

Waves – GCSE Physics Paper 21. **No.1**

0 1

Figure 1 shows a water wave.**Figure 1**

0 1 . 1

What type of wave is a water wave?

[1 mark]Tick (✓) **one** box.

Electromagnetic

☐

Longitudinal

☐

Transverse

☐

0 1 . 2

Which statement describes the movement of the water at point X?

[1 mark]Tick (✓) **one** box.The water at point X does **not** move.
☐

The water at point X moves to the left and right.

☐

The water at point X moves up and down.

☐

0 1 . 3 The wave has a frequency of 2.0 hertz.

The wavelength is 0.032 metres.

Calculate the wave speed.

Use the equation:

$$\text{wave speed} = \text{frequency} \times \text{wavelength}$$

Choose the unit from the box.

[3 marks]

m^2/s

m/s

s^2

Wave speed = _____ Unit _____

0 1 . 4 What is transferred by all waves?

[1 mark]

Tick (✓) **one** box.

Energy

☐

Information

☐

Water

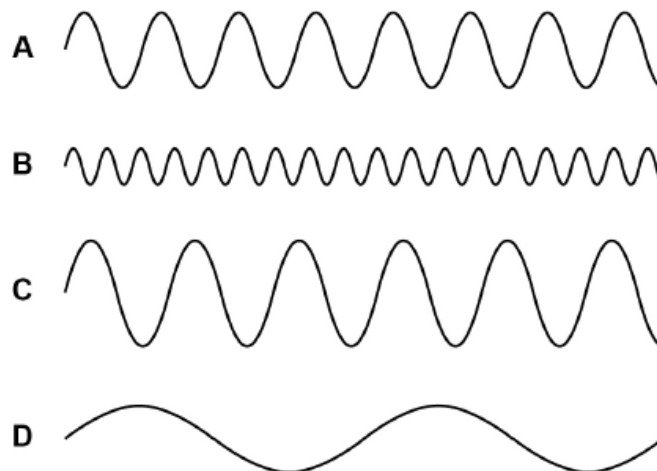
☐

Figure 2 shows four water waves.

The waves are all drawn to the same scale.

The waves all travel at the same speed.

Figure 2



0 1 . 5 Which wave has the longest wavelength?

[1 mark]

Tick (✓) **one** box.

A ☐ B ☐ C ☐ D ☐

0 1 . 6 Which wave has the highest frequency?

[1 mark]

Tick (✓) **one** box.

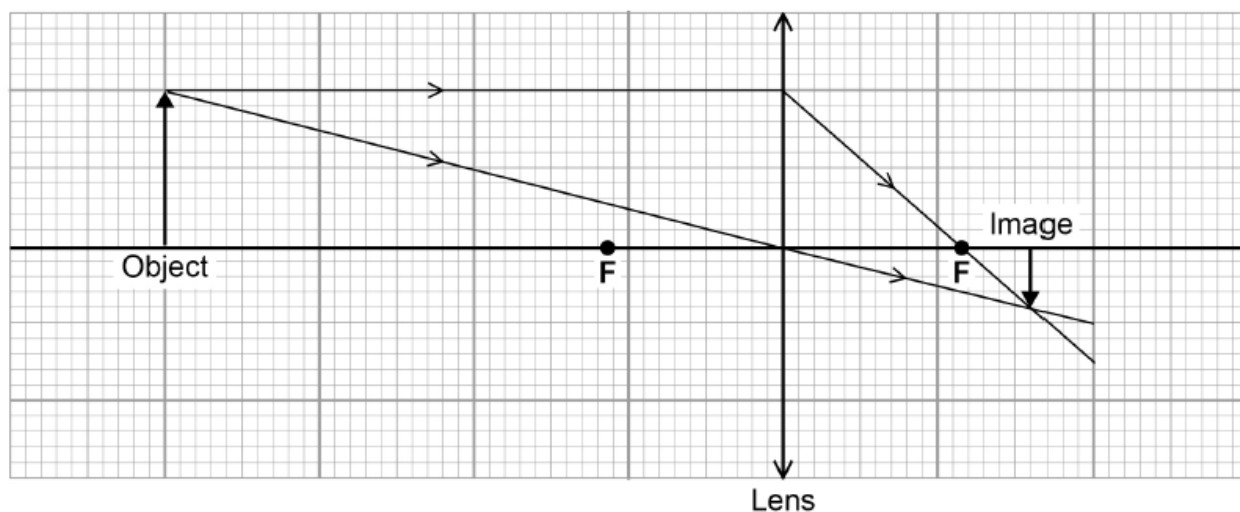
A ☐ B ☐ C ☐ D ☐

2. No.5

0 5

Figure 14 shows how a lens forms an image of an object.

Figure 14



0 5 . 1

What type of lens is represented in Figure 14?

[1 mark]

Tick (✓) one box.

Concave

☐

Convex

☐

Diverging

☐

0 5 . 2

Measure the image height and the object height in Figure 14.

[1 mark]

Image height = _____ cm

Object height = _____ cm

0 5 . 3 Calculate the magnification produced by the lens.

Use the equation:

$$\text{magnification} = \frac{\text{image height}}{\text{object height}}$$

[2 marks]

Magnification = _____

0 5 . 4 Which **two** words describe the image in **Figure 14**?

[2 marks]

Tick (✓) **two** boxes.

Enlarged

☐

Inverted

☐

Real

☐

Upright

☐

Virtual

☐

0 5 . 5 The object was blue.

A student looked at the blue object through a green filter.

Complete the sentences.

Choose answers from the box.

[2 marks]

black	blue	green	red	white
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Looking at the blue object through a green filter makes the object appear

_____.

This is because the green filter only transmits the light that is _____.

3. No.4

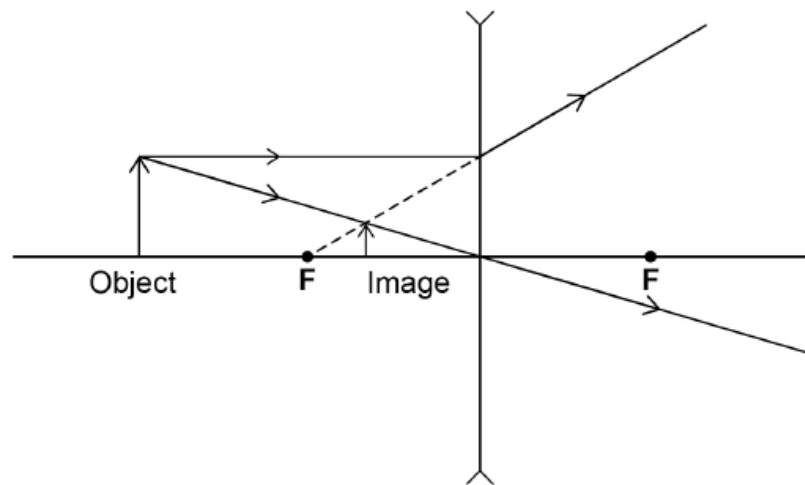
0	4
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Lenses are used to form images of objects.

0	4	.	1
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Figure 6 shows how a concave lens forms an image of an object.

Figure 6

The image of the object in **Figure 6** is upright.Give **two** other words that describe the image.**[1 mark]**

1 _____

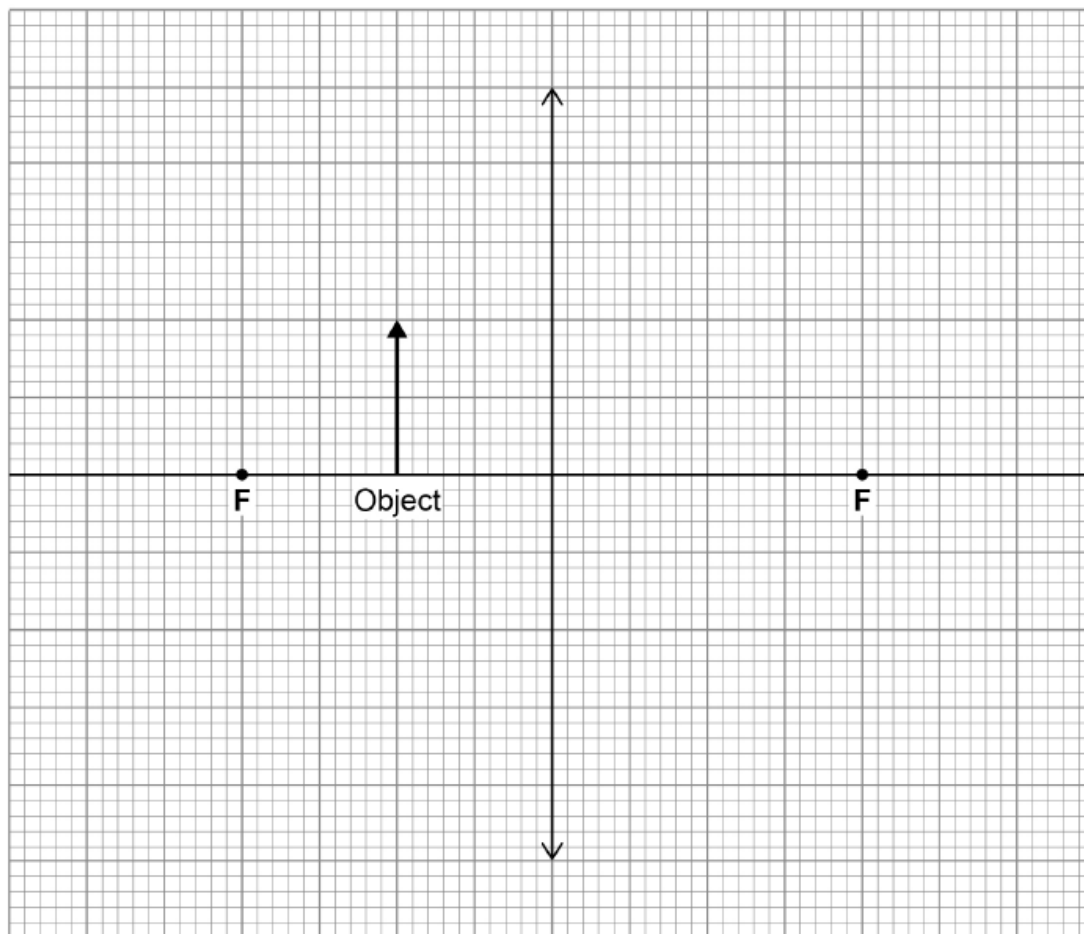
2 _____

0 4 . 2

Figure 7 shows an object near to a **convex** lens.

Complete the ray diagram to show how the image is formed.

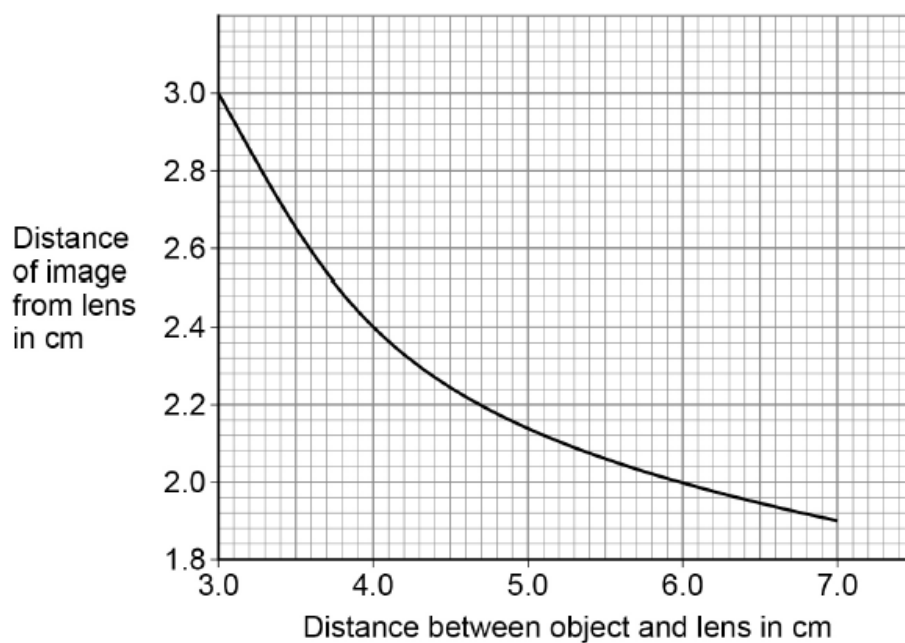
Use an arrow to represent the image.

[3 marks]**Figure 7**

The position of an image formed by a convex lens varies with the distance between the object and the lens.

Figure 8 shows the results of a student's investigation using a convex lens.

Figure 8



0 4 . 3

Describe how the distance of the image from the lens decreases as the distance between the object and the lens increases.

[1 mark]

0 4 . 4 The student measured the distance from the image to the lens four times.

The distance between the object and the lens did not change.

The 4 measurements from the image to the lens were:

1.9 cm 1.7 cm 2.2 cm 1.4 cm

Calculate the uncertainty in the measurements.

[2 marks]

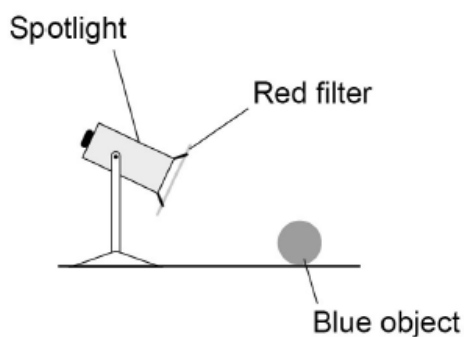
Uncertainty = $\pm$ _____ cm

0 4 . 5 **Figure 9** shows a spotlight containing a convex lens.

A red filter is placed in front of the spotlight.

The spotlight is directed at a blue object.

Figure 9



Explain why the blue object appears black.

[3 marks]

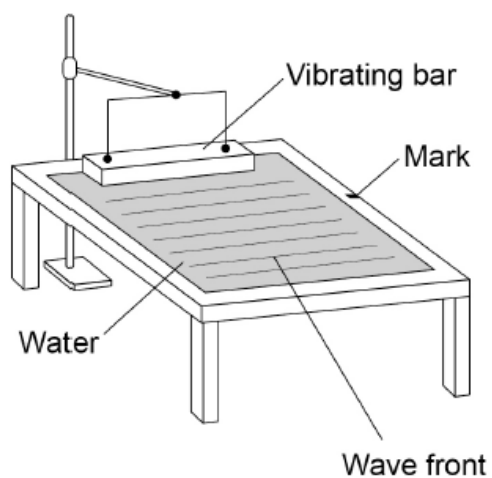
4. No.6

0	6
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A teacher demonstrated some features of waves using a ripple tank.

Figure 10 shows the ripple tank.

Figure 10



0	6	.	1
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The teacher measured the time taken for 10 wave fronts to pass the mark.

The teacher repeated this measurement three times and calculated the mean.

What is the advantage of repeating measurements and calculating a mean?

[1 mark]

0	6	.	2
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The teacher's measurements for the time taken for 10 wave fronts to pass the mark were:

8.4 s

7.8 s

8.1 s

Calculate the mean frequency of the wave.

Give your answer to 2 significant figures.

[5 marks]

Mean frequency (2 significant figures) = _____ Hz

0	6	.	3
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In a different investigation, the teacher wanted to determine the speed of water waves in the ripple tank.

The teacher did **not** measure the wavelength of the wave.

Explain how the teacher could determine the speed of the wave.

[3 marks]
