teacher wave interference activity guide

**Teacher Wave Interference Activity Guide**

**Group Members:   
  
Objective:** Working within a group, you will explore different visual models that illustrate how two waves combine so that both can occupy the same space.

**Model One: Two different ways that waves can interfere with each other.**

A picture containing shape

Description automatically generated

**Concept Questions:**

1) Predict how the waves in Set A combine and sketch the result:

*The waves will combine to form a wave with twice the magnitude.*

2) Predict how the waves in Set B combine and sketch the result:

*The waves will combine and cancel out.*

3) Set A represents constructive wave interference. In your own words, define constructive wave interference.

*Constructive interference describes when waves combine that have amplitude in the same direction so that the result is a wave with a larger amplitude than the original waves.*

4) Set B represents destructive wave interference. In your own words, define destructive wave interference.

*Destructive interference describes when waves combine that have amplitudes opposite directions so that the result is a wave with a smaller amplitude than the original waves*

For the following, assume the two waves have the same frequency and velocity but are traveling in opposite directions.

5) Sketch a wave that will destructively interfere with the wave on the left.

Shape

Description automatically generatedAnswer:Shape, arrow

Description automatically generated

6) Sketch two waves that are different from the previous drawings that will destructively interfere when they meet.

Drawings will vary but amplitudes of the waves should be inverted about the zero line so that they cancel.

7) Sketch two waves that will only partially experience destructive interference.

Drawings will vary but amplitudes of the waves should be inverted about the zero line so that they cancel.

8) Sketch a wave that will constructively interfere with the following wave:

Shape

Description automatically generatedAnswer:Shape, arrow

Description automatically generated

**Model Two: Wave interference using a different way to draw area under peaks and troughs.**

Chart

Description automatically generated with low confidence

9) Two pulse waves are sent through a spring in opposite directions as shown above. On the graph below, sketch the result of the pulse waves at the instant they combine. Is this constructive or destructive interference?

Answer:   
A picture containing chart

Description automatically generated   
This is destructive interference. The 2 squares directly above the zero line cancel the two squares directly below it.

10) Two pulse waves are sent through a spring in opposite directions as shown below. On the graph below, sketch the result of the pulse waves at the instant they combine. Is this constructive or destructive interference?

A picture containing chart

Description automatically generated

Answer:

A picture containing chart

Description automatically generated

This is constructive interference. Since both wave amplitudes are above the zero line, they combine to produce a new amplitude that is the positive sum of both amplitudes.

11) Sketch an original pulse wave pattern using blocks to represent peak and trough area and show the result of the combined pulse waves.

Background pattern

Description automatically generated with medium confidence

Drawings will vary. Teacher should check that amplitudes above (positive) and below (negative) the zero line add correctly.