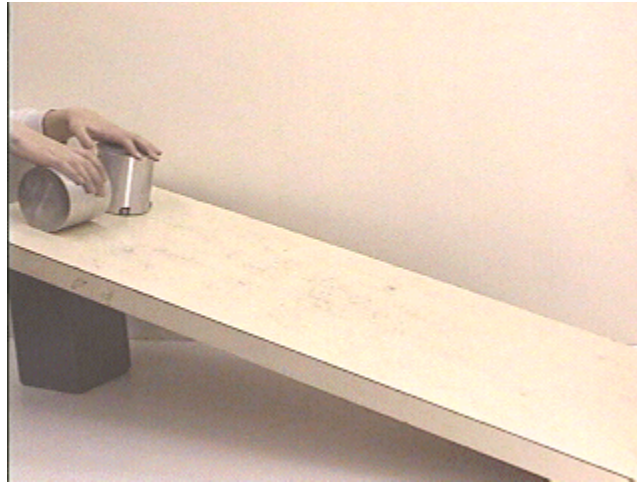


Answer #11

The answer is (b); the sliding cylinder will get to the bottom first, as seen in the mpeg video below.



This behavior can be explained by consideration of conservation of energy. As either of the objects goes down the incline, its initial gravitational potential energy is converted into kinetic energy - energy of motion - so it gains speed.

In the case of the slider, because there is no frictional loss all of the initial potential energy is converted into linear kinetic energy. On the other hand, as the roller moves down the incline its potential energy is divide into two types of kinetic energy: *translational* (moving linearly) and *rotational* (circular motion). In the case of rolling, therefore, only part of the kinetic energy goes into linear motion, so the roller moves more slowly. In fact, the kinetic energy is equally divided between translational and rotational modes. Can you calculate this and determine how much faster the slider will go than the roller?

[Archive 1](#)

[Question of the Week](#)

[Outreach Index Page](#)

[Lecture-Demonstration Home Page](#)



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