Coupled Resonance
Beat Frequency

A LIGO-SEC interactive version 3.14

Gently push pendulum A (perpendicular to the horizontal string), and watch what happens.

Every time pendulum A swings, it pushes on the string, which in turn pushes on Pendulum B – transmitting energy to pendulum B. According to Newton's 3rd law (Equal and Opposite Force), pendulum B pushes back on Pendulum A, slowing it down and taking energy from it! This happens very regularly – so regularly it can be calculated.

Pull Pendulum A and Pendulum B to the same side and let them swing – they should swing without changing their swing (much) – this is a stable swing. Do steps 1-3.

1) Time 10 swings.
2) You've got the period of 10 swings, so divide by 10 to get the period of one swing (the number of seconds per swing).
3) Invert this to get the frequency (the number of swings per second).

	# Swings	Total Time	Period of 1 Swing	Frequency
Same Side				
Opposite Side				

Pull Pendulum A and Pendulum B to opposite sides and let them swing – they should swing without changing their swing (much) – this is a stable swing. Do steps 1-3 again for this situation.

Subtract the frequency for Opposite side swinging from the frequency for same side swinging. That's the beat frequency. Invert (1/frequency = period) this to find the beat period (how long it takes to make one complete transfer of energy from pendulum A to pendulum B and back to pendulum A again. Check to see is you were accurate by swinging just one pendulum.

A) Time 10 (or if you're impatient, just 5) complete energy transfers if you can.
B) Divide the time by 10 (or 5 if you were impatient) to see if the actual beat period matches your calculated beat period!