

Physics 122-01

Test 2

April 4, 2003

Name: _____

Start all problems with a fundamental principle or with an equation from the equation sheet. Be sure to show your work **clearly** and **draw a box around your answer**. If any question is unclear, please ask immediately.

1. (20 pts.) When a violin string is played (without fingering) at the same time as a 440 Hz tuning fork, beats are heard at the rate of 3 per second. When the tension in the string is increased slightly, the beat frequency decreases. What was the initial frequency of the violin string?

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SOLUTIONS

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$$f_{tf} = 440 \text{ Hz}$$

$$f_v = ?$$

$$f_{\text{beat}} = |f_{tf} - f_v| = 3 \text{ Hz}$$

$$\therefore f_v = 437 \text{ or } 443 \text{ Hz. Which one?}$$

Recall $f = \frac{v}{2L} \sqrt{\frac{F_T}{\mu}}$. Increasing F_T means

increasing f . Since increasing f reduces the beat frequency, it must be bringing f_v closer

$$\text{to } 440 \text{ Hz. } \therefore \boxed{f_v = 437 \text{ Hz}}$$