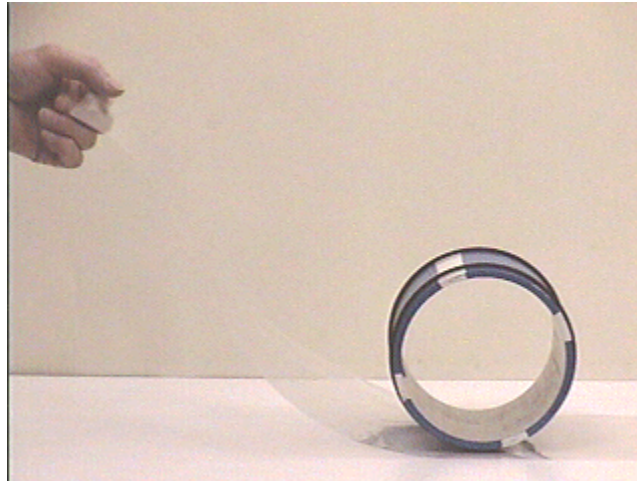


Answer #20

The answer is (c): The cylinder will stop and remain near where it was when it left the plastic. After the plastic sheet is pulled out from under the cylinder, friction between the o-rings and the table causes the cylinder to stop rotating and cease its translational motion. This action is shown in an mpeg video that can be seen by clicking your mouse on the photograph below.



Perhaps the best reasoning for why this occurs uses the concept of conservation of angular momentum.

As it is yanked out from under the aluminum tube, the plastic sheet applies no net torque to the tube around the point of contact with the plastic sheet, because the distance between the sheet and the tube is zero. Two components of angular momentum around the contact point can be identified: that due to the clockwise rotation of the tube, and that due to the linear velocity of the tube to the left. The net angular momentum of the tube around the point of contact of the tube with the plastic sheet, however, is zero just before the tube leaves the plastic sheet. Likewise, because the plastic sheet is very thin, there is no net angular momentum around the point of contact of the tube with the table just after the tube leaves the plastic sheet. Sliding friction of the o-rings on the tube with the table causes both the rotation and the translation to quickly cease.

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For questions and comments regarding the *Question of the Week* contact

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