

35. (a) The wave speed is given by $v = \sqrt{\tau/\mu}$, where τ is the tension in the string and μ is the linear mass density of the string. Since the mass density is the mass per unit length, $\mu = M/L$, where M is the mass of the string and L is its length. Thus

$$v = \sqrt{\frac{\tau L}{M}} = \sqrt{\frac{(96.0 \text{ N})(8.40 \text{ m})}{0.120 \text{ kg}}} = 82.0 \text{ m/s} .$$

- (b) The longest possible wavelength λ for a standing wave is related to the length of the string by $L = \lambda/2$, so $\lambda = 2L = 2(8.40 \text{ m}) = 16.8 \text{ m}$.
- (c) The frequency is $f = v/\lambda = (82.0 \text{ m/s})/(16.8 \text{ m}) = 4.88 \text{ Hz}$.