Solutions

Each answer shows the steps, then the **result**.

2.1

- $v = f\lambda$

$$v = f\lambda = (50\text{ Hz})(0.40\text{ m}) = \mathbf{20}\ \frac{\text{m}}{\text{s}}$$

2.2

- in a transverse wave the particles vibrate at right angles to the travel direction; in a longitudinal wave they vibrate along it

2.3

- the maximum displacement of a point on the wave from its rest position

2.4

- light: transverse; sound: longitudinal

3.1 C

- frequency is the number of waves per second

3.2

(a) $f = v/\lambda$

$$f = \frac{v}{\lambda} = \frac{0.30\ \frac{\text{m}}{\text{s}}}{0.020\text{ m}} = \mathbf{15}\text{ Hz}$$

(b) the waves spread out (diffract)

- because the gap is about the same size as the wavelength

3.3

- $\lambda = v/f$

$$\lambda = \frac{3.0 \times 10^{8}\ \frac{\text{m}}{\text{s}}}{1.0 \times 10^{8}\text{ Hz}} = \mathbf{3.0}\text{ m}$$

3.4

(a) frequency = waves per second

$$f = \frac{6}{2.0\text{ s}} = \mathbf{3.0}\text{ Hz}$$

(b) $v = f\lambda$

$$v = f\lambda = (3.0\text{ Hz})(0.50\text{ m}) = \mathbf{1.5}\text{ m/s}$$

3.5

(a) it stays the same, 15 Hz

(b) $v = f\lambda$, so $\lambda = v/f$

$$\lambda = \frac{v}{f} = \frac{0.18\text{ m/s}}{15\text{ Hz}} = \mathbf{0.012}\text{ m}$$

(c) refraction