

Answer on Question #64619, Physics / Other

A wave in a spring, stretched to a length of 6.85m, travels at a speed of 4.75m/s. How many nodes are located along the length of the spring if the frequency of the standing wave is 3.12Hz?

Solution:

First we find wavelength

$$\lambda = \frac{v}{f} = \frac{4.75 \text{ m/s}}{3.12 \text{ Hz}} = 1.522 \text{ m}$$

The nodes are produced at locations

$$x = \frac{\lambda}{2}, \lambda, \frac{3\lambda}{2}, \dots, \frac{n\lambda}{2} \quad n = 0, 1, 2, \dots$$

Then find number of halfwaves on the spring

$$n = \frac{2L}{\lambda} = \frac{2 \times 6.85 \text{ m}}{1.522 \text{ m}} = 9 \text{ halfwaves}$$

Finally, there is a node at the beginning followed by one node per each half wavelength, so the number of nodes is

$$k = 1 + n = 1 + 9 = 10 \text{ nodes}$$

Answer: 10 nodes

Answer provided by <https://www.AssignmentExpert.com>