

During this interactive you are going to investigate the relationship between linear density and the speed of a transverse wave pulse on a string.

1. Describe and draw what you expect to see on the string since you will be investigating **transverse wave pulses**.

Draw

2. Find the relationship between the speed of a wave and the characteristics of the string which the wave is traveling through.

In this simulation, two strings are tied together with a knot and stretched between two hooks. String 1, on the left, will be twice as long as string 2, on the right. Both strings have the same tension. In the simulation, each string is plucked at its hook at the same instant. The resulting wave pulses travel inward toward the knot. The wave pulse in string 1 starts at twice the distance from the knot as the wave pulse in string 2. You want the wave pulses to meet at the knot at the same instant. To accomplish this, you will set the linear density of each segment of string. When you increase a string segment's linear density in this simulation, the string gets thicker. The minimum and maximum linear densities you can set are 0.010 kg/m and 0.150 kg/m respectively.

3. If string 1 has a minimum linear density, calculate the linear density for string 2 so that the wave pulses meet at the knot. **Show all work and equations including substitution with units.**

Open the shortcut **IL Waves** on one of the lab stations.

Open the simulation contained in this section. **Do Not follow the directions in the simulation follow the following instructions.**

Enter the values you calculated in question 3 using the dials in the control panel and press GO to start the wave pulses. If they do not meet at the knot at the same instant, the simulation will pause when either of the pulses reaches the knot.

4. Did they reach the knot at the same time? Yes / No
(If your answer is No then recalculate questions 3 and when you have a new answer press RESET and enter your new answers for the linear densities to try again. Keep trying until you find the correct solution and record all trials here. Including units.)

5. Use the simulation to find 2 more combinations of values that will have the pulses reach the knot at the same time. Record all trials here, including units and the outcome of the trial (Which wave pulse reached the knot first).

String 1 Linear density	String 2 Linear density	Outcome

6. Using the data you found from question 5 and your understanding of the relationship in question 2 create an equation that relates the time it took for the pulses to reach the knot and linear density of each of the strings. **Show all work and equations including substitution with units.**