Name: ..... Date: .....

# Using the wave formula: wave speed, frequency and wavelength

$$v = f \times \lambda$$

***v* speed** (metres per second, m/s)

**λ wavelength** (metres, m)

***f* frequency** (hertz, Hz)

$f = v \div \lambda$

$\lambda = v \div f$

**Worked example**

*Q: A sound wave of frequency 220 Hz travels at a speed of 340 m/s in air. What is its wavelength?*

*A: Wavelength, λ = v ÷ f = 340 ÷ 220 =* ***1.55 m***

*(If the wave speed is in metres per second and the frequency is in hertz, the wavelength will be in metres)*

**Questions**

1. Calculate the **wave speed** (in m/s) for the following waves:

a) A sound wave in steel with a frequency of 500 Hz and a wavelength of 3.0 metres.

b) a ripple on a pond with a frequency of 2 Hz and a wavelength of 0.4 metres.

c) A radio wave with a wavelength of 30 m and a frequency of 10,000,000 hertz.

2. Calculate the **wavelength** (in metres) for the following waves:

a) A wave on a slinky spring with a frequency of 2 Hz travelling at 3 m/s.

b) An ultrasound wave with a frequency 40,000 Hz travelling at 1450 m/s in fatty tissue.

c) A sound wave with frequency 440 Hz travelling at 340 metres per second in air.

3. Calculate the **frequency** (in Hz) for the following waves:

a) A sound wave of wavelength 10 metres travelling at 340 metres per second in air.

b) A wave on the sea with a speed of 8 m/s and a wavelength of 20 metres.

c) A microwave of wavelength 0.15 metres travelling through space at 300,000,000 m/s.

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