Answer on Question #65639, Physics / Mechanics | Relativity

The linear density of a vibrating string is 1.3×10^{-4} kg m^{-1}. A transverse wave is propagating on the string and is described by the equation y (x, t) = 0.021 sin (30t x) where x and y are in metres and t is in seconds. Calculate the tension in the string.

Solution:

$$v = f\lambda = \frac{2\pi\omega}{2\pi k} = \frac{\omega}{k} = \frac{30}{1} = 30\ m/s$$

$$v = \sqrt{\frac{T}{\mu}}$$

$$T = \mu v^2$$

$$T = 1.3 \cdot 10^{-4} \times 30^2 = 0.117N$$

Answer: 0.117 N