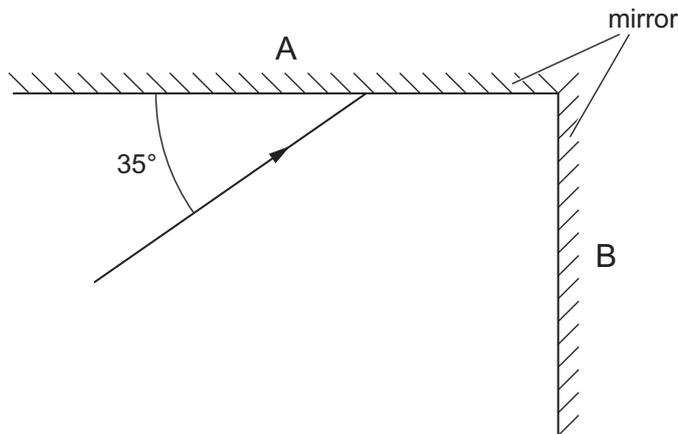
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3 A letter L is put in front of a mirror as shown below.



(a) Use the grid to draw the image of the letter L in the mirror. [2]

Two mirrors are arranged at  $90^\circ$  as shown below. A ray of light is incident on mirror A.



(b) (i) Draw a normal where the incident ray strikes mirror A. Label it N. [1]

(ii) What is the angle of incidence at mirror A?

Angle of incidence = \_\_\_\_\_ [1]

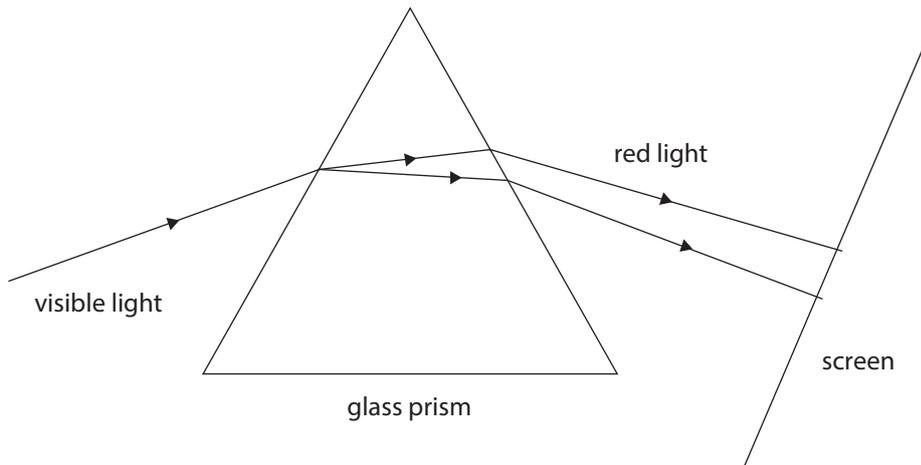
(iii) Continue the ray showing reflection at mirror B. [2]

(iv) Calculate the angle of reflection at mirror B.

Angle of reflection = \_\_\_\_\_ [2]

Examiner Only	
Marks	Remark
○	○

(c) Visible light enters a glass prism.



The visible light is split into different colours.

(i) Name this process.

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

(ii) Starting with red, list the colours, in order, that you would observe on the screen.

Red \_\_\_\_\_

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

(iii) Visible light is a member of the electromagnetic spectrum. Name a member with a wavelength shorter and a member with a wavelength longer than visible light.

1. Shorter wavelength than visible light \_\_\_\_\_

2. Longer wavelength than visible light \_\_\_\_\_ [2]

Examiner Only

Marks Remark

4 Some solids are electrical conductors while others are electrical insulators.

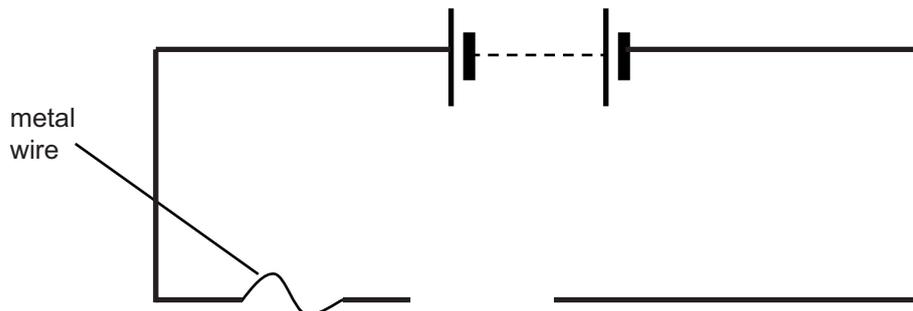
- (a) Explain the difference between electrical conductors and electrical insulators.

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

- (b) A charge of 15C passes through a resistor in a time of 50s.  
How much current flows through the resistor?  
**Show your working out.**

Current = \_\_\_\_\_ A [3]

- (c) Jenny sets up a circuit to measure the resistance of a metal wire.

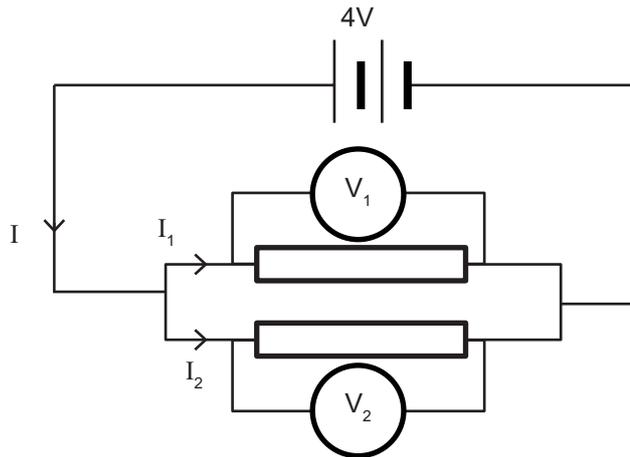


- (i) Complete the diagram of the circuit Jenny would set up to find the resistance of the metal wire. [3]

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Marks	Remark
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- 5 A 4 V battery is connected to two equal resistors in parallel.



- (a) (i) What is the reading on voltmeter  $V_1$ ?

Voltmeter  $V_1 = \text{_____ V [1]}$

- (ii) What is the reading on voltmeter  $V_2$ ?

Voltmeter  $V_2 = \text{_____ V [1]}$

The battery supplies a total current  $I$  which divides into currents  $I_1$  and  $I_2$  as shown above.

Current  $I_1$  is 0.4A.

- (iii) What is current  $I_2$ ?

Current  $I_2 = \text{_____ A [1]}$

- (iv) What is current  $I$ ?

Current  $I = \text{_____ A [1]}$

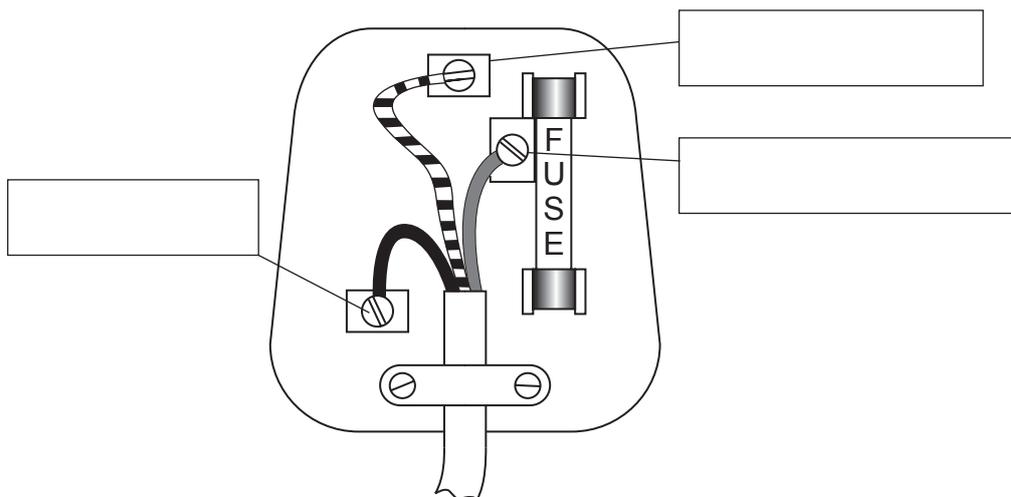
- (v) Each resistor has a resistance of  $10\Omega$ . Calculate their combined resistance.

**Show your working out.**

Combined resistance = \_\_\_\_\_  $\Omega$  [2]

Examiner Only	
Marks	Remark
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- (b) (i) The diagram shows an electrical three pin plug. In the boxes label the pins live, neutral or earth.



[3]

- (ii) State the colour of the live wire.

Colour: \_\_\_\_\_ [1]

- (iii) Wires are connected to the three pins. Which wire protects the user from electric shock?

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

- (iv) The plug is connected to a kettle and a current of 6.0A flows through the live wire. What current flows in the earth wire?

Current = \_\_\_\_\_ A [1]

Examiner Only

Marks Remark

6 (i) What does “direct current” mean?

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

(ii) Name a source of direct current.

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

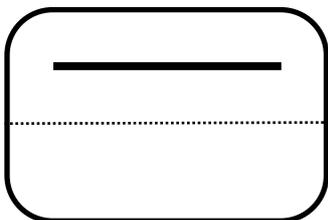
(iii) What does “alternating current” mean?

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

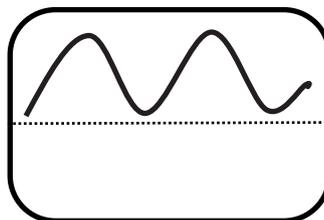
(iv) Name a source of alternating current.

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

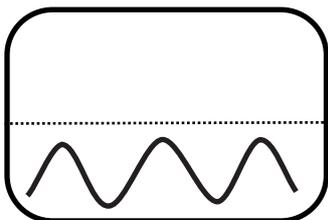
Four traces, A, B, C and D, are shown. The dotted line represents zero voltage.



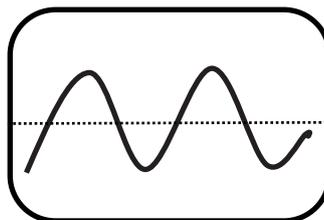
A



B



C



D

(v) 1. Which trace (or traces) represent a.c.?

Trace(s): \_\_\_\_\_

2. Which trace (or traces) represent d.c.?

Trace(s): \_\_\_\_\_ [3]

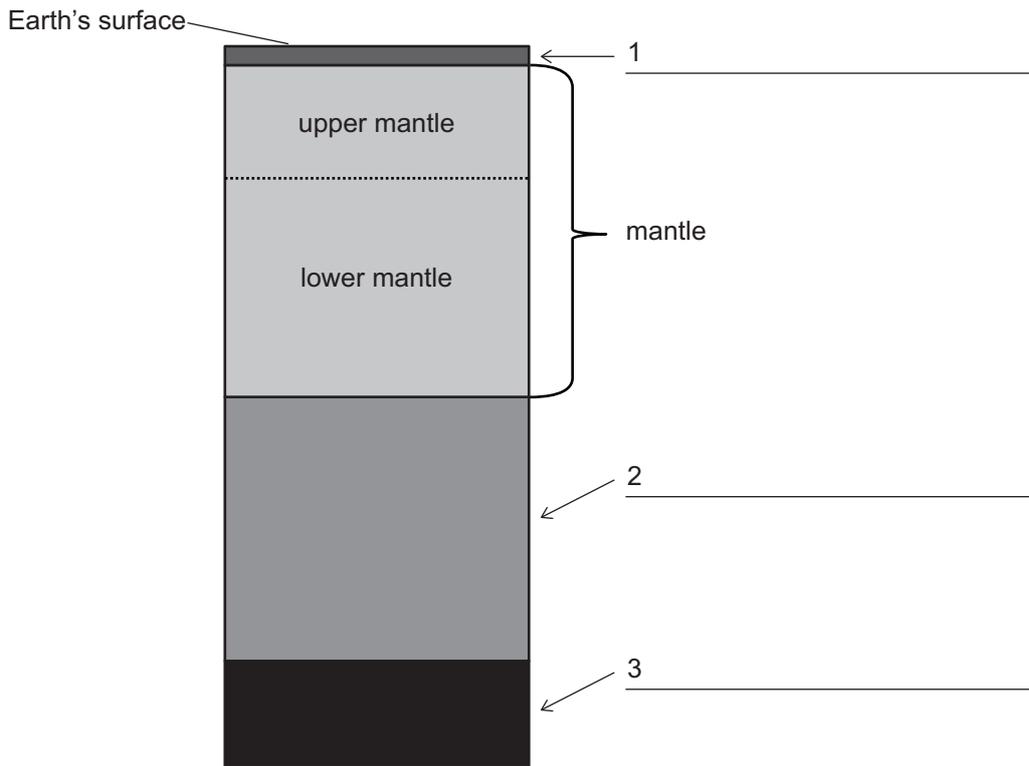
(vi) What instrument would you use to display the above traces?

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

Examiner Only	
Marks	Remark
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**(Questions continue overleaf)**

7 The questions below are concerned with the structure of the Earth. The diagram represents a cross section (not to scale) through the Earth.



(a) The mantle has been labelled for you. Label the layers 1, 2 and 3. [3]

(b) Name two major elements found below the mantle.

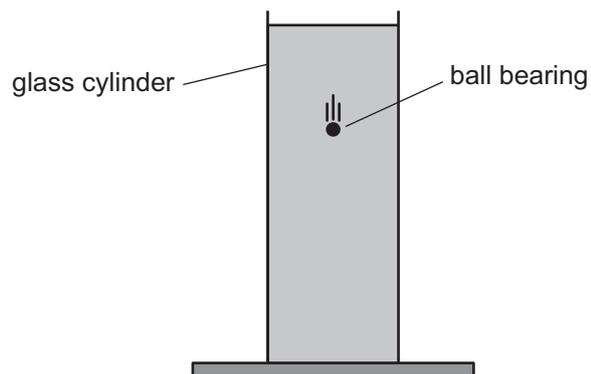
1. \_\_\_\_\_

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

Examiner Only	
Marks	Remark
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- 8 A ball bearing is released at the surface of a liquid contained in a tall glass cylinder.



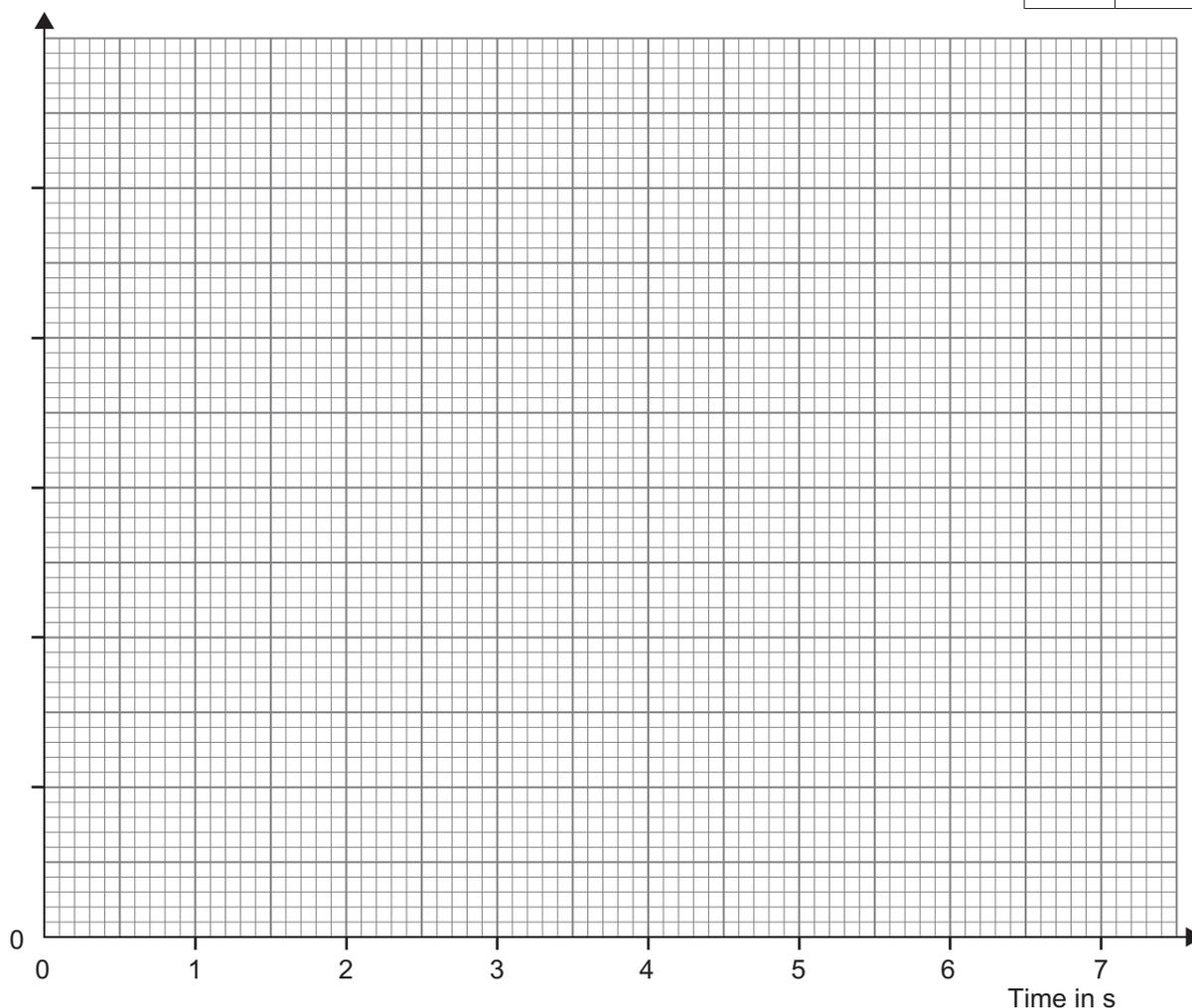
Its velocity is measured every second as it falls through the liquid and the results are recorded in the table.

Time in s	0	1	2	3	4	5	6	7
Velocity in cm/s	0	0.2	0.4	0.6	0.8	1.0	1.0	1.0

- (a) On the graph below choose and label a suitable scale on the vertical axis.

Plot points of velocity against time.

[4]



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Marks	Remark
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(b) Draw the graph. [2]

(c) (i) Over what time interval is there direct proportion between the two quantities?

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

(ii) Explain the reason for your choice.

\_\_\_\_\_

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

(iii) Find the gradient of the graph during the first four seconds and give its unit.

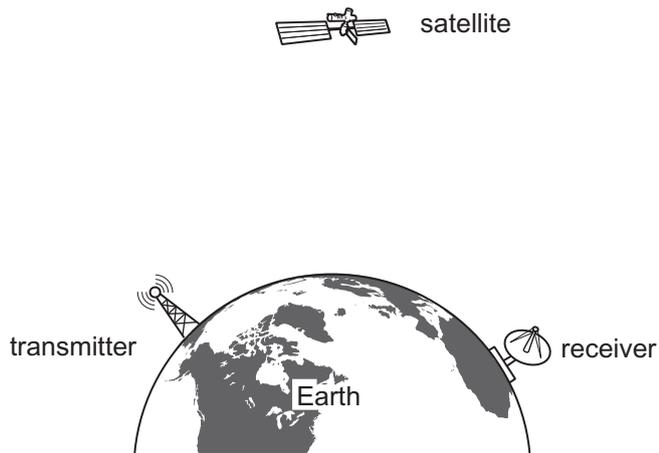
**Show your working out.**

Gradient = \_\_\_\_\_

Unit = \_\_\_\_\_ [3]

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Marks	Remark

- 9 A satellite, situated in space, may be used to pass a microwave signal from one part of the Earth to the other as shown in the diagram.



- (a) What two properties of microwaves allow the signal to travel from the transmitter to the satellite?

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

- (b) Artificial satellites are used for communications. Give two other uses of artificial satellites.

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

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

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

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