

Standing waves Examples:

1: What is the speed of a wave in a rope 1.5 m long that has a frequency of 4.0 Hz? (2nd overtone)

$L = \frac{n}{2} \lambda$   
 $1.5\text{m} = \frac{2}{2} \lambda$   
 $\lambda = \frac{2}{2}(1.5) = 1\text{m}$

$v = f\lambda$   
 $= (4\text{Hz})(1\lambda) = 4\text{m/s}$

2: Find the length of a string for the fundamental frequency of 3.0 Hz if  $v = 2.5\text{ m/s}$ .

$L = \frac{1}{2} \lambda$   
 $L = \frac{1}{2}(0.83\text{m}) = 0.415\text{m}$

$v = f\lambda$   
 $\lambda = \frac{v}{f} = \frac{2.5\text{m/s}}{3.0\text{Hz}} = 0.83\text{m}$

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