12-2018

Question 1: Clock Variation; Question 2: Recycling Coffee Pods

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Original Publication Citation

Weinstein, L. (2018). Question 1: Clock variation; question 2: Recycling coffee pods. *Physics Teacher, 56*(9), 645-645. doi:10.1119/1.5080590

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Citation: The Physics Teacher **56**, 645 (2018); doi: 10.1119/1.5080590
View online: https://doi.org/10.1119/1.5080590
View Table of Contents: http://aapt.scitation.org/toc/pte/56/9
Published by the American Association of Physics Teachers

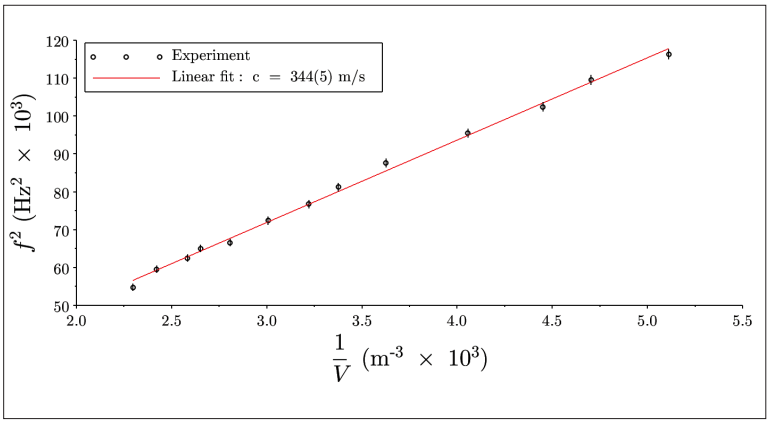

Fig. 3. Linearized relationship between resonance frequency and air volume: experimental values and linear fit.

this temperature. We note that there are at least a couple of uncontrollable sources of uncertainties in this experience: the temperature of the blown air is a bit larger than the ambient temperature and the contour conditions at the opening are modified by the blow and the proximity of the lips.

To sum up, we presented a very simple experiment using everyday stuff to study acoustic resonance. This experiment is based on the great processing capacity of smartphones to obtain real-time spectra. The result obtained for the sound speed is in concordance with the standard value.

Note about the end correction

The inner end of the neck is flanged, so the correction factor is $8/(3\pi)$ (according to Kinsler, Ref. 1). While the outer end of the neck is unflanged, then the correction factor is 0.6133 (according to Levine and Schwinger, Ref. 10). Thus, the total correction factor for the case of the bottle is the sum of these two factors, that is 1.4621.

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Fermi Questions

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Question 1: Clock variation

The first precise pendulum clock imported into North America failed to keep accurate time. How much does the local variation in effective *g* affect time keeping?

Question 2: Recycling coffee pods

When we order coffee pods, we now receive a large envelope to send the used pods back for recycling. Should we recycle the pods? (*Thanks to Sebastian Kuhn of Old Dominion University for prompting the question.*)

Look for the answers online at *tpt.aapt.org*

Question suggestions are always welcome!

For more Fermi questions and answers, see *Guesstimation 2.0: Solving Today's Problems on the Back of a Napkin,* by Lawrence Weinstein (Princeton University Press, 2012).

DOI: 10.1119/1.5080590