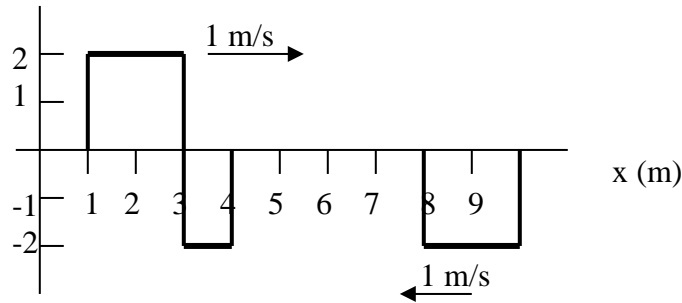


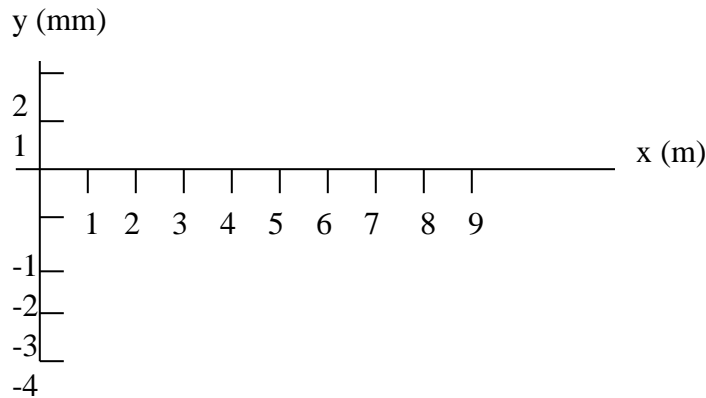
Name: _____

Problems Solved ___/ 8

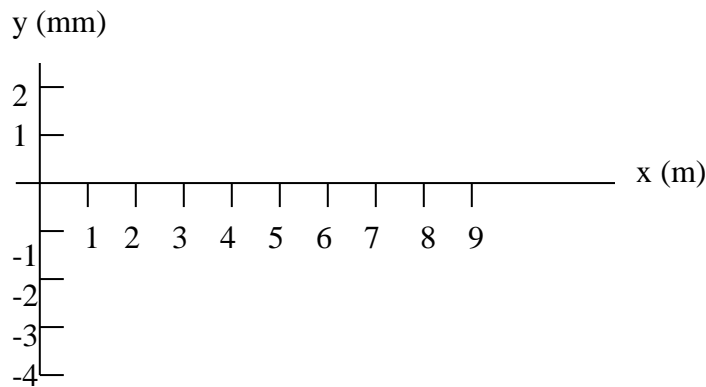
Below is a snapshot graph (x vs. y) of two wave pulses at $t = 0\text{s}$, moving with the velocities indicated in the graph.



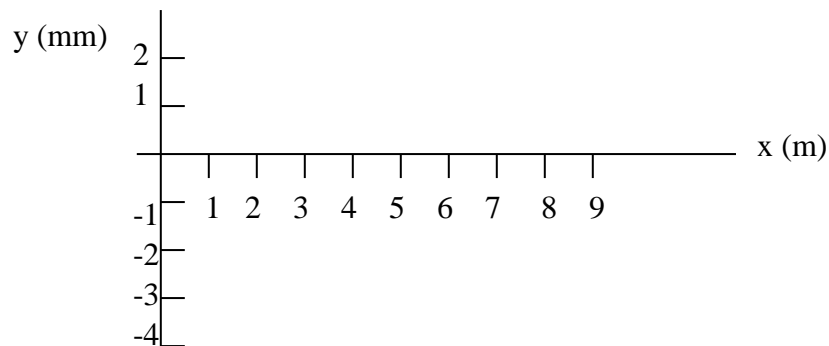
a) Draw a snapshot graph at $t = 2\text{s}$. At what point(s) along the x axis is there completely constructive/destructive interference?



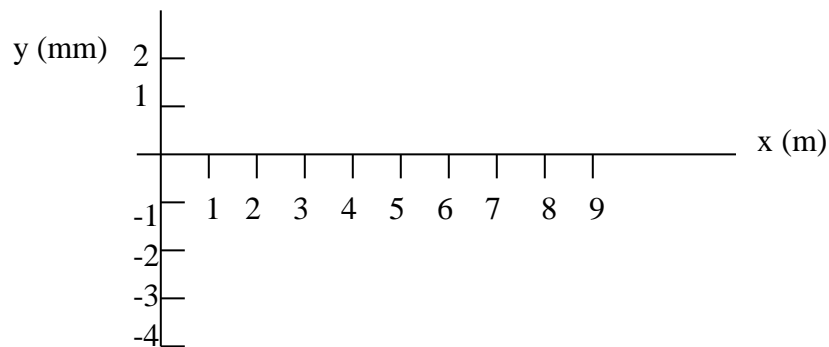
b) Draw a snapshot graph at $t = 3\text{s}$. At what point(s) along the x axis is there completely constructive/destructive interference?



c) Draw a snapshot graph at $t = 4\text{s}$. At what point(s) along the x axis is there completely constructive/destructive interference?



d) Draw a snapshot graph at $t = 5\text{s}$. At what point(s) along the x axis is there completely constructive/destructive interference?

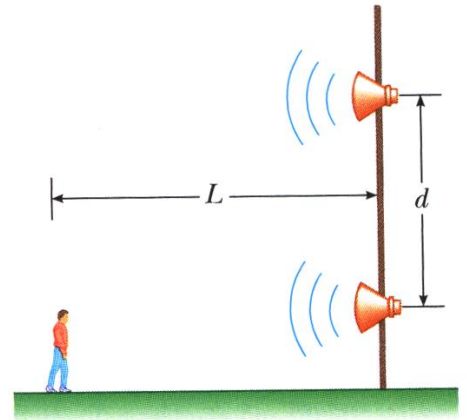


Two sinusoidal waves with identical wavelengths λ and amplitudes A travel in the same direction at a speed of v . The second wave originates from the same point as the first, but at a later time. The amplitude, A_{net} , of the resultant wave is the same as that of each of the two initial waves ($A_{net}=A$). Determine the minimum time lag between the two waves.

Waves – Set 2

Two speakers are driven by the same oscillator at a frequency f . They are located a distance d from each other on a vertical pole. A man walks straight toward the lower speaker in a direction perpendicular to the pole as shown in the figure. The speed of sound is v .

Find an expression for the location of the minima between the man and the pole?



Two waves simultaneously present in a long string are given by the wave functions

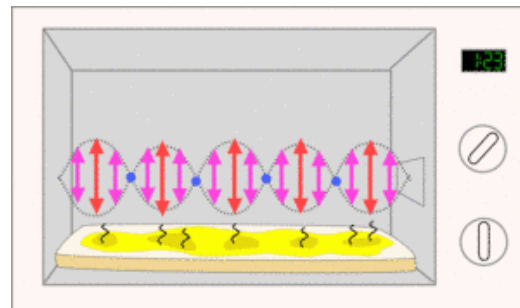
$$y_1(x, t) = A \sin(kx - \omega t + \varphi) \text{ and } y_2(x, t) = A \sin(kx + \omega t)$$

We showed earlier that when $\varphi=0$, a standing wave is formed.

- a) Show that the addition of the arbitrary phase constant changes only the position of the nodes.
- b) Show that the distance between nodes is still $\frac{\lambda}{2}$.

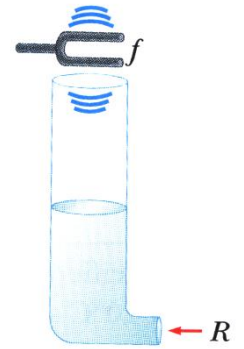
Waves – Set 2

In microwave ovens, food is heated by standing waves of high-frequency electric fields ($f = 2.45 \text{ GHz}$). Most ovens use a rotating tray because standing waves give rise to cold spots if the food is stationary. What is the shortest distance between cold spots for stationary food?



Waves – Set 2

In the figure, water is pumped into a tall vertical cylinder at a volume flow rate of $\frac{dV}{dt}$. The radius of the cylinder is r and at the open top of the cylinder a tuning fork is vibrating with a frequency f . As the water rises, how much time elapses between successive resonances?



Your friend has designed a new kind of muffler for a car. Noisy exhaust gases with a 40.0cm wavelength leave the engine and travel rightward to the tailpipe through a tube that consists of a straight portion and a half-circle. Part of the sound wave travels through the half-circle and rejoins the rest of the wave, which goes directly through the straight portion. This rejoining results in interference. What is the smallest radius r that results in an intensity minimum at the tailpipe?

