

# Physics Challenges for Teachers and Students

With this issue we introduce a new feature designed to assist in the teaching and learning of problem-solving skills. Each month, in this space, we will present three to five challenging physics problems that we hope you will find useful in your teaching. This feature will run on a trial basis for a few months and may evolve into a regular column. It is meant to be interactive in nature. Our readers (and their students!) are encouraged to submit their solutions to the address given below. The “best” solutions to each problem will be published in a later issue (we do not want to take any of the mystery out of them too soon). We also hope that our readers will help us shape this possible new column with their suggestions and their own favorite physics challenges.

Below is the first group of challenges. We will start with problems on mechanics, since this is the topic most of us teach in the fall. Each problem has a semi-serious title, which we hope will make it easier for you to refer to particular problems in your future correspondence. Enjoy, and we look forward to hearing from you.

**Please send correspondence to:**

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## ► The Ball Stops Here

The soccer ball approaches a player at  $v = 12$  m/s. At what speed  $u$  should the player’s foot move in order to stop the ball upon contact? Assume that the mass of the foot is much greater than that of the ball and that the collision is elastic.

## ► Bee Aware

Two bees are in the air at an unknown initial distance  $D$  from each other. They are flying with velocities  $v_1$  and  $v_2$  directed toward each

other and have accelerations  $a_1$  and  $a_2$  directed away from each other. In their subsequent motion, the minimum separation of the bees is  $d$ . Find the initial separation  $D$ .

## ► Gold in the Cold

A spherical planet has no atmosphere and consists of pure gold. Find the minimum orbital period  $T$  for a satellite circling the planet. Needed numerical data may be found in your textbook or in common handbooks.