

Two tuning forks of frequency 256Hz and 260Hz are sounded close to each other. What is the frequency of the beats predicted?

When you superimpose two sine waves of different frequencies, you get components at the sum and difference of the two frequencies. This can be shown by using a sum rule from trigonometry. For equal amplitude sine waves:

$$A \cos 2\pi f_1 + A \cos 2\pi f_2 = 2A \cos\left(2\pi \frac{f_1 - f_2}{2}\right) \cos\left(2\pi \frac{f_1 + f_2}{2}\right)$$

The first term gives the phenomenon of beats with a beat frequency equal to the difference between the frequencies mixed. The beat frequency is given by:

$$f_{beat} = f_1 - f_2$$

In our case:

$$f_{beat} = 260 \text{ Hz} - 256 \text{ Hz} = 4 \text{ Hz}$$

Answer: 4 Hz