

Comparing Waves in Strings and Sound Waves

Answers

For waves on a string $y(x,t)$ moving along x-axis

(a) The wave is **Transverse** or Longitudinal

(b) String is characterized by linear density μ with units of ...
kg/m

(c) For a string characterized by μ and tension F , the speed is ...

$$v = \sqrt{F/\mu}$$

(d) Amplitude measures the change in what variable?

transverse displacement, y

(e) Write a general equation of a string wave moving left.

$$y = Y \sin (kx - \omega t)$$

(f) Waves in string carry power having units of ...
watts

(g) Write the expression for the average power carried by a string wave.

$$\langle P \rangle = (1/2) \mu v \omega^2 Y^2$$

(h) The speed of a string wave is determined by source **medium** both neither

The frequency of string waves is determined by **source** medium both neither

Wavelength of string waves is determined by source medium both neither

Since wavelength is determined by speed and frequency, one could argue that the answer is both or neither ...

For sound waves $s(x, y, z, t)$ moving along x-axis

The wave is **Transverse** or **Longitudinal**

Air is characterized by volume density with units of ...
kg/m³

For air the speed is ...

$$v = \sqrt{B/\rho}$$

Amplitude measures the change in what variable? (2 answers)

(1) **displacement, s**

(2) **pressure difference, ΔP**

Write a general equation of a sound wave moving left. Two expressions, one for displacement,

$$s = S \sin (kx - \omega t)$$

... one for pressure.

$$\Delta P = \Delta P^{\max} \sin (kx - \omega t)$$

Sound waves have intensity in units of ...
watts / m²

Write the expression for the average intensity carried by a sound wave.

$$I = (1/2) \rho v \omega^2 S^2$$

The speed of sound is determined by source **medium** both neither

The frequency of sound is determined by **source** medium both neither

Wavelength of string waves is determined by source medium both neither

Since wavelength is determined by speed and frequency, one could argue that the answer is both or neither ...