

Hear the Pulse Between Two Tones

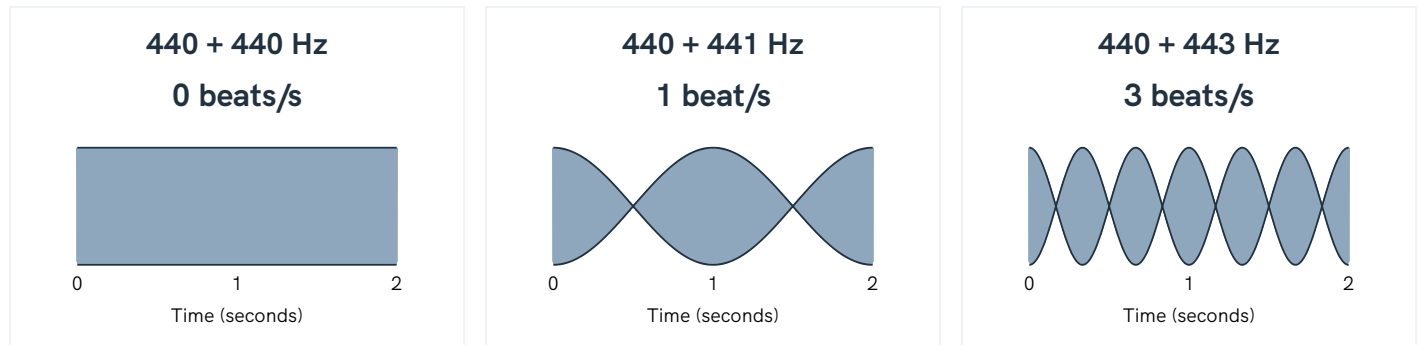
Two close, steady tones can make one pulsing sound. Listen for the pulses while both tones sound together.

1 · HEAR 0, 1 AND 3 BEATS PER SECOND

Listen to References 1–3. Model: in-phase sine waves with equal component amplitudes.

The reference is the steady 440 Hz tone. The candidate is the other tone we compare with it.

Beat rate = higher frequency – lower frequency. Hz means cycles per second. $440 - 437 = 3$ beats per second.



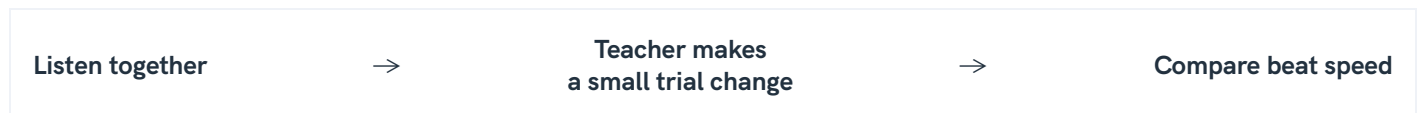
Plots show 0–2 seconds of the sum, scaled by the same factor. The dark outlines show how the sound's strength changes. Each wide–narrow–wide cycle is one beat; the top and bottom halves show the same pulse. Each tone pair sounds for 6 seconds. Check 1 plays two pairs with a 1-second pause. At equal frequency, in-phase waves reinforce steadily: no beats.

2 · SAME SPEED DOES NOT TELL YOU WHICH SIDE



Compare Reference 4 with Reference 3, then Check 1. Both are 3 Hz away from 440 Hz. Beat speed alone cannot tell you whether the candidate is sharp or flat relative to the reference.

3 · LISTEN → COMPARE → RECHECK



Slower? The frequencies are closer; ask the teacher whether to continue with a smaller change in that direction. **Faster?** Ask the teacher to reverse the trial. **Same rate?** Neither endpoint is closer; ask for a smaller trial. **No pulsing?** In this steady pure-tone model, the frequencies match. Recheck against the same reference.

These are pure-tone listening models. Real instruments have harmonics; vibrato and recordings can complicate the pulsing. Let your teacher guide any physical adjustment.

Try it You hear 3 beats per second against 440 Hz. Does that prove the candidate is sharp? Give one possible candidate on each side.



Listen: tissimo.co/worksheets/tuning-beats-listening-map
Mono audio · use a comfortable volume · synthesized directly to preserve the exact frequencies.

Mini-task: No. 437 Hz and 443 Hz both give 3 beats/s against 440 Hz.