Wave Properties with Waves on a String Simulation Student Guide
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Student guide: Name:_____

Discuss the words in the box.

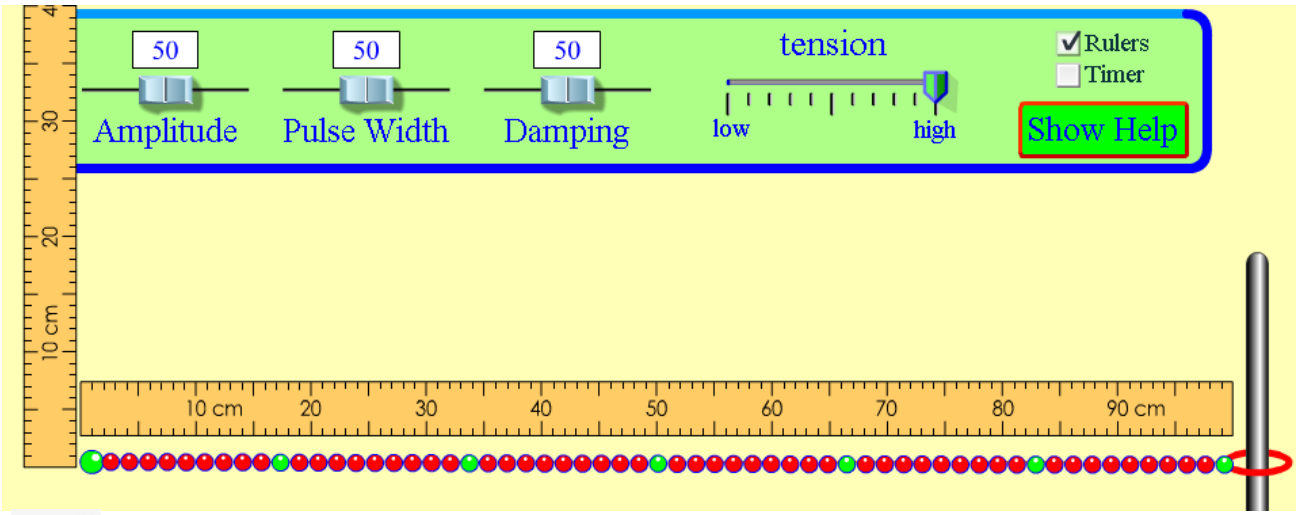
- **review** we have already covered and **new** you will learn today

Review:	**New:** (check-off at the end)
crest	☐ amplitude
trough	☐ frequency
line of origin	☐ oscillate vs. pulse

Guiding Question:
How do the properties of amplitude and frequency affect wavelength?

Start: Google Phet Waves on a string

1. Click on the first link
2. For this activity you will be **collecting data** to explore three properties of a wave.
3. Explore the simulation with your partner. Be sure to click on all the buttons.
4. For the first set of investigations, we will look at **amplitude**.
   - you need to be on Pulse Loose End
   - The rest of your screen should be set up like this:



Look over the data table, on the back, and discuss how get the data you need.

Pulse moves the wave.

Amplitude setting	Height of wave at the start (be sure your ruler is lined up correctly)	Distance ring moves on pole (end)
100		
50		
5		

Discuss what happened to the energy at the end of the wave when we changed the amplitude. **Be prepared to share your thoughts on this with the class**

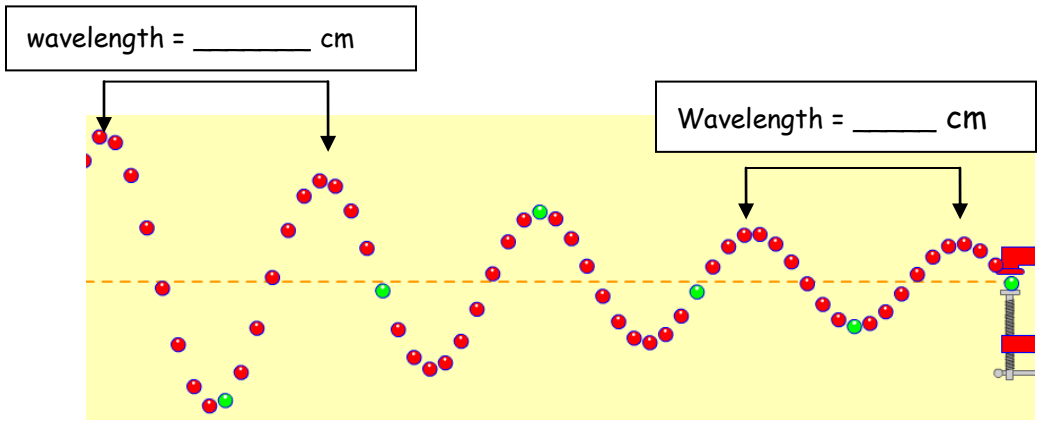
5. Repeat number 4 – using Fixed End and then No End

Why didn't we use these options for the experiment with the amplitude button?

Teacher Check- point

6. For this next part we will investigate **wavelength**.
   - You need to be on Oscillate
   - The rest of your screen should be set up like we did for **number 4.**
   - Try out the step button after you hit pause. This may be useful for collecting data.

Data:



7. Talk about the wavelength of the two waves you measured.
   - Discuss how they were similar and how they were different.
   - Be prepared to share your thoughts with the class.

Name _____

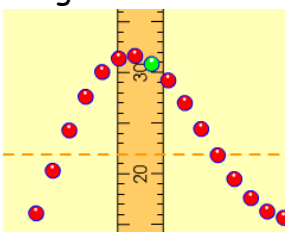
Day 2: For the third set of investigations, we will look at **frequency**.

- you need to be on Oscillate
- open both the ruler and timer
- controlled variables: Amplitude and damping should be left on 50 and tension stays on "high"
- Remember, to stop or slow the wave use pause/play and step

1. Look over the data table and discuss how you will collect the data you need.

2. Before you begin… try a little **practice using the timer**:
   - Turn the timer on, off and reset the timer while waves are moving.

3. Practice counting waves passing a given point:
   - Move the vertical ruler so that it is along the wave's path. This will be the point where you watch waves pass and count them. Count 5 waves passing the ruler. Change the frequency and count again.



4. Fill in the table by working together counting the waves and using the timer.

Data:

frequency	Time interval	Number of waves:			**Average** number of waves counted in 10 second period	Number of waves in 1 second **frequency****
		Trial #1	**Trial #2**	**Trial #3**		
50	10 seconds					
10	10 seconds					
100	10 seconds					

*****To find **frequency**, divide the **average** number of waves counted by the **time interval**.

5. Talk about the data.
   - Decide on a way your group can explain wave **frequency** to the class.
   - Write your idea(s) on the lines.

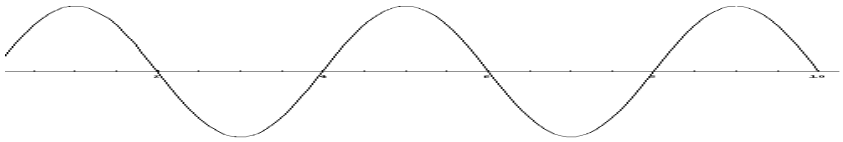
_____

_____

_____

Frame: Our data show that the higher the number chosen for the frequency on the slider, the _____ the number of waves passing _____ in a certain amount of _____.

6. Use arrows, or draw on the wave, to show what will happen when the **amplitude** is increased:



7. Use arrows, or draw on the wave, to show what will happen when the **frequency** is increased: