Transverse Waves: Student Activity Sheet

Name:_______________________________________ Date:________________________

Transverse Waves

1. Go to https://ciblearning.org/wave/wave-on-a-string/wave-on-a-string_en.html

Challenge 1

1. Find and list 13 things that you can change or do with the simulation.

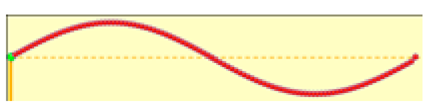
Challenge 2

1. Use the wave simulator to make a wave in which:
   - Both ends touch the dotted yellow line
   - No ball is completely below the line
   - The amplitude setting is between 20 and 100
     TIP: Use the step function to get the green ball on the far left of the dotted yellow line and a red ball on the far right of the dotted yellow line.
2. Record your amplitude and frequency.

Amplitude	Frequency

Challenge 3

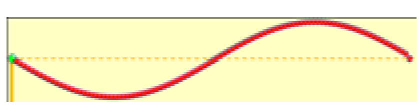
1. Make a wave that looks like this:



2. Record your amplitude and frequency.

Amplitude	Frequency

3. Make a wave that looks like this:



4. Record your amplitude and frequency.

Amplitude	Frequency

5. What is the relationship between the frequency setting of the first wave **(Challenge 2)** and the new waves **(Challenge 3)**? ____

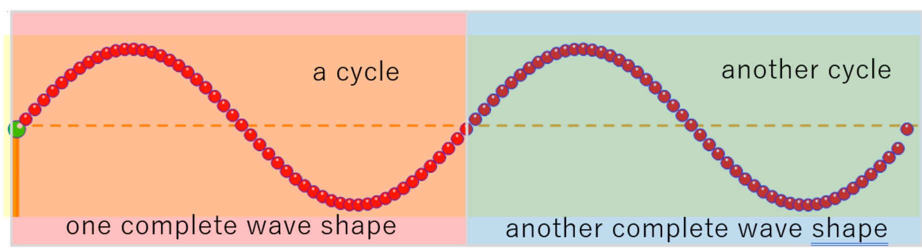
6. What do you notice about this wave? ____

Challenge 4

1. The **crest** is the high point of a wave. A **trough** is a low point of a wave. Without using the computer to look at the wave, draw a wave that would be made by setting the frequency to 20.

2. Set the frequency at 20, run, and pause. Compare the wave to your prediction. What do you notice about the wave? ____

3. A **wave cycle** is one complete wave shape. There are two complete cycles in the wave from **Challenge 4**. Without using the words "complete wave shape," write your own definition of a wave cycle so that someone else could identify a cycle when they see one. You may use the wave simulator to check and revise your definition as needed. Your cycle above starts on the dotted yellow line, but a cycle can start anywhere on a wave.



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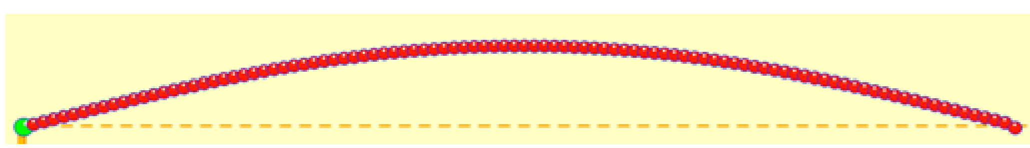
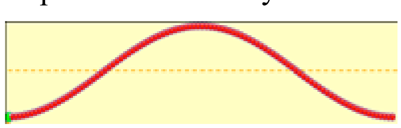
4. What part, or fraction, of a cycle does this figure represent? ______________________

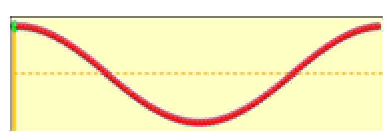


This figure represents ½ of a cycle.

5. Explain if these waves represent one full cycle.



and



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6. Set your frequency controls to 30, 40, and 50. At each setting report how many crests and troughs are showing and how many cycles are chowing.

Frequency	# of Crests and Troughs	# of Cycles
30		
40		
50		

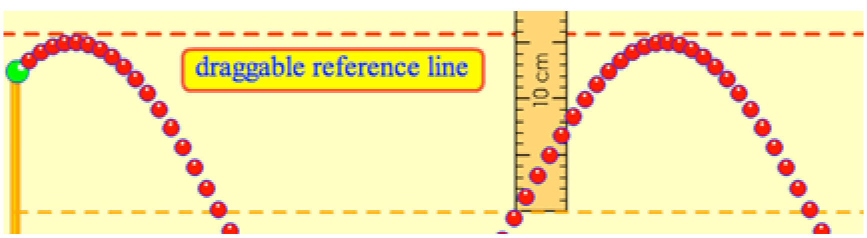
Challenge 5

1. How could you measure the length of one whole cycle? ____
2. After you have chosen a way to measure one cycle, measure and record one whole cycle.
3. Use a different starting point and measure one cycle again. Did you get the same result? _____________
4. Using a frequency setting of 20, measure and record the length of one whole cycle. _________________

   Wavelength is the length of a wave's complete shape.

Challenge 6

1. Set the amplitude to 80, run a wave, and pause it.
2. Measure the height in centimeters of a crest, measuring from the dotted centerline. You may use the reference line as a tool. Height = _____________________

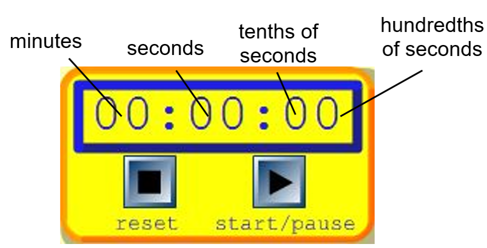
   

   Amplitude is the distance from the center point of a wave to the highest or lowest point of a wave. It is **NOT** measured from lowest to highest points.

3. So far you have measured the lengths and heights of waves. It is also important to know how fast a transverse wave moves up and down (or side to side). What additional tool or tools would you need to measure how quickly a wave rises and falls? ____

Challenge 7

1. You will use the timer in the wave simulator to time one cycle of a wave. The timer looks like this:

2. Set the frequency to 30.

3. Use the step function and any marker you choose to stop the wave in a position where you can know when you finish a whole cycle.

4. When you are ready to measure, reset the time to 0.

5. Use the step function to step through one cycle.

6. Record the time it took for a whole cycle. ________________

   You have just now measured the period of a wave. The **period of a wave** is the time it takes for a wave's shape to repeat. **Frequency** is the number of cycles of a wave that occur in a given amount of time. It is also the number of periods in a second. Frequency is often given as the number of cycles per second.