

Exercise walk-through

6.1

Transverse and longitudinal waves; properties of waves (4.6.1.1–4.6.1.2, RP8)

AQA · GCSE · Physics

Exercises 2.1·2.3

2.1 A wave has frequency 250 Hz. Calculate the period. [2]

2.2 Water waves of wavelength 0.25 m travel at 1.5 m/s. Calculate the frequency. [2]

2.3 State one piece of evidence that in a water ripple it is the wave, not the water, that travels. [1]

3 Exam-style questions

Exercises 2.1·2.3

2.1 A wave has frequency 250 Hz. Calculate the period. [2]

2.1 $T = 1/f = 1/250 = 4.0 \times 10^{-3} \text{ s}$ (C1, A1)

2.2 Water waves of wavelength 0.25 m travel at 1.5 m/s. Calculate the frequency. [2]

2.2 $f = v/\lambda = 1.5/0.25 = 6.0 \text{ Hz}$ (C1, A1)

2.3 State one piece of evidence that in a water ripple it is the wave, not the water, that travels. [1]

3 Exam-style questions

2.3 A floating ball bobs up and down but does not travel with the ripple.

Exercise 3.1

3.1 A teacher times 10 wavefronts passing a point in a ripple tank: 12.0 s in total. The wavelength on the screen is 0.080 m.

- (a) Calculate the frequency. [2]
- (b) Calculate the speed of the water waves. [2]
- (c) The bar motor speeds up. State and explain the effect on wavelength at constant wave speed. [2]

Exercise 3.1

3.1 A teacher times 10 wavefronts passing a point in a ripple tank: 12.0 s in total. The wavelength on the screen is 0.080 m.

(a) Calculate the frequency. [2]

(b) Calculate the speed of the water waves. [2]

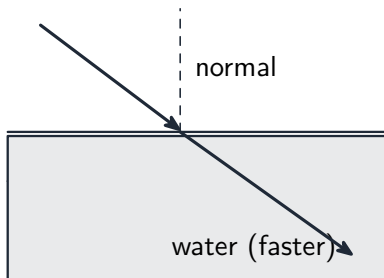
(c) The bar motor speeds up. State and explain the effect on wavelength at constant wave speed. [2]

3.1 (a) $f = 10/12.0 = \mathbf{0.83}$ Hz (2 s.f.) (C1, A1) (b) $v = f\lambda = 0.833 \times 0.080 = \mathbf{0.067}$ m/s (C1, A1) (c) Wavelength decreases: $\lambda = v/f$ – the speed is fixed by the water, so a higher frequency forces a shorter wavelength.

Exercise 3.2

3.2 A wave travels from air into water where it moves faster.

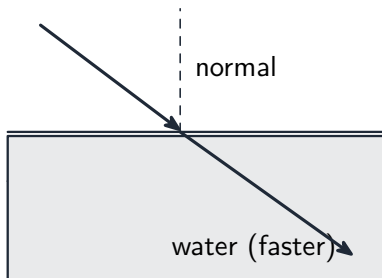
- (a) State which of frequency and wavelength changes, and why frequency cannot. [2]
- (b) The speed rises from 330 m/s to 1650 m/s at an unchanged frequency of 660 Hz. Calculate both wavelengths. [3]
- (c) Describe how the wavefront spacing looks in a diagram after entering the water. [1]



Exercise 3.2

3.2 A wave travels from air into water where it moves faster.

- (a) State which of frequency and wavelength changes, and why frequency cannot. [2]
- (b) The speed rises from 330 m/s to 1650 m/s at an unchanged frequency of 660 Hz. Calculate both wavelengths. [3]
- (c) Describe how the wavefront spacing looks in a diagram after entering the water. [1]



3.2 (a) Wavelength changes; frequency does not – the number of wavefronts arriving per second cannot change at the boundary. (b) Air: $\lambda = 330/660 = \mathbf{0.50}$ m (C1); water: $\lambda = 1650/660 = \mathbf{2.5}$ m; five times longer, matching the speed ratio. (c) The wavefronts are drawn further apart.