

(a) 220 Hz and 260 Hz

(b) 25 Hz; 20 Hz; 30 Hz

Question

(a) Two tuning forks are sounded at the same time. Which tuning forks will give a beat frequency of 20 Hz when sounded with a 240 Hz tuning fork?

- 12 Hz
- 260 Hz
- 4800 Hz
- 220 Hz

(b) What is the beat frequency heard for each pair of tuning forks below?

300 Hz and 325 Hz; 360 Hz and 380 Hz; 480 Hz and 510 Hz.

Place the following under the proper column above:

- 625 Hz
- 740 Hz
- 990 Hz
- 20 Hz
- 30 Hz
- 25 Hz

Solution

Formula of the beat frequency: $f_{beat} = |f_1 - f_2|$.

(a) $f_{beat} = 20 \text{ Hz}; f_1 = 240 \text{ Hz}; f_2 \geq 0 \text{ Hz}$.

Thus, we have the equation: $20 = |240 - f_2|$, which we can rewrite as follows:

$$\begin{cases} 20 = 240 - f_2, & \text{if } 240 \text{ (Hz)} \geq f_2 \geq 0 \text{ (Hz)} \\ 20 = f_2 - 240, & \text{if } f_2 > 240 \text{ (Hz)} \end{cases}$$

From where we have solutions:

$$\begin{cases} f_2 = 220 \text{ (Hz)} \\ f_2 = 260 \text{ (Hz)} \end{cases}$$

(b) $f_1 = 300 \text{ (Hz)}; f_2 = 325 \text{ (Hz)} \rightarrow f_{beat} = |300 - 325| = |-25| = 25 \text{ (Hz)}$

$f_1 = 360 \text{ (Hz)}; f_2 = 380 \text{ (Hz)} \rightarrow f_{beat} = |360 - 380| = |-20| = 20 \text{ (Hz)}$

$f_1 = 480 \text{ (Hz)}; f_2 = 510 \text{ (Hz)} \rightarrow f_{beat} = |480 - 510| = |-30| = 30 \text{ (Hz)}$