Answer on Question #47926 – Physics - Mechanics | Kinematics | Dynamics

A musical instrument can be tuned by comparing its frequency to that of a standard such as a tuning fork. Let's say that you hear a beat frequency of 6 Hz when comparing your instrument to a 900-Hz tuning fork. What is the frequency of your instrument?

A) 894 Hz
B) 900 Hz
C) 906 Hz
D) Either 906 Hz or 894 Hz but we can't tell which

Now let's say you begin to adjust your instrument's frequency upwards and you find that the beat frequency goes down. What was the original frequency of your instrument?

A) 900 Hz
B) Still can't tell
C) 906 Hz
D) 894 Hz

Solution:

I part

$f_1 = 900\ Hz - frequency\ of\ the\ tuning\ fork;$
$f_2 - frequency\ of\ the\ musical\ instrument;$
$f = 6\ Hz - beat\ frequency;$

Beat frequency is equal to the difference between two frequencies:
$$f = |f_1 - f_2|$$
$$f_2 = f_1 - f = 900\ Hz - 6\ Hz = 894\ Hz;$$
$$f_2 = f_1 + f = 900Hz + 6\ Hz = 906\ Hz$$

II part

In second part, you begin to adjust your instrument's frequency upwards and you find that the beat frequency goes down, thus frequency of the musical instrument is less then frequency f_1, because the difference between frequencies goes down:
$$f_2 = 894\ \text{Hz}$$

Answer: D)
D)