PhyzJob:
"Kenneth, what's the frequency?"

Felix

On a Saturday night in October, 1986, at about 10:30pm, CBS anchorman Dan Rather was accosted in upper Manhattan by a well-dressed assailant who demanded an answer to a mysterious question. “Kenneth, what’s the frequency?” asked the anchorman’s antagonist. Rather, who had forgotten his high school physics, was perplexed and unable to offer a solution to the stranger.

You, however, *are* taking high school physics and are therefore capable of answering the assailant’s riddle. *You* have the ability to mathematically describe the frequency of the *n*th harmonic of a standing wave in a string of a given mass and length at a certain tension. Simply follow the steps below.

1. Write the equation for the speed of a wave in a string under tension (in terms of the tension in the string, the mass of the string, and the length of the string).

$$v = \sqrt{(TL/m)}$$

2. Write the general equation for the wavelength of the *n*th harmonic of a string (in terms of *n* and the length of the string).

$$\lambda_n = 2L/n$$

3. Write the equation for the frequency associated with a wave (in terms of the propagation speed of the wave and wavelength).

$$f = v/\lambda$$

4. Substitute the expression for wavelength in step 2 into the expression for the frequency in step 3 to derive a general equation for the frequency of the *n*th harmonic (in terms of the propagation speed of the wave, the harmonic number, and the length of the string).

$$f = nv/2L$$

5. Finally, substitute the expression for the propagation speed of the wave in step 1 into the expression for *f* in step 4 to derive a general equation for the frequency of the *n*th harmonic (in terms of the tension in the string, the mass of the string, the harmonic number, and the length of the string).

$$f = \frac{n\sqrt{(TL/m)}}{2L}$$

$$\boxed{f = \frac{n}{v}\sqrt{\frac{T}{mL}}}$$

5. n/2 · √(T/mL).
You may wish to send this information on to Mr. Rather c/o CBS News, New York, NY. Rather was beaten and chased by the mugger.
Special Offer: 10 CTF pts if you bring a copy of an article regarding the above incident that you found through your own research (by the end of this unit). 40 CTF pts for a personal response from Dan Rather regarding the incident and the derivation above (by the final)