Worksheet for Exploration 18.3: A Microphone between Two Loudspeakers

A microphone is placed between two loudspeakers (position is given in centimeters and time is given in seconds). The speakers are connected to two sources of sound that have variable frequencies, $f_1$ and $f_2$. The graph shows the sound waves arriving at the microphone, as a function of time, from each speaker and also shows the sum of the two waves. Change the frequency of either sound source (25 Hz $< f_1, f_2 < 30$ Hz), and watch the changing interference between the two sound waves. Study the phenomenon of beats and verify that the beat frequency is correct. Restart.

a. What happens as the two frequencies get closer together?

b. What happens as the two frequencies get farther apart?

c. Does it matter which speaker has the higher frequency?

d. What happens if the two frequencies are identical?
   i. Consider what the implications are for the phases of the two speakers must be to give the result that you observe.

Remember that it is the difference between the two sound frequencies that determines the beat frequency.