



Rewarding Learning

General Certificate of Secondary Education  
2013

Centre Number

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Candidate Number

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## Science: Physics

Unit P2

Foundation Tier

[GPH21]

MONDAY 24 JUNE, MORNING



\*GPH21\*

### TIME

1 hour 30 minutes.

### 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 box, around each page or on blank pages.**

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

Answer **all** questions.

### INFORMATION FOR CANDIDATES

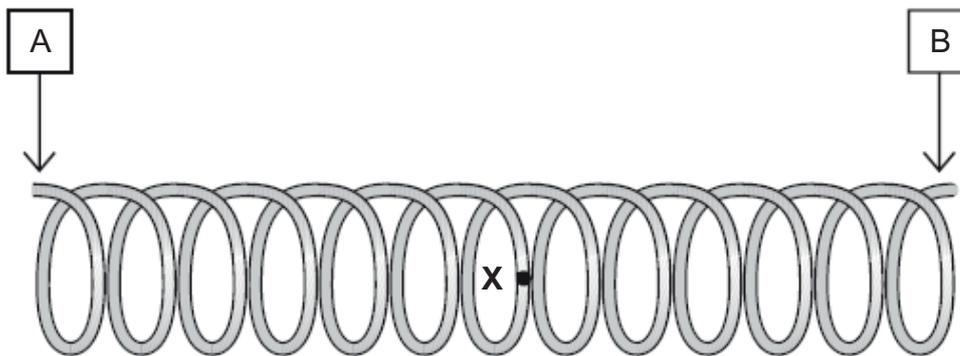
The total mark for this paper is 90.

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(b)**.



- 1 (a) A stretched spring rests on a table.  
A wave travels from end A to end B.



Describe **carefully** how point **X** will move when

- (i) a **transverse** wave passes along the spring;

\_\_\_\_\_

\_\_\_\_\_

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

- (ii) a **longitudinal** wave passes along the spring.

\_\_\_\_\_

\_\_\_\_\_

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

- (iii) Give another example of a transverse wave and another example of a longitudinal wave.

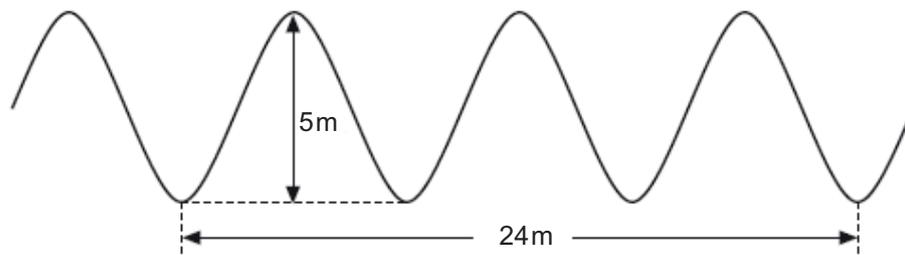
Transverse: \_\_\_\_\_

Longitudinal: \_\_\_\_\_ [2]

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Marks	Remark



(b) The outline of sea waves is shown below. The diagram is not to scale.



(i) What is the amplitude of the waves? \_\_\_\_\_ m [1]

(ii) What is the wavelength of the waves? \_\_\_\_\_ m [1]

In 60 seconds 15 waves pass the end of a pier.

(iii) Calculate the frequency of the waves.

**You are advised to show clearly how you get your answer.**

**Remember to provide the unit with your answer.**

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

(iv) Calculate the speed of the waves.

**You are advised to show clearly how you get your answer.**

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

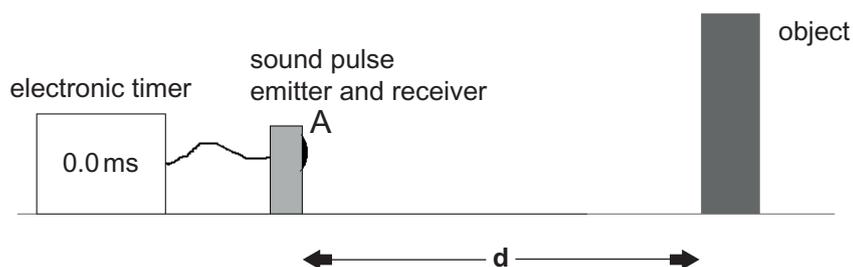
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Marks Remark

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- (c) To study the reflection of sound from a solid object the apparatus below was used.



A pulse of sound was emitted by the device at A and the time taken for the sound pulse to travel **to the object and back again** (round trip time) was measured.

This was repeated for different distances  $d$ .

The results of the investigation are shown in the table below.

Distance $d$ in m	Time for the round trip in ms	Time to travel the distance $d$ in ms
0.2	1.2	
0.4	2.6	
0.6	3.4	
0.8	4.8	
1.0	6.0	

- (i) Complete the table above by calculating the time for the pulse of sound to travel the distance  $d$ . [1]
- (ii) Using the equation below and data from the table calculate the speed of sound.

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$(1 \text{ ms} = 1 \text{ millisecond} = 0.001 \text{ s})$$

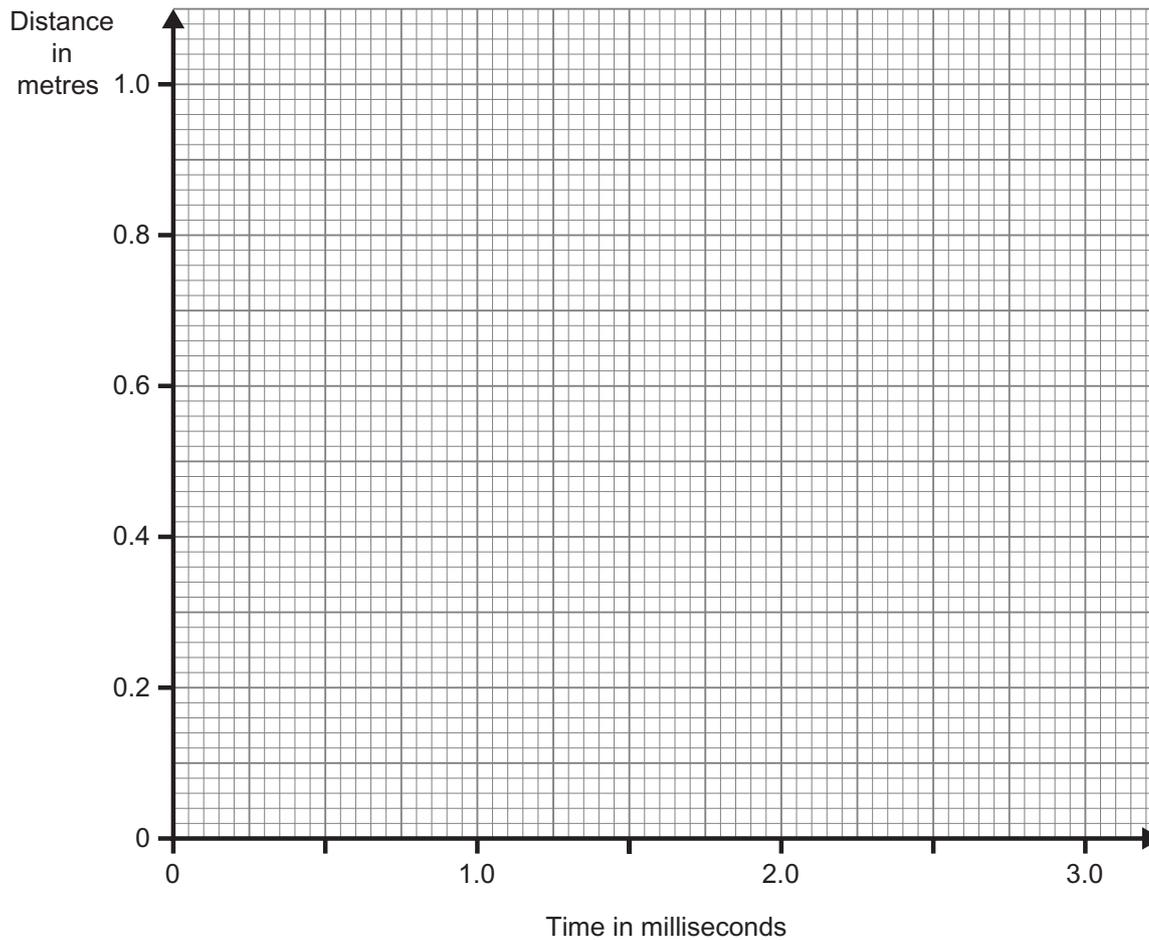
$$\text{Speed of sound} = \underline{\hspace{2cm}} \text{ m/s [3]}$$

Examiner Only

Marks Remark



- (iii) Using the grid below plot a graph of distance  $d$  (y-axis) against time to travel the distance  $d$  (x-axis). Draw a line of best fit through the points. [3]



- (iv) The sound emitter was placed at a distance from the object that gave a **round trip** time of 3.0 ms. Using the graph determine the distance  $d$ .

Distance  $d$  = \_\_\_\_\_ m [1]

Examiner Only

Marks Remark

Total Question 1

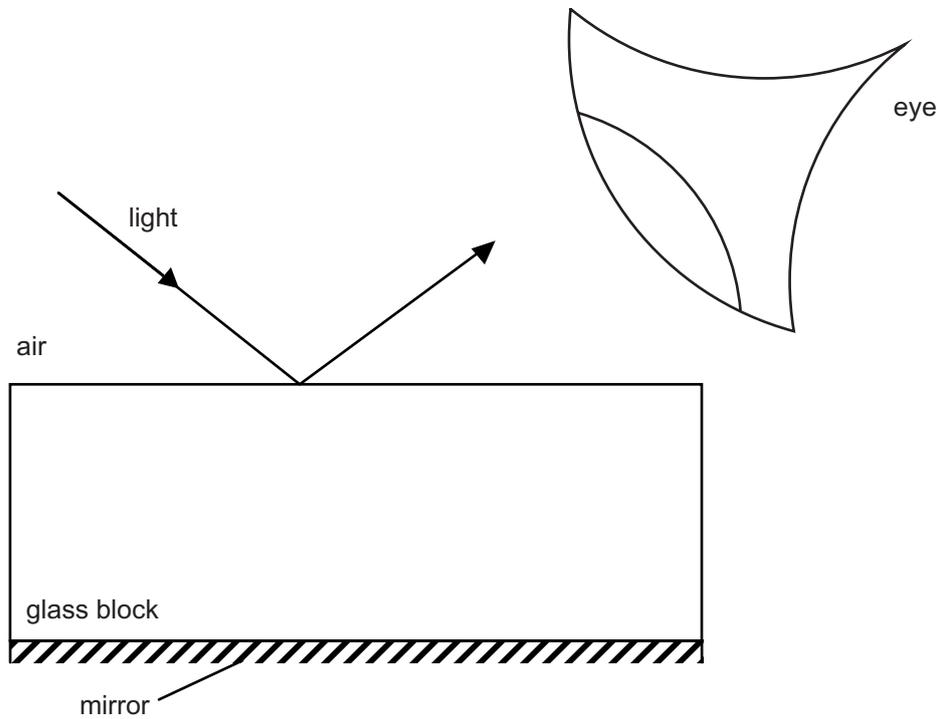
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8005.04R



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- 2 (a) The diagram shows a ray of light incident on a glass block. Some of the light is reflected at the top surface and some of the light passes through the glass and is reflected at the opposite side which has a mirrored surface.



- (i) Complete the path of the ray of light through the glass block and back out into the air towards the person viewing it as shown in the diagram. [3]
- (ii) Explain, in terms of the speed of light, why the ray of light takes the path you have drawn in the glass.

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

\_\_\_\_\_

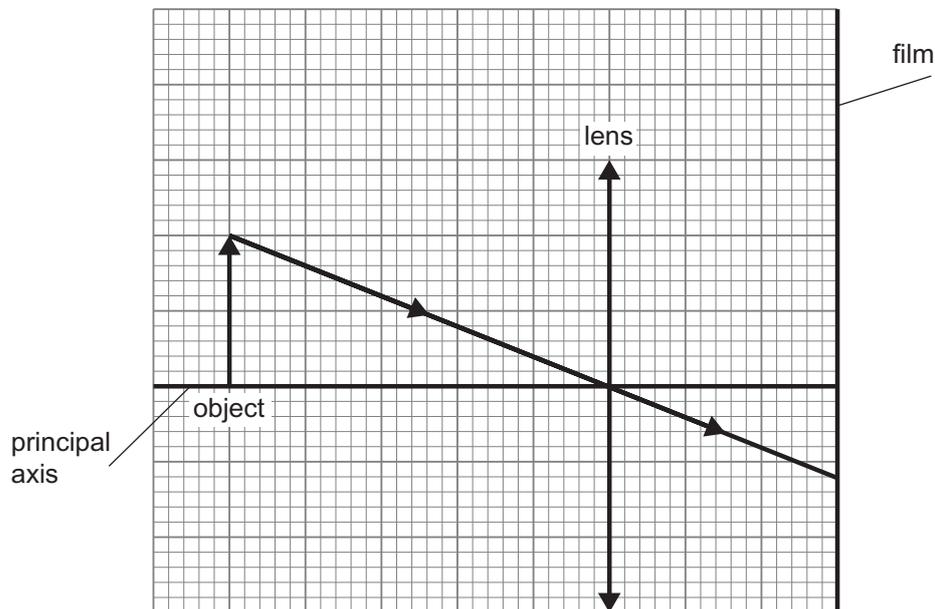
- (iii) What is the relationship between the angle of incidence and the angle of reflection?

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





- (c) In a camera, a lens is used to form an image on the film.  
The diagram below, which is **full scale**, shows the lens of a camera and the film.  
**The lens is adjusted so that a sharp image is formed on the film.**



- (i) What type of lens is used in this camera?

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

- (ii) The first ray from the top of the object has been drawn.  
Draw a second ray from the top of the object so that the position of the principal focus (focus) of the lens can be found.  
Mark the focus with an F. [2]

- (iii) What is the focal length of the lens?

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

- (iv) Which **two** of the words listed below describe the properties of the image formed on the film? Circle those that are correct.

Virtual    Diminished    Real    Magnified    Upright [2]

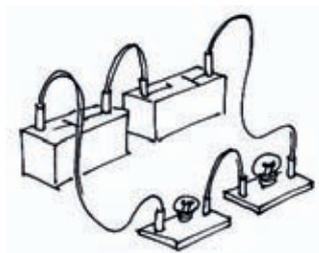
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Total Question 2



- 3 (a) The diagram below shows two 1.5V cells connected to two lamps. The two lamps are lit.



- (i) In the space below draw the circuit diagram, using the standard symbols, for the circuit shown above.

[4]

- (ii) When the two lamps are lit the current flowing in the circuit is 0.2A. Each cell provides a voltage of 1.5V. Calculate the total resistance of the circuit.  
**You are advised to show clearly how you get your answer.**  
**Remember to give a unit with your answer.**

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

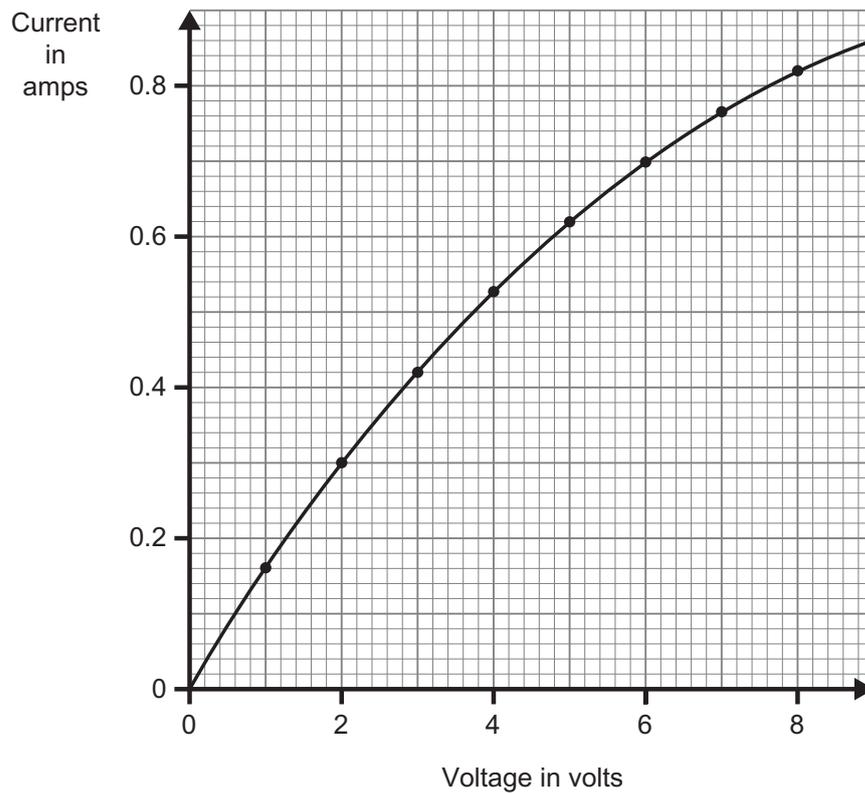
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Marks Remark

(ii) Is the current proportional to the voltage? Explain your answer.

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[2]

(iii) Does the resistance of the component remain constant as the current and voltage are changed? Explain your answer.

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[2]

(iv) What type of component is inside the box?

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[1]

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[Turn over



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- (c) The photograph shows a girl touching an electrostatic generator. The generator gives the girl's hair a positive charge.



© Ted Kinsman / Science Photo Library

- (i) Describe how her hair acquires a positive charge.

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[1]

- (ii) When she touches an object a small spark is seen. What particles are moving in the spark and in what direction do they move?

1. The particles are \_\_\_\_\_

2. The direction in which they move is \_\_\_\_\_

[2]

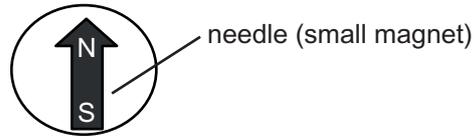
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Total Question 3

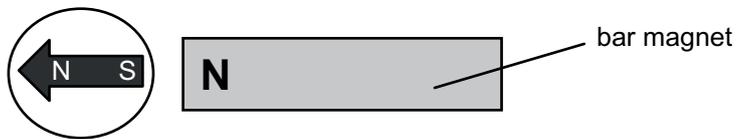


- 4 (a) The diagram below shows a plotting compass which consists of a needle (small magnet) pivoted so that it can move freely. When a magnet is not present it points in the direction shown.



- (i) When the plotting compass is placed close to a bar magnet the needle of the plotting compass points in the direction shown below.

Explain why this happens.




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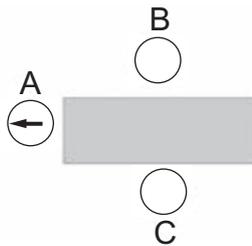
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[1]

In the diagram below, a plotting compass shows the direction of the magnetic field of the bar magnet at position A.



- (ii) Draw arrows in the circles to show the directions of the magnetic field at points B and C. [2]
- (iii) Mark with an S, on the diagram, the south pole of the magnet. [1]

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Marks Remark

[Turn over















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Question Number	Marks
1	
2	
3	
4	
5	
6	

<b>Total Marks</b>	
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Examiner Number

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