

Name: _____ Date: _____

m_r^β **Physics Practice: We got the beat**

Waves are additive. When waves are added, they create a new wave, which is the *superposition* of the waves being added. When two sinusoidal sound waves with different frequencies are added, something interesting happens. We will use the three wave simulator at <http://www.mrbenson.org/sound-waves/>.

1. What happens if you superpose two waves with the same frequency?

2. Superpose waves with frequencies 430Hz and 440Hz. What do you notice?

3. Superpose waves with frequencies 435Hz and 440Hz. How does this sound and look different from the previous problem?

4. Superpose waves with frequencies 439Hz and 440Hz. How frequently does the superposed wave become quiet?

5. The changes in amplitude due to superposition of waves with different frequencies is called *beat*. Can you come up with a mathematical relationship that gives the beat frequency as a function of the input frequencies? Be sure to define your variables.

6. Use your formula to predict the beat frequency from waves with frequencies 220Hz and 222Hz.

7. Before trying it, what do you think would happen if you added three waves together with frequencies 220Hz, 221Hz, and 222Hz?

8. Use the three-wave simulator to test your prediction. Explain why this happens.
