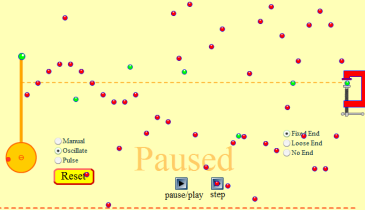
**Tips for controls:**

* 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](http://phet.colorado.edu/en/simulation/mass-spring-lab) (“Damping” is called “Friction” in this sim) or [Resonance](http://phet.colorado.edu/sims/resonance/resonance_en.html) sim (the [Tips](http://phet.colorado.edu/files/teachers-guide/resonance-guide.pdf) 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**](http://phet.colorado.edu/teacher_ideas/contribution-guidelines.php)and [**Using PhET Sims**](http://phet.colorado.edu/teacher_ideas/classroom-use.php)
* 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**](http://phet.colorado.edu/phet-dist/publications/Teaching_physics_using_PhET_TPT.pdf)
* For activities and lesson plans written by the PhET team and other teachers, see: [**Teacher Ideas & Activities**](http://phet.colorado.edu/teacher_ideas/index.php)
* Gold Star Activities: Middle school [**Anatomy of a Wave by Jackie Esler**](http://phet.colorado.edu/en/contributions/view/3447); High School [**Waves on a String Inquiry Based by Trish Loeblein**](http://phet.colorado.edu/en/contributions/view/2819)**;** Undergrad [**EM Wave Analogy by Noah Podolefsky**](http://phet.colorado.edu/en/contributions/view/2910)