

Telecommunications HW2 – Waves

1. Waves can be used to transmit signals.

2.

Wave term	Definition
Frequency	Number of complete wavelengths in one second.
Wavelength	Minimum distance in which a wave repeats itself.
Wavespeed	Distance travelled by a wave in one second.
Amplitude	Size of maximum disturbance measured from zero position.

3.

Wave term	Symbol	Unit (symbol)
Frequency	f	Hertz (Hz)
Wavelength	λ	metres (m)
Wavespeed	v	metres per second (m/s)
Amplitude	----	metres (m)
Time	t	seconds (s)
Distance	d	metres (m)

4. 0.5Hz means that only half of a full wave passes every second, so it takes 2 s for a complete wave to pass.

5.

(a)

$$\text{wavespeed} = \frac{\text{distance}}{\text{time}}$$

(b)

$$\text{wavespeed} = \text{frequency} \times \text{wavelength}$$

6. Use $v = f\lambda$

$$v = 6\text{Hz} \times 0.4\text{m}$$

$$\text{so } v = \underline{2.4\text{m/s}}$$

7. Number of waves passing per second = the frequency

$$\text{Use } v = f\lambda$$

$$\text{So } f = v/\lambda = 15 \div 5 = 3\text{Hz}$$

3 waves will pass you in one second.

8. Use $\lambda = v/f$

$$\text{so } \lambda = 0.16 \div 8$$

$$\lambda = \underline{0.02\text{m}}$$