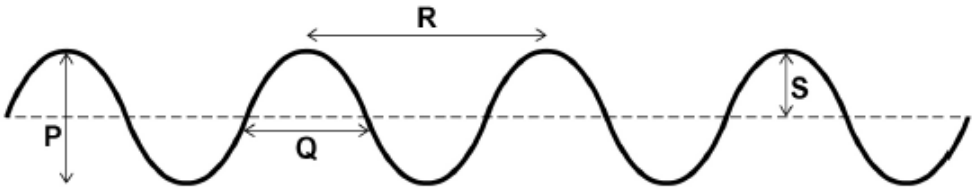
GCSE
PHYSICS

Physics Test 5: Waves (Foundation)

Total number of marks: 35

0 3 **Figure 2** shows some waves.

Figure 2



0 3 . 1 Which arrow represents the wavelength of the waves?

[1 mark]

Tick (✓) **one** box.

P ☐

Q ☐

R ☑

S ☐

0 3 . 2 Which arrow represents the amplitude of the waves?

[1 mark]

Tick (✓) **one** box.

P ☐

Q ☐

R ☐

S ☑

0 3 . 3 The waves have a frequency of 0.20 hertz.

Calculate the period of the waves.

Use the equation:

$$\text{period} = \frac{1}{\text{frequency}}$$

[2 marks]

= $\frac{1}{0.2}$

Period = 5 s

0 3 . 4 The frequency of the waves is increased. The speed of the waves stays the same.

What happens to the wavelength of the waves?

[1 mark]

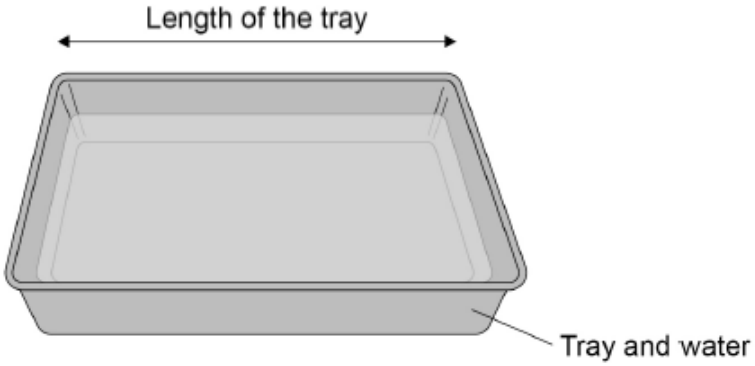
Tick (✓) **one** box.

- The wavelength decreases. ☑
- The wavelength increases. ☐
- The wavelength stays the same. ☐

A student investigated how the speed of water waves is affected by the depth of water in a tray.

Figure 3 shows some water in a rectangular tray.

Figure 3



The student lifted one end of the tray and then dropped it.

This made a wave which travelled the length of the tray.

0 3 . 5 The student measured the length of the tray.

What else should the student measure in order to calculate the speed of the wave?

[1 mark]

Tick (✓) **one** box.

- Area of the bottom of the tray ☐
- Depth of water in the tray ☐
- Temperature of the water in the tray ☐
- Time taken by the wave to travel the length of the tray ☑

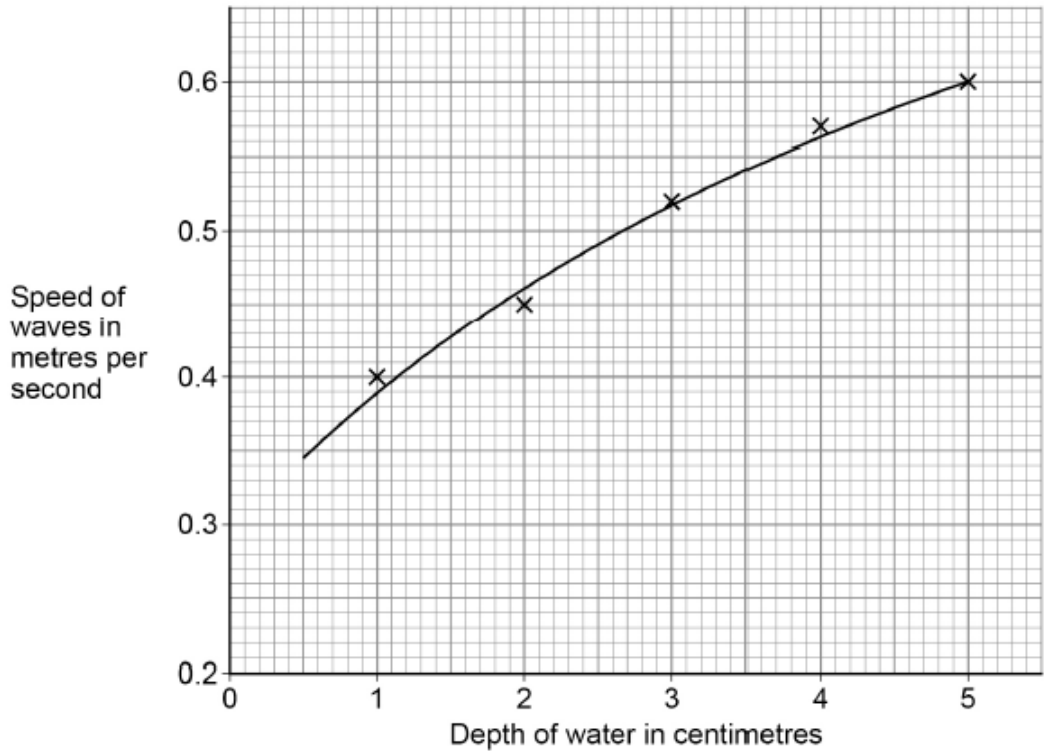
0 3 . 6 What was the independent variable in this investigation?

[1 mark]

- [x] Depth of water
- [ ] Length of tray
- [ ] Speed of waves

Figure 4 shows the results.

Figure 4



0 3 . 7 Give **one** conclusion that can be made from **Figure 4**.

[1 mark]

As depth of water increase, speed of wave increases.

0 3 . 8 What was the speed of a wave when the depth of water was 2.5 cm?

[1 mark]

Speed of wave = 0.49 m/s

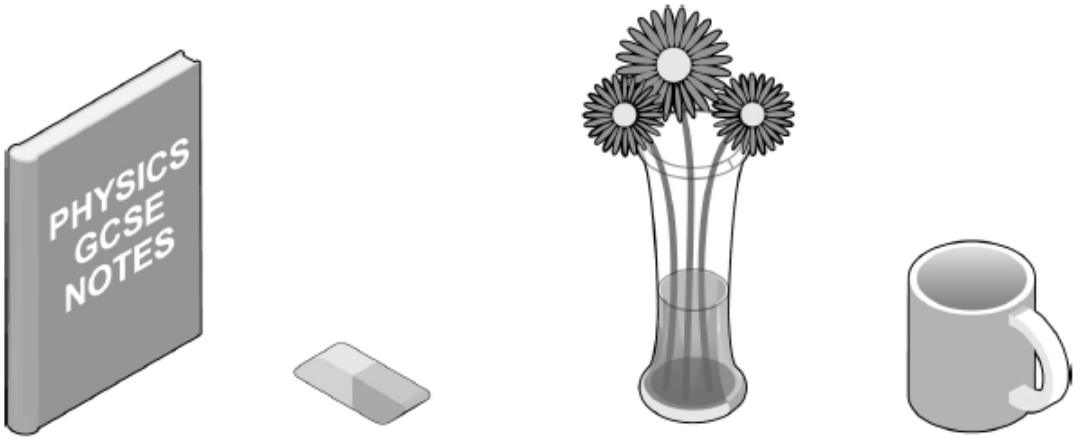
0 5 Some objects are transparent and some objects are opaque.

0 5 . 1 Which **one** of the objects in **Figure 5** is transparent?

Tick **one** box.

[1 mark]

Figure 5



Book	Pencil rubber	Glass vase	Ceramic mug
☐	☐	☑	☐

0 5 . 2 Complete the sentence.

Choose an answer from the box.

[1 mark]

absorb	reflect	transmit

An opaque object does not transmit light.

A student wears a white T-shirt and a red baseball cap to a party.

0 5 . 3 Why does the T-shirt look white in white light?

[1 mark]

None of the frequencies of light are absorbed.

0 5 . 4 Explain how the colour of the baseball cap appears to change when the room lights at the party change from white to blue.

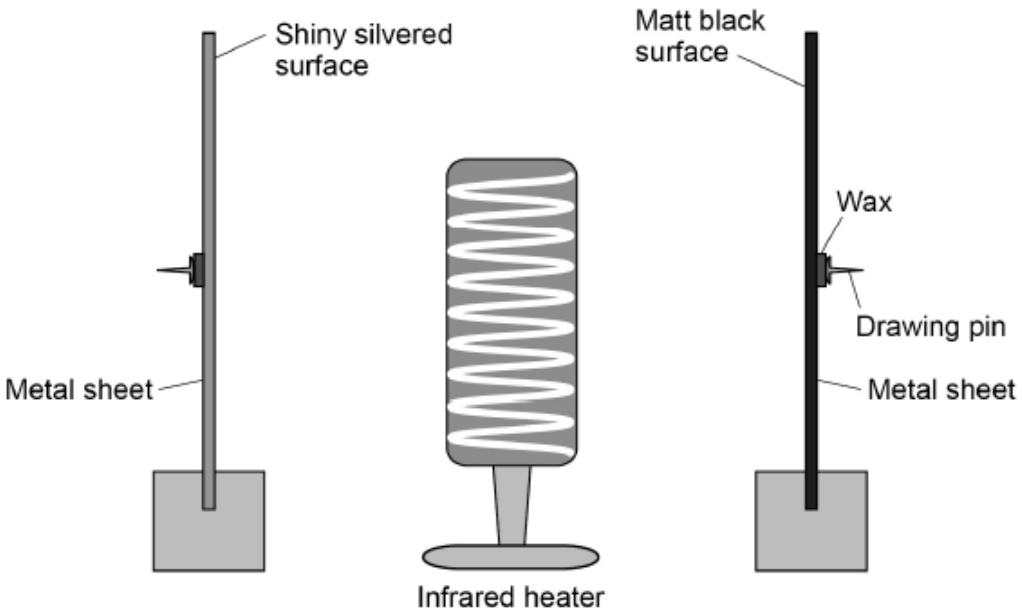
[2 marks]

Red objects absorb all other colors, so most of the blue light will be absorbed and object will appear dark.

A student investigated how the type of surface affects the amount of infrared radiation the surface absorbs.

Figure 6 shows the equipment that the student used.

Figure 6



The metal sheets absorb infrared radiation. The wax melts and the drawing pins fall off the surfaces.

0 5 . 5 In the investigation there are several variables.

Draw **one** line from each variable to the correct description of that variable.

[2 marks]

Variable	Description
Control	Distance from the metal sheets to the infrared heater.
Dependent	The surface colour of the metal sheets.
Independent	Time taken for the drawing pins to fall off.

0 5 . 6 What is the main hazard in this investigation?

[1 mark]

The infrared heater is very hot and may burn the student.

0 5 . 7 The drawing pin attached to the matt black metal sheet fell off first.

What can be concluded from this result?

[1 mark]

Matt Black absorbed more infrared radiation compared to shiny silver.

0 5 . 1 Which **one** of the following is **not** an electromagnetic wave?

[1 mark]

Tick **one** box.

- Gamma rays ☐
- Sound ☑
- Ultraviolet ☐
- X-rays ☐

0 5 . 2 What type of electromagnetic wave do our eyes detect?

[1 mark]

Light waves

0 5 . 3 What is a practical use for infrared waves?

[1 mark]

Tick **one** box.

- Cooking food ☑
- Energy efficient lamps ☐
- Medical imaging ☐
- Satellite communications ☐

Scientists have detected radio waves emitted from a distant galaxy.

Some of the radio waves from the distant galaxy have a frequency of 1 200 000 000 hertz.

0 5 . 4 Which is the same as 1 200 000 000 hertz?

[1 mark]

Tick **one** box.

- 1.2 gigahertz ☑
- 1.2 kilohertz ☐
- 1.2 megahertz ☐
- 1.2 millihertz ☐

0 5 . 5 Radio waves travel through space at 300 000 kilometres per second (km/s).

How is 300 000 km/s converted to metres per second (m/s)?

[1 mark]

Tick **one** box.

- 300 000 ÷ 1000 = 300 m/s ☐
- 300 000 × 1000 = 300 000 000 m/s ☑
- 300 000 + 1000 = 301 000 m/s ☐
- 300 000 – 1000 = 299 000 m/s ☐

0 5 . 6 Write the equation which links frequency, wavelength and wave speed.

[1 mark]

$v = f\lambda$

0 5 . 7 Calculate the wavelength of the radio waves emitted from the distant galaxy.

Give your answer in metres.

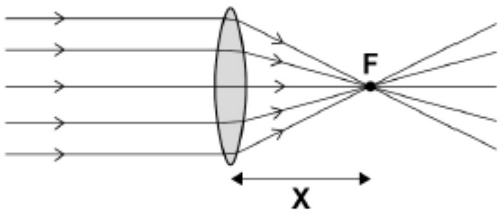
[3 marks]

$3 \times 10^{8} = 1.2 \times 10^{9} \times \lambda$

Wavelength = 0.25 m

0 8 . 1 **Figure 20** shows parallel rays of light being refracted by a convex lens.

Figure 20



What is distance '**X**' called?

[1 mark]

Focal Length

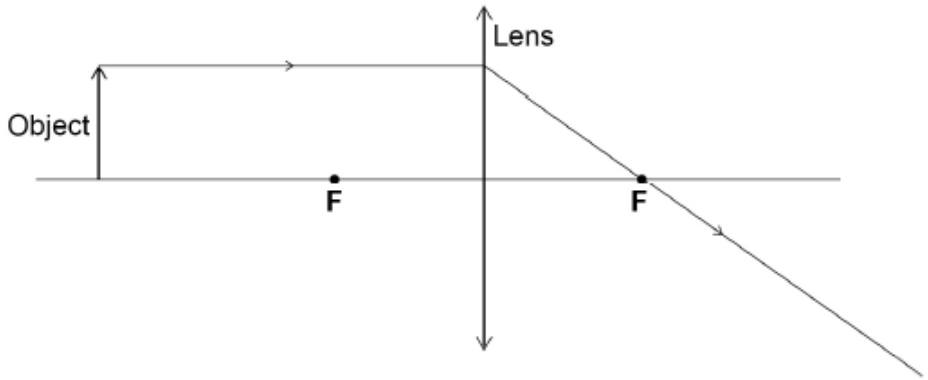
0 8 . 2 Lenses can be used to form the image of an object.

Complete the ray diagram in **Figure 21** to show how a **convex** lens forms the image of the object.

Use an arrow to represent the image.

[2 marks]

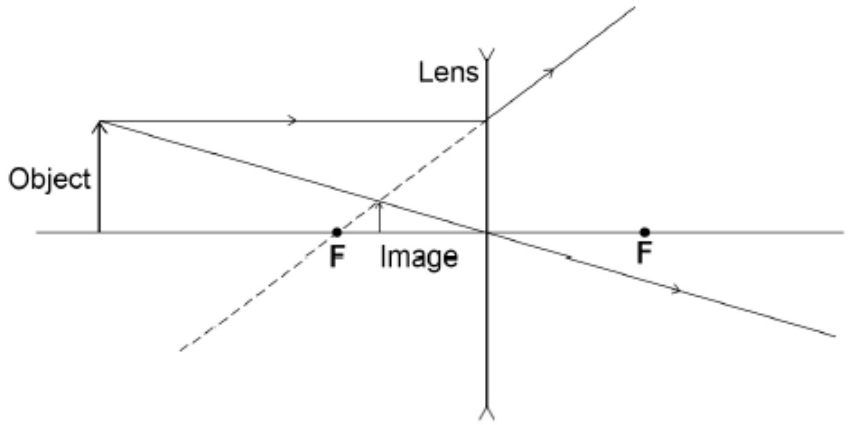
Figure 21



1.2

Figure 22 shows how a **concave** lens forms the image of an object.

Figure 22



0 8 . 3 Give **one** similarity and **one** difference between the image formed by the convex lens and the image formed by the concave lens.

[2 marks]

Similarity Image is diminished.

Difference Image formed is inverted in the convex lens while image is upright in concave lens.

0 8 . 4 A person uses a lens to read the letters on the back of a coin.

The image height of the letters on the coin is 9.0 mm

The magnification produced by the lens is 6.0

Calculate the height of the letters on the coin.

Use the Physics Equations sheet.

[3 marks]

$$\frac{\text{Image height}}{\text{Object height}} = 6$$

Height = 1.5 mm

$$\frac{9}{6} = 1.5 \text{ mm}$$