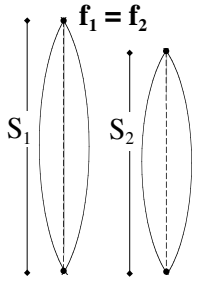
**Quiz 4A** **TA**_____ **Name** (last)_____ (first)_____ |___|___|___
first 3 letters last name

**Rubric Codes:** **Student ID:** _____

**I certify by my signature that I will abide by the code of academic conduct of the University of California.** **Signature** _____

**1)** Two guitar strings are fixed at both ends. One string is made of metal; the other is made of nylon. The metal string has length $\mathbf{S_1}$. The nylon string has length $\mathbf{S_2}$ (which is shorter than $S_1$). However, both guitar strings, when plucked, make the exact same note (same frequency when vibrating at its fundamental frequency as shown to the right). ***Which string has the faster wave speed?*** (To receive credit, you must ***explain*** your answer.***)***




**2)** Two speakers are playing slightly different frequencies; therefore, we hear beats. If you could adjust one of the speakers (change its frequency), ***describe how the beats change as the two frequencies become closer***.

$$y(x,t) = A\sin(\frac{2\pi t}{T} \pm \frac{2\pi x}{\lambda} + \varphi) + y_o;\ \ \lambda = \frac{v_{wave}}{f};\ \ T = \frac{1}{f};\ \ \lambda = d\sin\theta\ ;\ f_{beat} = |f_1 - f_2|;\ \ f_{carrier} = \frac{f_1 + f_2}{2}$$

**Quiz 4B** **TA**_____ **Name** (last)_____ (first)_____ |___|___|___
first 3 letters last name

**Rubric Codes:** **Student ID:** _____

**I certify by my signature that I will abide by the code of academic conduct of the University of California.** **Signature** _____

**1.** While studying, one friend says that if you stand directly between two speakers playing different frequencies, you will not hear the beats. The other friend says, "No, the only way to not hear beats is to plug your ears or leave the room!" Who is correct? **Explain**.

**2.** Two ocean waves with the same frequency move toward each other and form a standing wave. How far is a node from the nearest anti-node, ***one wavelength, 1/2 wavelength, 1/4 wavelength or other***? **Explain** your answer ***and*** include a simple drawing.

**3.** A musician is tuning her guitar by tightening her guitar string. She notices that the beats start to ***move closer together***. Should she continue to tighten the string or should she start to loosen it? **Explain**.

$$y(x,t) = A\sin\left(\frac{2\pi t}{T} \pm \frac{2\pi x}{\lambda} + \varphi\right) + y_o;\quad \lambda = \frac{v_{wave}}{f};\quad T = \frac{1}{f};\quad \lambda = d\sin\theta;\quad f_{beat} = |f_1 - f_2|;\quad f_{carrier} = \frac{f_1 + f_2}{2}$$