Answer on Question #72214-Physics-Other

A guitar string under the tension of 200N, vibrating in its fundamental mode, gives 6 beats/sec. With a tuning fork the player increase the string tension to 242N and again gets 6 beat/sec. Find the frequency of the tuning fork?

Solution

$$f_2 - f = 6\frac{beat}{s}.$$

$$f - f_1 = 6\frac{beat}{s}.$$

$$\frac{f_2}{f_1} = \sqrt{\frac{T_2}{T_1}}$$

$$\sqrt{\frac{T_2}{T_1}}f_1 - f = 6\frac{beat}{s}.$$

$$\sqrt{\frac{T_2}{T_1}}(f - 6) - f = 6.$$

$$\left(\sqrt{\frac{T_2}{T_1}} - 1\right)f = 6\left(\sqrt{\frac{T_2}{T_1}} + 1\right)$$

$$f = 6\frac{\left(\sqrt{\frac{T_2}{T_1}} + 1\right)}{\left(\sqrt{\frac{T_2}{T_1}} - 1\right)} = 6\frac{\left(\sqrt{\frac{242}{200}} + 1\right)}{\left(\sqrt{\frac{242}{200}} - 1\right)} = 126 \; Hz.$$

Answer: 126 Hz.