

Waves – GCSE Physics Paper 2

1. No.7

0 7

Sound travels as longitudinal waves.

0 7 . 1

Complete the sentences.

Choose the answers from the box.

[2 marks]

amplitude

frequency

speed

wavelength

The distance between the centre of one compression of a sound wave and the centre of the next compression is called the _____.

The number of waves passing a point each second is called the _____.

0 7 . 2

Complete the sentence.

Choose the answer from the box.

[1 mark]

opposite

perpendicular

parallel

In a longitudinal wave, the oscillations are _____
to the direction of energy transfer.

07.3

A sound wave has a frequency of 8.0 kHz.

Which of the following is the same as 8.0 kHz?

[1 mark]

Tick (✓) **one** box.

0.0080 Hz

☐

8.0 Hz

☐

8000 Hz

☐

800 000 Hz

☐

07.4

Calculate the period of a sound wave with a frequency of 8.0 kHz.

Use the Physics Equations Sheet.

[2 marks]

Period = _____ s

0 7 . 5

Calculate the wavelength of a sound wave with a frequency of 6600 Hz.

speed of sound = 330 m/s

Use the equation:

$$\text{wavelength} = \frac{\text{speed}}{\text{frequency}}$$

Choose the unit from the box.

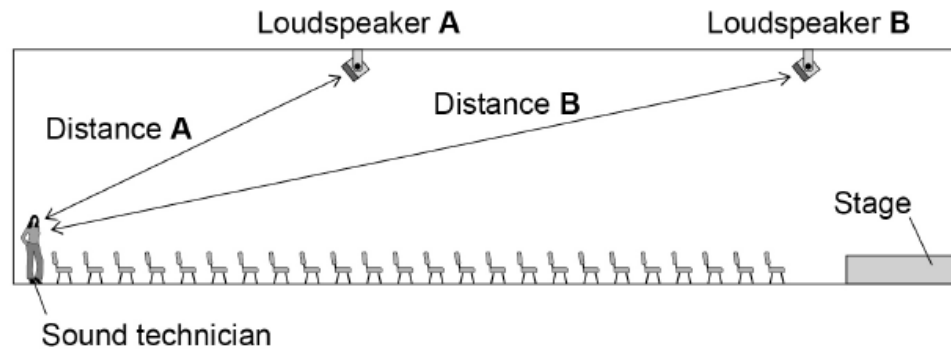
[3 marks]

kg	m	N
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Wavelength = _____ Unit _____

Figure 14 shows the arrangement of two loudspeakers at a concert venue.

Figure 14



The loudspeakers in **Figure 14** are tested by playing the same song through both loudspeakers.

A sound technician listens to the song.

Use the Physics Equations Sheet to answer questions 07.6 and 07.7.

07.6 Write down the equation which links distance (s), speed (v) and time (t).

[1 mark]

07.7 Distance **A** on **Figure 14** is 13.2 m.

speed of sound = 330 m/s

Calculate the time taken for the sound to travel from loudspeaker **A** to the technician.

[3 marks]

Time taken = _____ s

07.8

The sound from each loudspeaker travels at the same speed.

For the sound technician to hear the song clearly, the sound from loudspeaker **B** should be emitted slightly before the sound from loudspeaker **A**.

Explain why.

[3 marks]

2. No.9

0 9

A student used a ray box to shine a ray of light through air into a glass block.

The student investigated how the angle of refraction varied with the angle of incidence.

Table 5 shows the results.

Table 5

Angle of incidence in degrees	Angle of refraction in degrees
10	5
20	10
30	14
40	19
50	23
60	26
70	28
80	29

0 9 . 1

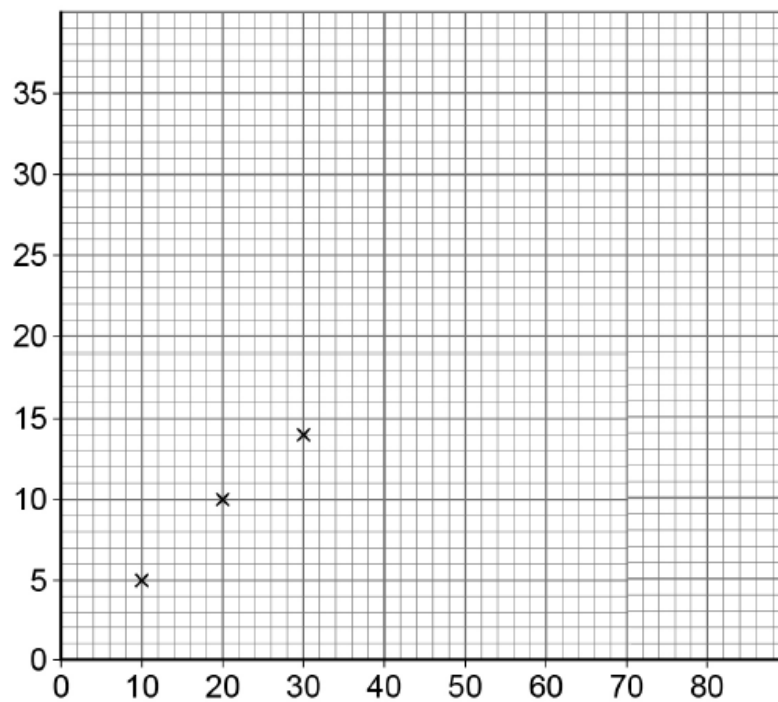
Describe a method the student could have used to obtain the results in Table 5.

Your answer may include a labelled diagram.

[6 marks]

0 9 . 2 Figure 16 is an incomplete graph of the results.

Figure 16



Complete Figure 16 using data from Table 5.

- Label the axes.
- Plot the remaining data.
- Draw a line of best fit.

[4 marks]

09.3

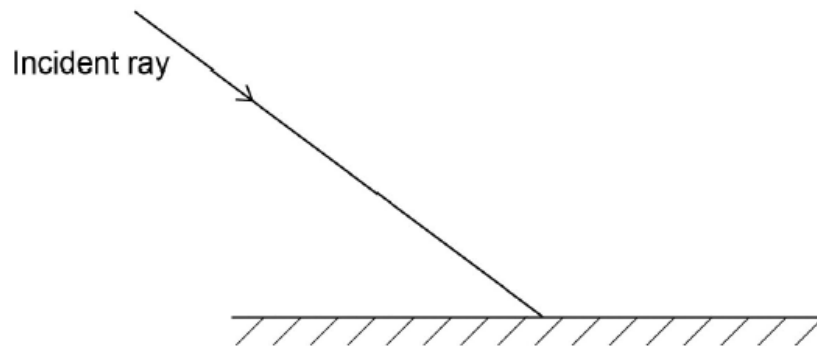
Complete the ray diagram in **Figure 17** to show the reflection of light from the surface of a plane mirror.

You should:

- draw the normal line
- draw the reflected ray.

[2 marks]

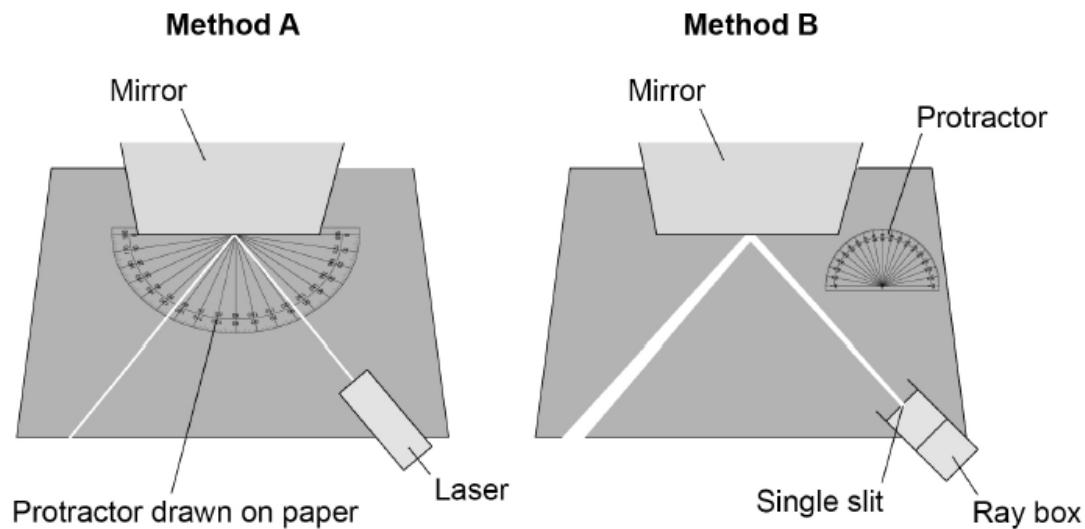
Figure 17



0 9 . 4 Two students investigated the reflection of light by a plane mirror.

Figure 18 shows the different equipment the students used.

Figure 18



Explain **two** ways that **Method A** is better than **Method B**.

[4 marks]

1 _____

2 _____

3. No.5

0 5

Ultraviolet and visible light are both parts of the electromagnetic spectrum.

0 5 . 1

How does the speed of ultraviolet in a vacuum compare to the speed of visible light in a vacuum?

[1 mark]

Tick (✓) **one** box.

Ultraviolet travels at a faster speed than visible light.

☐

Ultraviolet travels at a slower speed than visible light.

☐

Ultraviolet travels at the same speed as visible light.

☐

0 5 . 2

Figure 9 shows parts of the electromagnetic spectrum.

Figure 9

Radio waves	A	B	C	D	X-rays	Gamma rays
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Which letters represent the positions of ultraviolet and visible light in the electromagnetic spectrum?

[2 marks]

Ultraviolet _____

Visible light _____

0 5 . 3 Table 3 shows the range of wavelengths for different types of ultraviolet.

Table 3

Type	Range of wavelength in nanometres
Ultraviolet A (UVA)	315–400
Ultraviolet B (UVB)	280–315
Ultraviolet C (UVC)	100–280

Determine which type of ultraviolet shown in **Table 3** has the largest range of wavelengths.

To gain full marks you must calculate the range of wavelengths for each type of ultraviolet.

[3 marks]

Type of ultraviolet with the largest range of wavelengths _____

Figure 10 shows how different types of ultraviolet are absorbed by the ozone layer in the Earth's atmosphere.

Table 4 shows the relative ionising power from each type of ultraviolet.

Figure 10

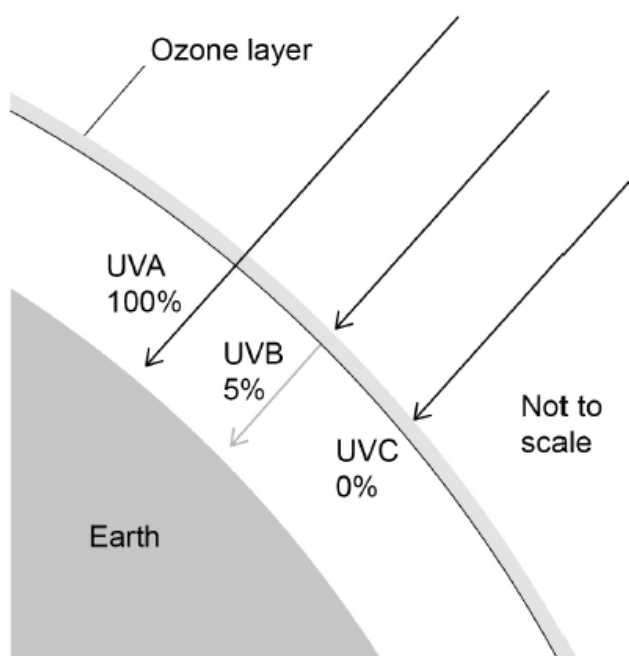


Table 4

Type	Relative ionising power
UVA	Low
UVB	Medium
UVC	High

0 5 . 4

Explain the importance of the ozone layer in reducing the risk to people from all types of ultraviolet.

Use **Figure 10** and **Table 4**.

[4 marks]

0 5 . 5 The Sun emits visible light.

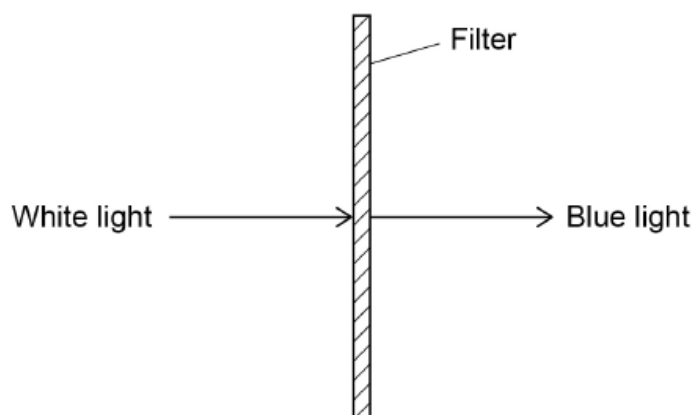
A student concludes that visible light is **not** absorbed by the ozone layer.

Give **one** piece of evidence that shows the student's conclusion is correct.

[1 mark]

0 5 . 6 Figure 11 shows white light incident on a colour filter.

Figure 11



Complete the sentence.

Choose the answers from the box.

[2 marks]

absorbed	radiated	reflected	refracted	transmitted
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When white light is incident on the filter, only blue light is _____

and all other colours of light are _____.

4. No.2

0 2

A student used a ray box to shine a ray of light through air into a glass block.

The student investigated how the angle of refraction varied with the angle of incidence.

Table 1 shows the results.

Table 1

Angle of incidence in degrees	Angle of refraction in degrees
10	5
20	10
30	14
40	19
50	23
60	26
70	28
80	29

0 2 . 1

Describe a method the student could have used to obtain the results in **Table 1**.

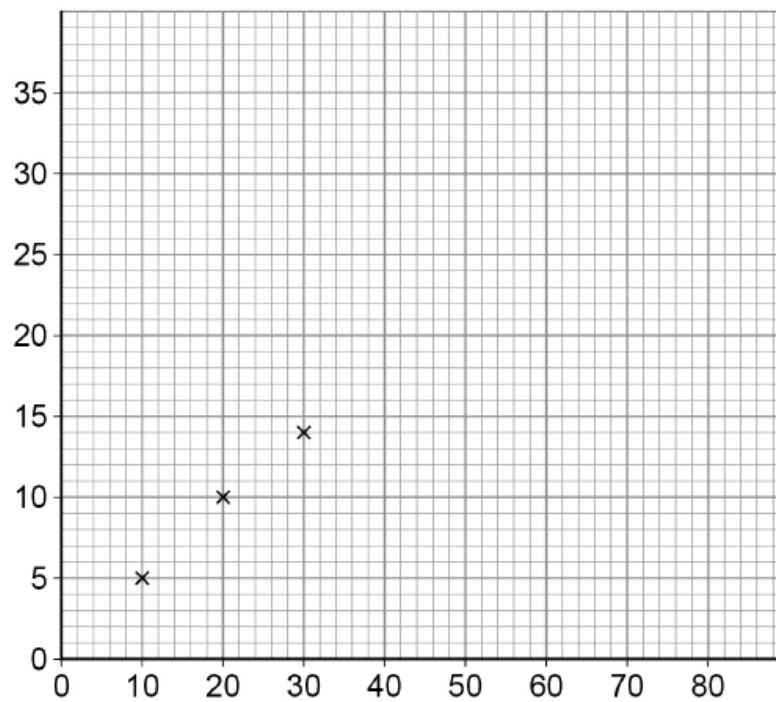
Your answer may include a labelled diagram.

[6 marks]

0 2 . 2

Figure 2 is an incomplete graph of the results.

Figure 2

Complete **Figure 2** using data from **Table 1**.

- Label the axes.
- Plot the remaining data.
- Draw a line of best fit.

[4 marks]

0 2 . 3

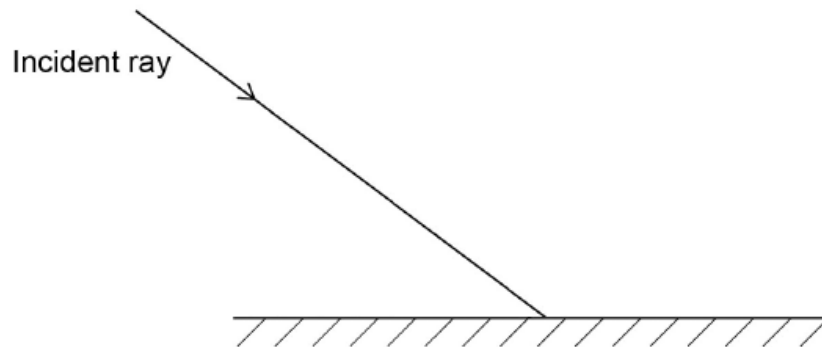
Complete the ray diagram in **Figure 3** to show the reflection of light from the surface of a plane mirror.

You should:

- draw the normal line
- draw the reflected ray.

[2 marks]

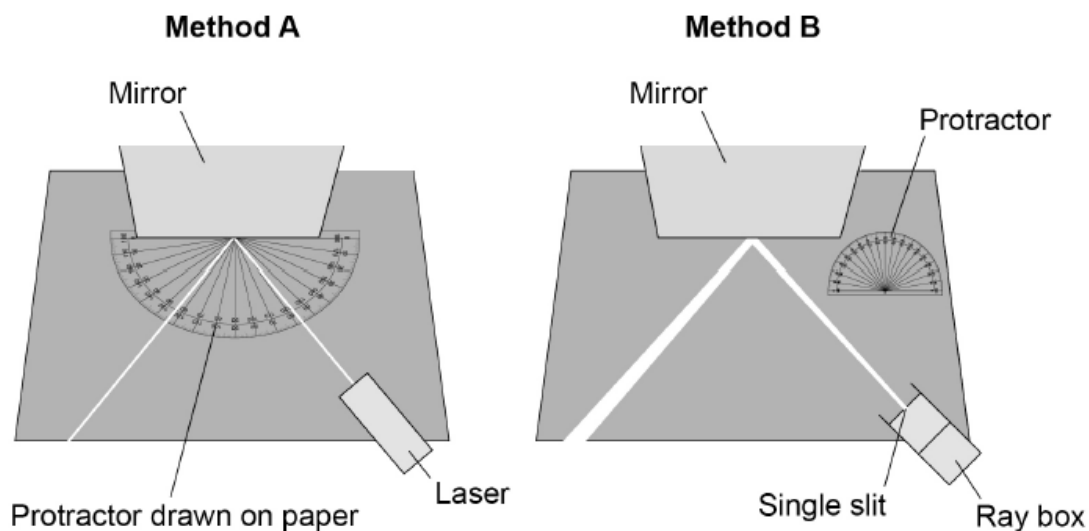
Figure 3



0 2 . 4 Two students investigated the reflection of light by a plane mirror.

Figure 4 shows the different equipment the students used.

Figure 4



Explain **two** ways that **Method A** is better than **Method B**.

[4 marks]

1 _____

2 _____
