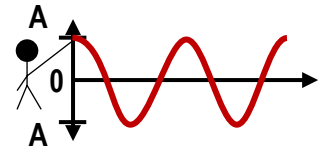


CONCEPT: AVERAGE POWER OF WAVES ON STRINGS

- Waves carry _____ through space, *not matter*.
 - To continuously produce a wave, you must supply Energy over Time, which is _____.

$$P_{avg} = \frac{E}{\Delta t} = \underline{\hspace{2cm}}$$



EXAMPLE: You continuously whip a taut string with a mass density $\mu = 0.05 \text{ kg/m}$ with a tension of 100.0 N . How much average power must be supplied to the string to create waves at a frequency of 60.0 Hz and an amplitude of 6.00 cm ?

WAVES

$$v = \lambda f$$

$$v = \sqrt{\frac{F_T}{\mu}} \text{ (for strings only)}$$

$$k = \frac{2\pi}{\lambda}$$

$$\omega = \frac{2\pi}{T} = 2\pi f$$

PROBLEM: A horizontal string is stretched with a tension of 90 N, and the speed of transverse waves for the wire is 400 m/s. What must the amplitude of a 70.0 Hz traveling wave be for the average power carried by the wave to be 0.365 W?

- A) 2.9 mm
- B) 4.1 mm
- C) 0.2 mm
- D) 0.017 mm

WAVES
$v = \lambda f$ (all waves) $v = \sqrt{\frac{F_T}{\mu}}$ (for strings only) $k = \frac{2\pi}{\lambda}$ $\omega = \frac{2\pi}{T} = 2\pi f$ $P_{avg} = \frac{1}{2} \omega^2 A^2 v \mu$