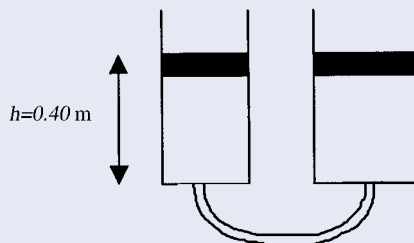


# Physics Challenges for Teachers and Students

## ► Ups and Downs Under Pressure

The bottoms of two vertical cylinders of different cross sections are connected by a thin pipe. Each cylinder contains gas at constant temperature and is covered by a movable piston. The mass of one piston is  $m_1 = 1.0$  kg, the other  $m_2 = 2.0$  kg. Initially, the pistons are at the same height  $h = 0.40$  m. What would be the difference in the heights of the pistons ( $H$ ) if an extra load of  $m = 1.0$  kg is placed on the lighter piston? Assume the entire arrangement is placed in vacuum. DOI: 10.1119/1.1557515



## First to Submit Correct Solutions

Below are the names of the readers who were first to submit the correct solutions to the December Challenges:

*John F. Goehl Jr.* (Miami Shores, FL)

*Art Hovey* (Milford, CT)

*Carl E. Mungan* (Annapolis, MD)

*Inge H. A. Pettersen* (Kongshavn, Norway)

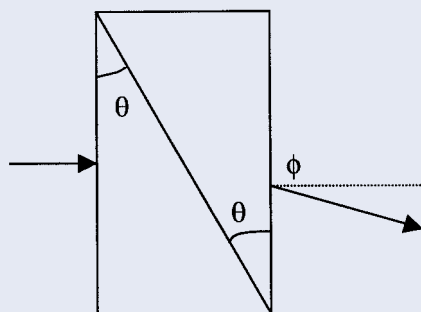
The solutions, as well as the more complete list of their contributors, can be found on our website: <http://www.aapt.org/tpt>. We look forward to your future contributions.

## ► The Ray of Hope

A capillary tube is made of glass with the index of refraction  $n'$ . The outer radius of the tube is  $R$ . The tube is filled with a liquid with the index of refraction  $n < n'$ . What should be the minimum internal radius of the tube  $r$  so that any ray that hits the tube would enter the liquid? DOI: 10.1119/1.1557516

## ► Beam Me Up!

Two identical prisms with slightly different indices are located as shown. Angle  $\theta$  is small. When a laser beam strikes one of the prisms perpendicular to the surface, the refracted ray is deviated by a small angle  $\phi$ . Find the difference  $dn$  between the indices of refraction of the prism in terms of  $\theta$  and  $\phi$ . DOI: 10.1119/1.1557517



## Note to contributors:

As the number of submissions grows, we request that certain guidelines be observed, in order to facilitate the process more efficiently:

- Please email the solutions as Word files.
- Please name the file as: "Apr03HSimpson" if — for instance — your name is Homer Simpson, and you are sending the solutions to April 2003 Challenges.
- State your name, hometown, and professional affiliation in the file, not only in the email message.

*Many thanks!*

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