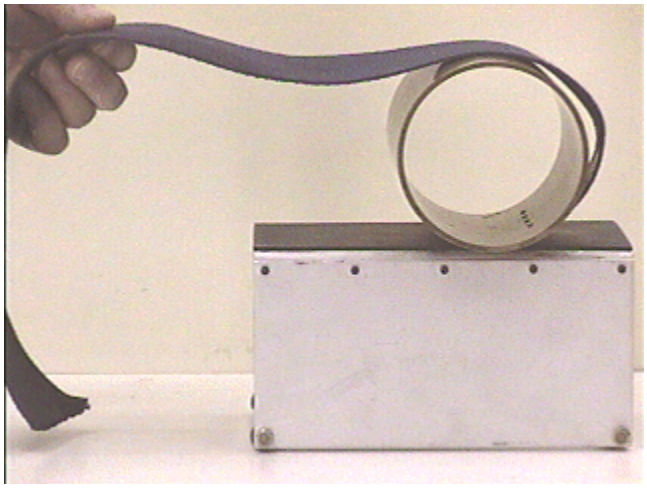
Question #52

The figure below shows a thin brass cylindrical shell, resting on a rectangular base, with a cloth strip wound around the cylindrical shell. The base slides without friction on the table through the use of three small ball bearings as wheels. When the base is gently pushed, it moves across the table top at a constant speed, as can be seen in an mpeg video by clicking on the photograph.



The top of the rectangular base is made from rubber, so there is lots of friction between the top of the base and the metallic surface of the cylindrical shell.

Now suppose that the cloth strip is held parallel to the table top (horizontal) and yanked, so that the cylindrical shell comes off the base. The question this week involves what the base will do when the cylindrical shell is rapidly pulled off the base by rapidly pulling on the cloth strip.

Pulling on the cloth might cause the cylindrical shell to rotate counterclockwise, creating a reaction force to the right on the base. On the other hand, perhaps pulling on the cloth will cause the cylindrical shell to move to the left and friction between the shell and the base will also pull the base to the left. Or perhaps the cylindrical shell will move off to the left leaving the base motionless.

When the cylindrical shell is yanked off the base by pulling the cloth strip horizontally to the left the base will:

- (a) move to the right.
- (b) move to the left.
- (c) remain motionless.

Click here for Answer #52 after February 19, 2001.

Question of the Week

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For questions and comments regarding the *Question of the Week* contact Dr. Richard E. Berg by e-mail or using phone number or regular mail address given on the Lecture-Demonstration Home Page.