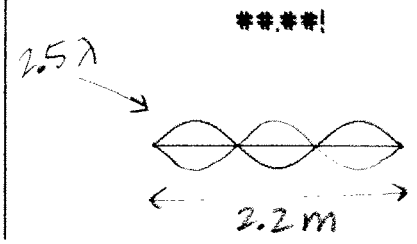
Sample Problems from Waves sublevel 8

WM8 Mathematics of Standing Waves

A standing wave is created in a 2.2-meter long rope by vibrating the rope 76 times in 10.0 seconds. The diagram below represents the standing wave pattern created for this frequency. Determine the wavelength (in meters), frequency (in Hertz) and speed (in meters/second). Enter numerical answers below.



$f = \frac{\text{cycles}}{\text{sec}} = \frac{76}{10\,s} = \boxed{7.6\,Hz}$

$L = 2.5\lambda$

$2.2\,m = 2.5\lambda$

$\lambda = \frac{2.2\,m}{2.5} = \boxed{0.88\,m}$

$v = \lambda f = (0.88\,m)(7.6\,Hz) = \boxed{6.69\,\frac{m}{s}}$

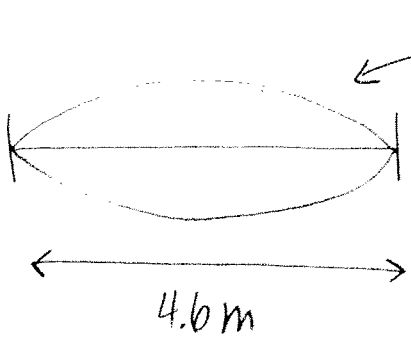
WM8 Mathematics of Standing Waves

Jack and Jill create a standing wave pattern in a slinky by vibrating the slinky 27 times (i.e., 27 complete vibrational cycles) in 19.1 seconds. The pattern contains one loop between the ends of the slinky (the first harmonic). The slinky is stretched to a length of 4.6 meters. Determine the wavelength (in meters), frequency (in Hertz) and speed (in meters/second). Enter numerical answers below.

Draw a picture!

Wavelength = [ ] m Frequency = [ ] Hz Speed = [ ] m/s

Use Tab key to navigate between fields



$L = \frac{1}{2}\lambda$

$4.6\,m = \frac{1}{2}\lambda$

$\lambda = \frac{4.6\,m}{\frac{1}{2}}$

$\boxed{\lambda = 9.2\,m}$

$f = \frac{\text{cycles}}{\text{sec}} = \frac{27}{19.1\,s} = \boxed{1.41\,Hz}$

$v = \lambda f = (9.2\,m)(1.41\,Hz) = \boxed{13.01\,\frac{m}{s}}$