

## Chapter 25 Vibrations and Waves

**Wave Speed**

While watching the ocean surf roll in at the beach, you estimate the ocean wave frequency is about one wave every 10 s. You also estimate the average wavelength is about 25 m. What is the speed of the ocean waves?

**Read and Understand**

*What information are you given?*

$$\text{Period} = 10 \text{ s}$$

$$\text{Wavelength, } \lambda = 25 \text{ m}$$

**Plan and Solve**

*What unknown are you trying to calculate?*

$$\text{Wave speed, } v = ?$$

*What formulas contains the given quantity and the unknown?*

$$F = \frac{1}{T} \text{ and } v = \lambda f$$

*Substitute the known values and solve.*

$$f = \frac{1}{10 \text{ s}} = 0.1 \text{ s}^{-1}$$

$$v = \lambda f = (25 \text{ m})(0.1 \text{ s}^{-1}) = 2.5 \text{ m/s}$$

**Look Back and Check**

*Is your answer reasonable?*

Yes, the calculated speed of 2.5 m/s seems reasonable for an ocean wave.

**Math Practice**

*On a separate sheet of paper, solve the following problems.*

1. One wave passes by a pier every 5 s. If the wavelength of the wave is 12 m, what is the wave speed?
2. A sound wave has a speed of 340 m/s in air. If the wave has a frequency of 185 Hz, what is its wavelength?
3. A sound wave travels at 345 m/s in air and has a wavelength of 1.9 m. What is the period of the wave?