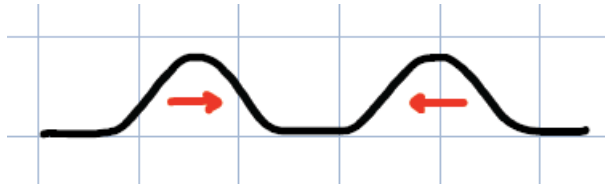
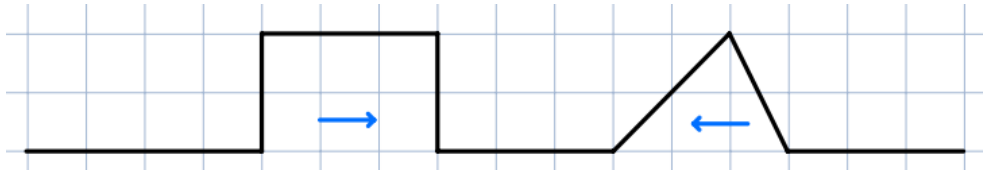


Superposition & Interference

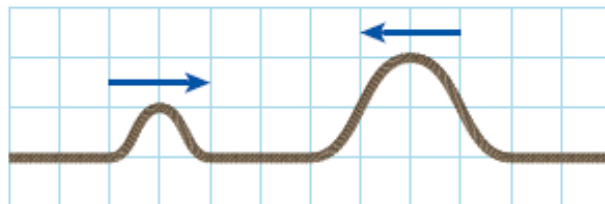
- 1) Two wave pulses are propagating along a straight line toward each other, each at a speed of one unit per second. Draw the resultant after 1 seconds, then after 2 seconds.



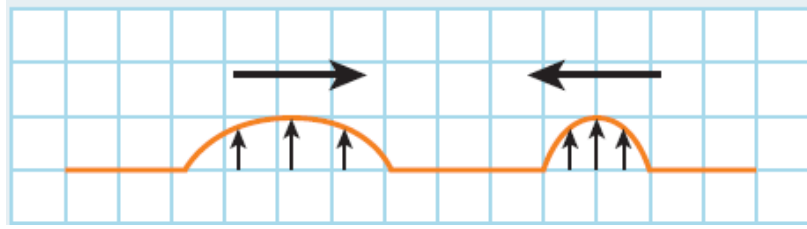
- 2) Two wave pulses are propagating along a straight line toward each other, each at a speed of one unit per second. Draw the resultant after 1 seconds, then after 2 seconds, then after 3 seconds



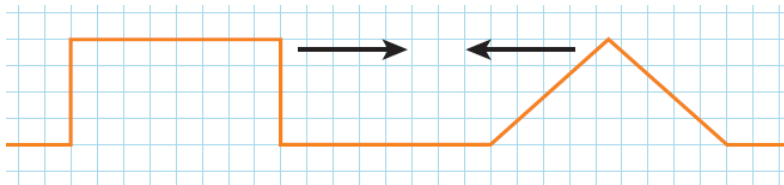
- 3) Two wave pulses are propagating along a straight line toward each other, each at a speed of one unit per second. Draw the resultant after 1 seconds, then after 2 seconds, then after 3 seconds



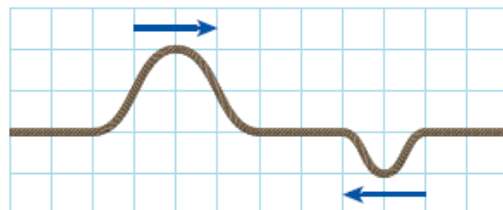
- 4) Two wave pulses are propagating along a straight line toward each other, each at a speed of one unit per second. Draw the resultant after 2 seconds, then after 4 seconds, then after 6 seconds



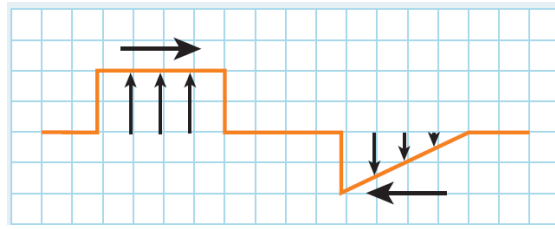
- 5) Two wave pulses are propagating along a straight line toward each other, each at a speed of one unit per second. Draw the resultant after 2 seconds, then after 4 seconds, then after 6 seconds



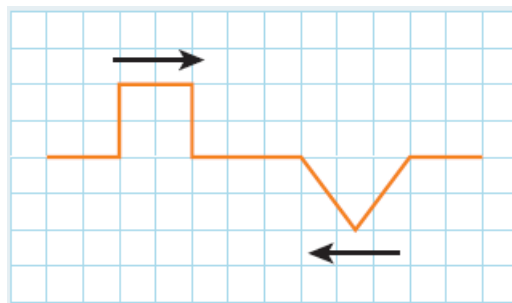
- 6) Two wave pulses are propagating along a straight line toward each other, each at a speed of one unit per second. Draw the resultant after 1 seconds, then after 2 seconds, then after 3 seconds



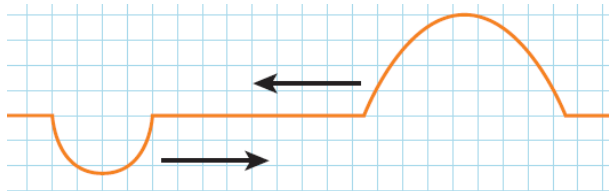
- 7) Two wave pulses are propagating along a straight line toward each other, each at a speed of one unit per second. Draw the resultant after 2 seconds, then after 4 seconds, then after 6 seconds



- 8) Two wave pulses are propagating along a straight line toward each other, each at a speed of one unit per second. Draw the resultant after 1 seconds, then after 2 seconds, then after 3 seconds



- 9) Two wave pulses are propagating along a straight line toward each other, each at a speed of one unit per second. Draw the resultant after 2 seconds, then after 4 seconds, then after 6 seconds



- 10) At the instant when the two pulses overlap the most, how does the amplitude of the combined wave compare to the amplitude of a single pulse?

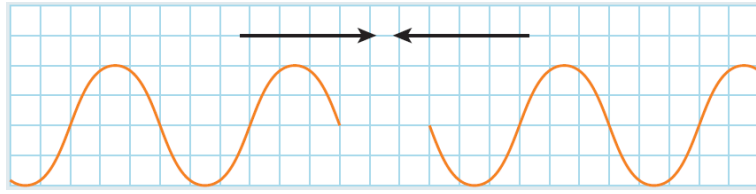
- 11) What happens to each pulse after they pass through each other?

- 12) If one pulse had been inverted (downward) while the other stayed upright, how do your sketches look during the overlap?

- 13) How would your sketches differ if the two pulses do not have the same amplitude or had different shapes/wavelengths?

- 14) If the wave speed or initial separation changed, how would that affect the overlap diagrams?

What happens when waves interfere?



Use Desmos to view these three functions, then add a slider for c .

$$f_1(x) = \sin(x) \quad \text{and} \quad f_2(x) = \sin(x + c) \quad \text{and} \quad g(x) = f_1(x) + f_2(x)$$

For what values of c is $g(x)$ the largest?

For what values of c is $g(x)$ the smallest?

Describe what is happening to $g(x)$ as c changes.

Sketch the three functions when $g(x)$ is largest.

Sketch the three functions when $g(x)$ is smallest.

1. Use Desmos to view these three functions, then add a slider for c , A , and w .

$$f_1(x) = A \sin\left(\frac{2\pi}{w}x\right) \quad \text{and} \quad f_2(x) = \sin(x - c) \quad \text{and} \quad g(x) = f_1(x) + f_2(x)$$

Set $A = 0.5$ and $w = 1$. Describe what is happening to $g(x)$ as c changes.

Press play on c . Which functions appear to move?

2. Use Desmos to view these three functions, then add a slider for c , A , and w .

$$f_1(x) = A \sin\left(\frac{2\pi}{w}x - c\right) \quad \text{and} \quad f_2(x) = \sin(x) \quad \text{and} \quad g(x) = f_1(x) + f_2(x)$$

Set $A = 0.5$ and $w = 1$. Describe what is happening to $g(x)$ as c changes.

Press play on c . Which functions appear to move?

3. In which visualization was it easier to see why $g(x)$ appears to move up and down?

4. Sketch the three functions.