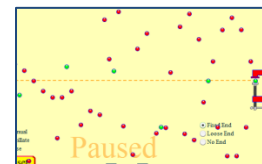


Tips for controls:

- To “Reset All”, refresh your browser. **Reset** only restarts the Oscillator and wave string to a zero position.
- **Pulse** is very helpful to focus particularly on what happens to a wave as it travels in the medium and during reflection. Using **Low Tension** with pulse slows the motion, so makes for good demonstrations. Pressing **Pulse** a second time allows for analysis of superposition.
- You can **Pause** the sim and then set the parameters. In a demonstration, it would provide easy opportunity to ask “What if..?”
- In most browsers, F11 will maximize the window; F11 is a toggle, so use it again to get back the tool bars.
- The rulers and other tools are draggable to allow interesting investigation. Select **Show Help** to get ideas.
- To demonstrate a standing wave set the **Amplitude** to 3 and the **Frequency** to 25. This will create a slightly imperfect standing wave.

Important modeling simplifications:

- The simulation is like a rope on the ground with transverse waves being propagated side to side with no gravitational effects or external friction.
- The string is modeled by using particles and can look like the string has dissociated if extreme conditions are set because the processing increments are not infinitely small.

**Insights into student use / thinking:**

- Students are very engaged and learn from the sim with little guidance
- Some students struggle with “Damping” which is like internal resistance. Some students may want to understand more and could use [Masses and Springs](#) (“Damping” is called “Friction” in this sim) or [Resonance](#) sim (the [Tips](#) give a mathematical definition).
- This sim may be helpful for students as an introduction to more difficult concepts like sound, earthquakes, or light.

Suggestions for sim use:

- For tips on using PhET sims with your students see: [Guidelines for Inquiry Contributions](#) and [Using PhET Sims](#)
- The simulations have been used successfully with homework, lectures, in-class activities, or lab activities. Use them for introduction to concepts, learning new concepts, reinforcement of concepts, as visual aids for interactive demonstrations, or with in-class clicker questions. To read more, see [Teaching Physics using PhET Simulations](#)
- For activities and lesson plans written by the PhET team and other teachers, see: [Teacher Ideas & Activities](#)
- Gold Star Activities: Middle school [Anatomy of a Wave by Jackie Esler](#); High School [Waves on a String Inquiry Based by Trish Loeblein](#); Undergrad [EM Wave Analogy by Noah Podolefsky](#)