

Solutions

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

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

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

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.

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.