

**Answer on Question #39568, Physics, Mechanics |  
Kinematics | Dynamics**

**Question:**

A 125 cm length of string has mass 2.00 g and tension 7.00 N. (a) What is the wave speed for this string? (b) What is the lowest resonant frequency of this string?

**Answer:**

a) The speed of the waves on the string is given by:

$$v = \sqrt{\frac{T}{m/L}} = \sqrt{\frac{7 \text{ N}}{0.002 \text{ kg}/1.25 \text{ m}}} = 66.1 \frac{\text{m}}{\text{s}}$$

where  $T$  is tension,  $m$  is mass,  $L$  is length.

b) The lowest resonance frequency is known as the fundamental frequency for the string. The fundamental vibrational mode of a stretched string is such that the wavelength is twice the length of the string:

$$\lambda = 2L$$

Therefore the lowest resonant frequency equals:

$$f = \frac{v}{\lambda} = \frac{\sqrt{\frac{T}{m/L}}}{2L} = 26.5 \text{ Hz}$$