Letters
to the Editor

Credit Where Credit Is Due

In the September issue of *TPT* we wrote an article titled "Learning Cycle Model of a Science Lesson." Although the article mentioned the role that Robert Karplus played in the evolution of this instructional model, no mention was made of Rodger Bybee's contribution. This omission has been pointed out by Arthur Eisenkraft (arthur.eisenkraft@umb.edu), and we hope this note will help to remedy the oversight by providing credit to Rodger Bybee for his contribution.[1]

Thomas Rossing (rossing@ccrma.Stanford.EDU) also sent us an email cautioning us to be careful to distinguish between pitch (a psychoacoustic quality) and frequency (a physical property of sound waves). See *The Science of Sound* (3rd ed.) by Rossing et al.

References

1. R.W. Bybee, *Achieving Scientific Literacy* (Heinemann, Portsmouth, NH, 1997).

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Closed Tube with Varying Length

I have read with interest the recent articles where variable length tubes are used to determine the speed of sound. I see that most of the authors have found ways to eliminate the large water-filled "U" tubes. I thought I'd pass on something I discovered about 12 years ago. Most golf shops sell plastic tubes that are placed in one's golf bag to separate the clubs. They come in two sizes, regular and oversized. Conveniently the regular fits into the oversized with a fairly snug fit. Wooden dowels that fit snugly inside the regular tube can be purchased at the local hardware store. I cut pieces off of the dowel about five centimeters long to form a plug, then attach a much smaller diameter dowel about a meter long into the plug by drilling a hole into one end. The assembled result is a closed tube whose length can be varied from 0 to over 150 centimeters.

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Issue with TI-83s

While grading the June 2005 NYS Regents[1,2] Physics Exam, I found that 20% of my students were missing question 71:

> The alpha line in the Balmer series of the hydrogen spectrum consists of light having a wavelength of 6.56×10^{-7} meter. Calculate the frequency of this light. [Show all work, including the equation and substitution with units.]

The correct answer to this problem is

$$f = \frac{c}{\lambda} = \frac{3\times10^{8}\ \text{m/s}}{6.56\times10^{-7}\ \text{m}} = 4.57\times10^{14}\ \text{Hz}.$$

However, many of my students were simply answering $f = 5.57$ Hz. I would have expected a few of my students to forget to check their calculator for an exponent, but too many of them missed this question for such a simple explanation. After trying a few different calculations, I found that the problem was not with the physics but with students' calculations on their calculators.

As part of my master's project for Buffalo State College, I have developed a web page that will help students to understand the importance of using the [EE] button on their TI-83 calculators.[3] The web page is divided into four major sections for using the calculators. In the first section there are directions for addition, subtraction, multiplication, and division that explicitly describe the keystrokes for entering calculations with scientific notation. The second contains sample physics problems where scientific notation is commonly used, such as gravitational force, electrostatic force, and calculations involving the speed of light. Using parentheses for the correct orders of operation can be found in the third section, and the final section shows orders of operation that the TI-83 calculators follow.

The address for this web page is: http://physicsed.buffalostate.edu/pubs/PHY690/Doty2005Calculator/Calculator.html.

References

1. http://www.emsc.nysed.gov/ciai/mst.html.
2. http://www.nysedregents.org/testing/scire/regentphys.html.
3. http://www.ticalc.org/basics/calculators/ti-83plus.html.

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