

Question 1

A traveling wave on a string is described by the displacement via

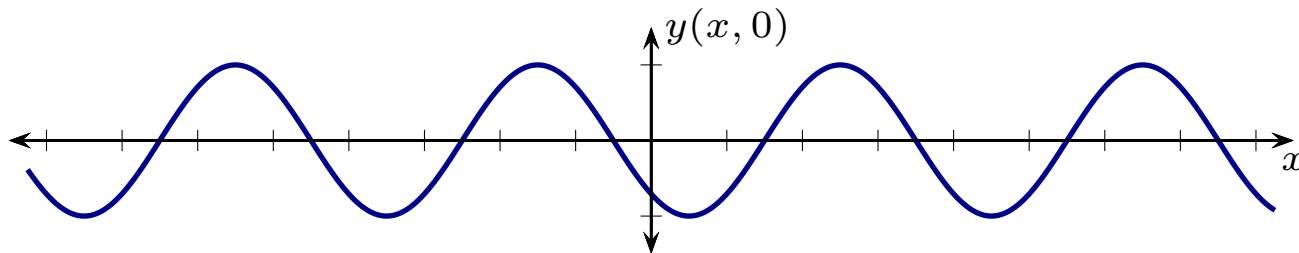
$$y(x, t) = A \cos(kx - \omega t).$$

Which of the following is true?

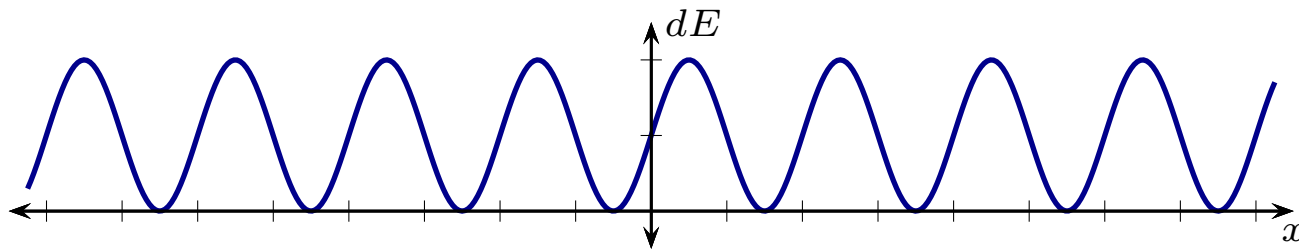
1. The energy density is independent of A .
2. The energy density is proportional to A .
3. The energy density is proportional to A^2 .

Energy for Sinusoidal Waves

Sinusoidal traveling wave: $y(x, t) = A \sin(kx - \omega t + \phi)$



$$\text{Energy density} = \mu\omega^2 A^2 \sin^2(kx - \omega t + \phi)$$



Question 2

The energy density for a sinusoidal traveling wave on a string is

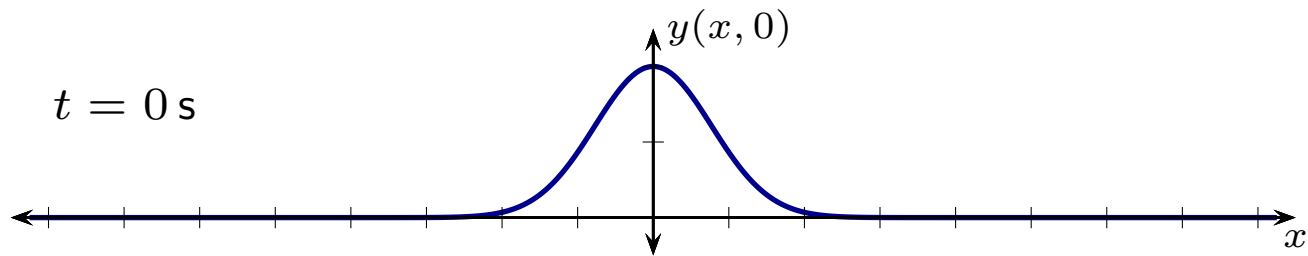
$$y(x, t) = \mu\omega^2 A^2 \sin^2(kx - \omega t).$$

Which of the following is true?

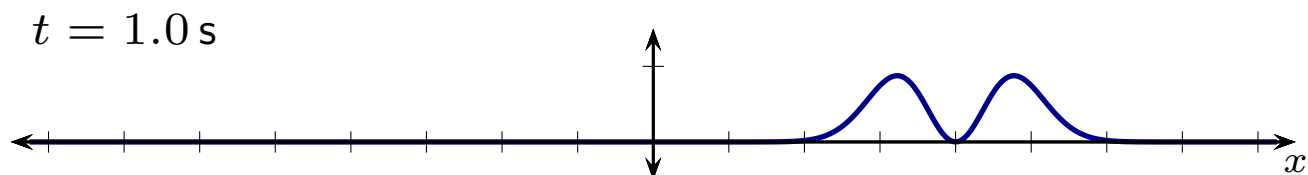
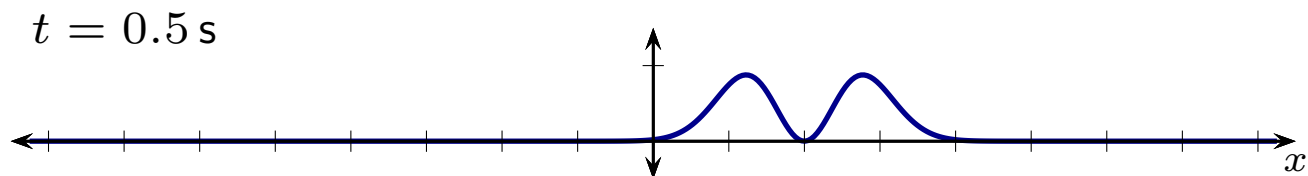
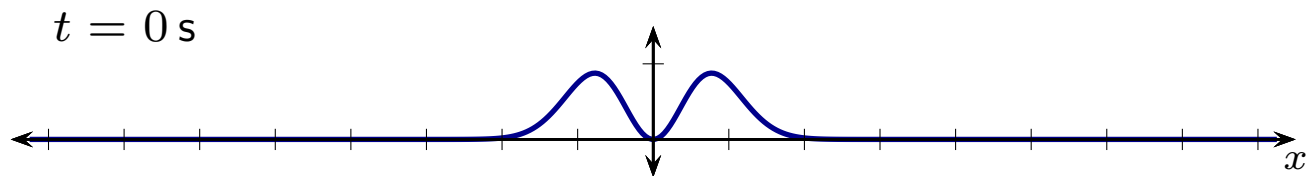
1. The total energy is zero.
2. The total energy is positive.
3. The total energy is infinite.

Energy for Gaussian pulses

Gaussian pulse: $y(x, t) = e^{-(x-4t)^2/1}$.



Energy density = $\mu v^2 (x - 4t)^2 e^{-2(x-4t)^2/1}$.



Question 3

A traveling wave on a string is described by the displacement via

$$y(x, t) = A \cos(kx + \omega t).$$

Which of the following is true?

1. The power is zero.
2. The power is positive.
3. The power is negative.