

Optics I Theory CPHY 62250/72250

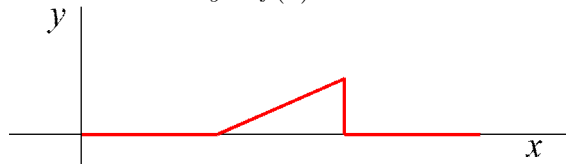
Assignment 1

Peter Palfy-Muhoray

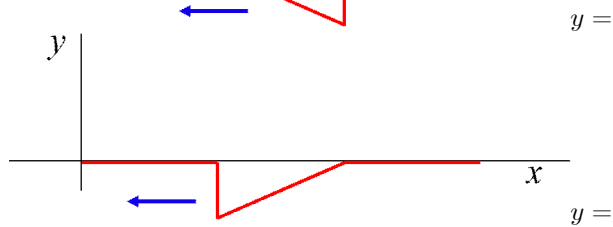
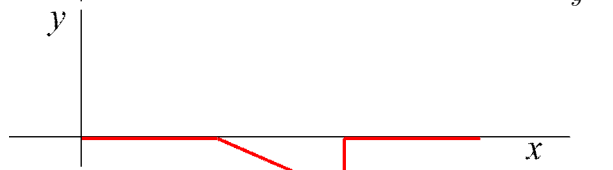
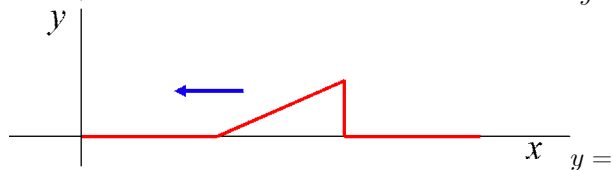
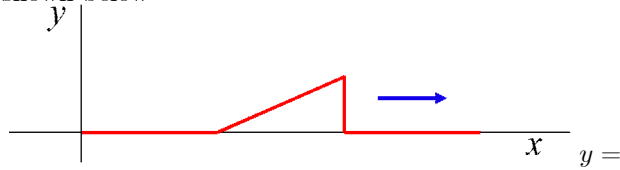
Due: Sept. 16, 2018

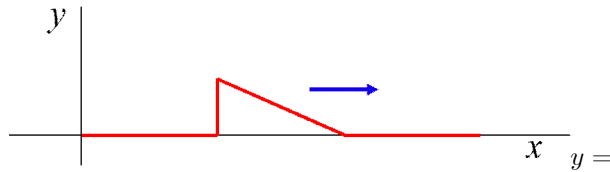
September 9, 2018

1. The function $y = f(x)$ is shown below.

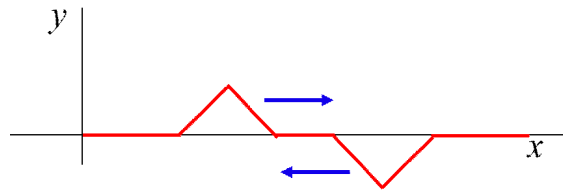


Give the expression for y if y is a travelling wave, travelling with velocity v , as shown below





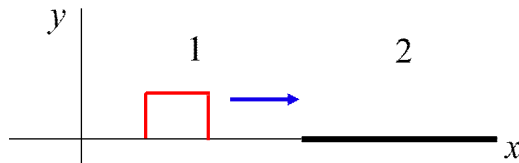
2. A long string has mass density $\rho = 10g/m$ and tension $T = 1N$. Two triangular waves are travelling in opposite directions on the string as shown below.



The amplitude (maximum vertical displacement) is $1m$, the slope is 45° .

- What is the velocity of transverse waves travelling on the string?
- What is the impedance of the string?
- What is the kinetic energy of each triangular wave?
- What is the potential energy of each triangular wave?
- Describe, in words, what the string looks like at the instant the triangular waves are on top of each other.
- Calculate the total energy in the string at the instant the triangular waves are on top of each other.

3. Two strings are joined together, with $\rho_1 = 10g/m$ and tension $T_1 = 1N$ and $\rho_2 = 60g/m$ and $T_2 = 1.5N$. A square pulse is travelling along string 1 as shown below.



Sketch, in 5 figures, what happens before, during, and after the pulse reaches the interface.