Standing Waves Worksheet

When waves come in contact with each other, they go through what is called interference. When they interfere, their amplitudes sum together, just like how numbers. If a positive amplitude and another positive amplitude meet the combined amplitude is greater and thus constructive, if a positive and negative amplitude meet, the combined amplitude is smaller and thus destructive.

Helpful Equations:

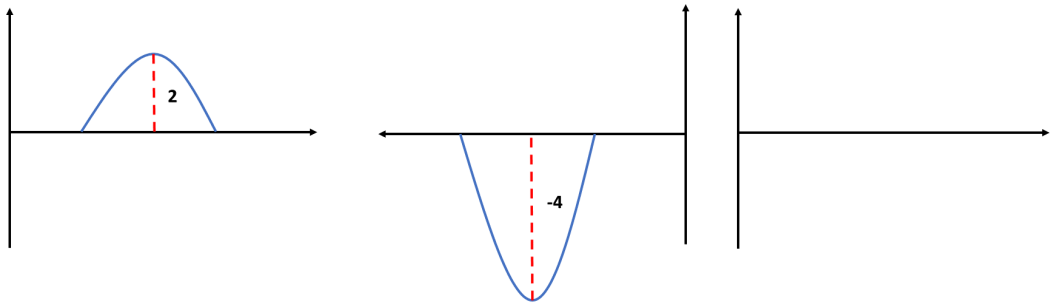
$$v = \lambda f \qquad v = \frac{x}{t}$$

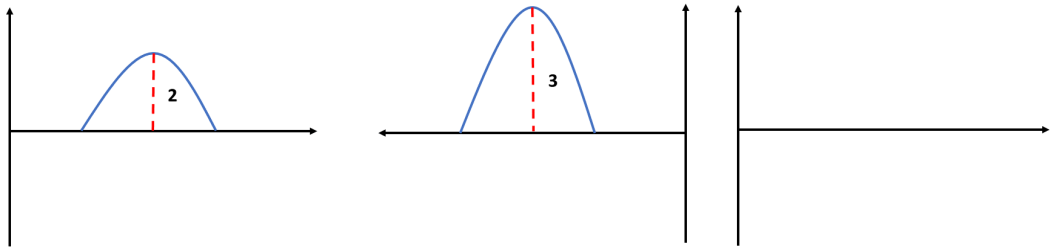
$$T = \frac{1}{f} \qquad f = \frac{1}{T}$$

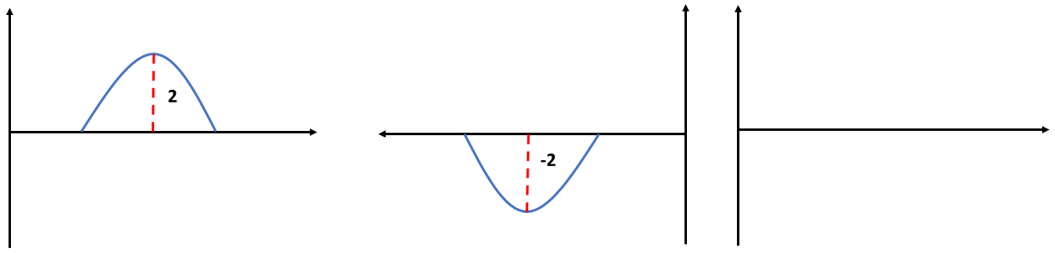
$$T = \frac{time}{cycles} \qquad f = \frac{cycles}{time}$$

v = waves speed
λ = wavelength
x = difference in waves position
t = difference in time
f = waves frequency
T = waves period

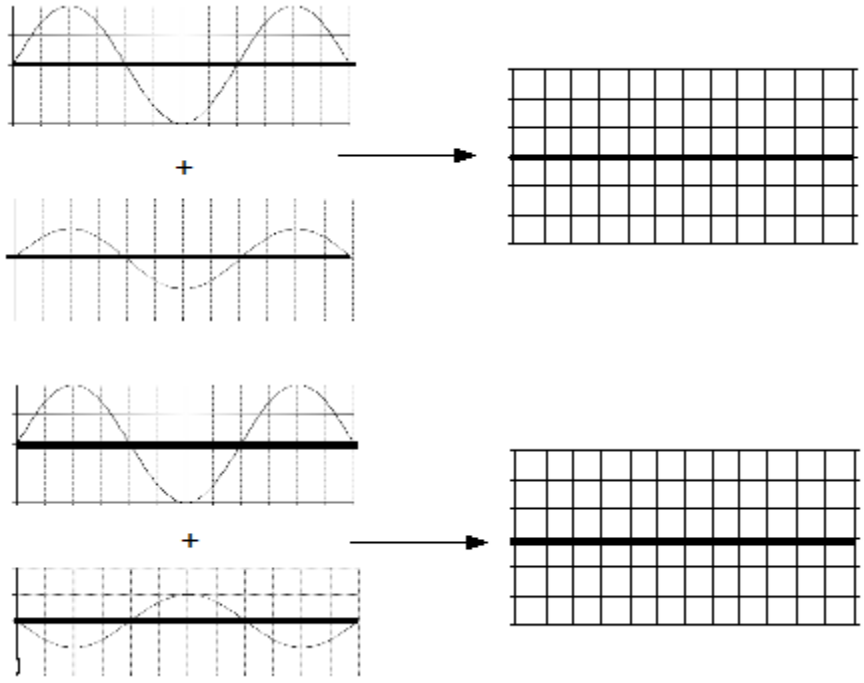
1. Given the amplitudes of the 2 peaks in each scenario, draw and label the amplitude of the subsequent wave when both peaks meet.



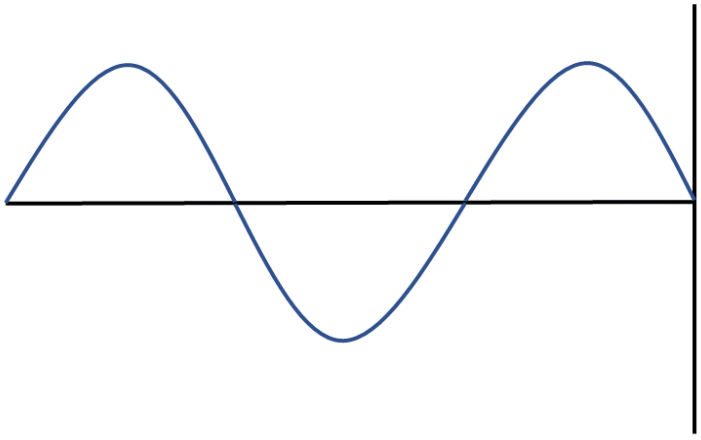


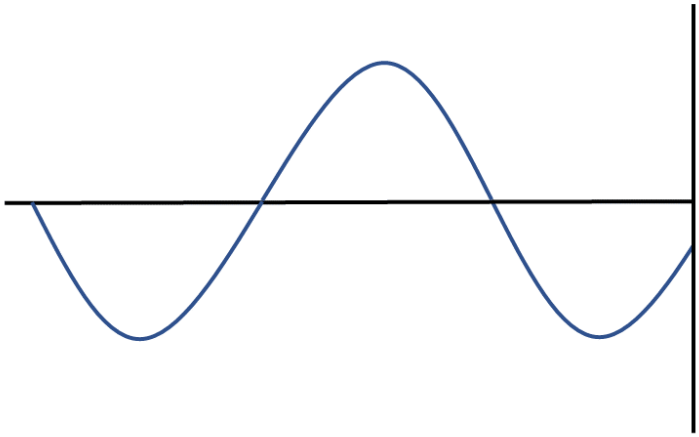


2. Often during wave interference, it's not just single amplitudes that interfere, but long recurring waves. In this question, using the grids, combine two sets of waves to create their interference pattern.

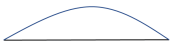
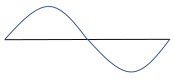
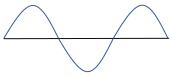


3. Waves can reflect off surfaces. If reflection is perfect, they keep their energy, meaning they also keep their amplitudes. The following waves hit a barrier causing them to reflect, draw the reflection of these waves on the same plot.





4. The situation in 3a is the same type of situation that creates a standing wave. In the following grid complete the info in all the missing squares. The pictures show a wave traveling along a string of length λ.

Picture	N of Antinodes	N of Nodes	Wavelength	Frequency
	1	2	2λ	F_o
		3	λ	
	3			
				$4F_o$
		6		

5. Recall that $f = v/\lambda$, where f is the wave's frequency, v is the wave's velocity, and λ is the wavelength. If you have a speaker that produces a sound wave of 50 Hz, and a glass pane to reflect the wave back to the speaker, what distance should you place the glass from the speaker to create a standing wave with 10 nodes? (Hint: The speed of sound is 343 m/s)