

# Physics Challenges for Teachers and Students

## ► Broken Record

$N$  elastic pool balls of the same mass and size are arranged on the table. One ball is colored red; others are white. All balls are initially at rest. The red ball is then hit by a cue. Mysteriously, after several collisions with the white balls, the red ball *stops* at the very point it was originally placed. What is the minimum total number of balls  $N$  that allows for such a situation?

## ► U Will be Shaken

A U-shaped tube with smooth inner surface has a uniform cross-section area. The tube is partially filled with a fluid. The total length of the filled part of the tube is  $L$ . After the fluid has reached an equilibrium, a small disturbance causes the fluid to oscillate in the tube. Find the period  $T$  of these oscillations.

## ► The Block Schedule

Two blocks of equal masses  $m$  are connected by a relaxed spring with a force constant  $k$ . The blocks rest on a smooth horizontal table. At  $t = 0$ , the block on the left is given a quick impulse toward the right, and the blocks begin to slide along the table. At what time  $t$  would the left block first have zero instantaneous velocity?



*Readers are encouraged to submit their solutions to the physics challenges. The "best" answers will be published in a later issue. Readers are also encouraged to submit their favorite physics challenges, some of which may be published.*

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