

A string of length 4.0-m is fixed at both ends. A standing wave with 6 antinodes is formed on the string. What is the frequency of the standing wave, if the wave speed is 30 m / s ?

Given:

Length of the string:	$L = 4.0 \text{ m}$
Number of antinodes:	$n = 6$
Speed of wave:	$v = 30 \text{ m / s}$

Determine: frequency of the standing wave:  $f$

Use formula:

$$f = v / \lambda \text{ -----(1)}$$

**" $\lambda$ " is the wavelength of the standing wave.**

For a standing wave formed on a string:

$$\lambda = 2L / n \text{ -----(2)}$$

where  $n = 1, 2, 3, \dots$

Substituting for  $L$  and  $n$  in (2):

$$\lambda = ( 2 \times 4.0 ) / 6 = 1.33 \text{ m}$$

Substituting for  $\lambda$  and  $v$  in (1):

$$f = v / \lambda = 30 / 1.33 = 23 \text{ Hz}$$