

## Activity #1 “Let’s get the ball rolling” Questions:

**Question #1:** Why will the speed of the ball along the level tabletop be the same as the speed of the ball at the bottom of the ramp?

**Answer:** Gravity pulls all things downward. Because the tabletop is level and the ball only moves horizontally, gravity (which only acts vertically) does not speed the ball up or slow it down.

**Question #2:** Give a reason why the average time, calculated from 5 separate measurements, is more reliable than any single measurement of the time.

**Answer:** We time the ball 5 times at each height so that we minimize the effects of “error” in the lab activity. We start this activity thinking that the ball will roll uninterrupted known the ruler, and roll smoothly and straight, right through our measured distance. This will not happen. In fact, the ball will not roll along the exact same path twice. It may have been released a little differently, or from slightly different points. It may have rolled off the ruler onto the table differently, or even hit something on the table. Simply put, the ball does not roll the same way each time. Human reaction time using the stopwatch is also a source of “error”. To reduce the possibility that our results will be based on an unusual ‘roll’ of the ball or faulty use of the stopwatch, we do the experiment several times and average the results.

**Question #3:** What effect did increasing the release height have on the speed of the ball?

**Answer:** The higher the release point of the ball, the greater its speed will be at the bottom of the incline.

**Question #4:** Why do you think the speed of the ball depends upon its release height?

**Answer:** The weight of an object is the force that it feels due to Earth’s gravity. This force pulls the objects downward. Acceptable student answers probably include:

- The higher the release point, the more time gravity has to pull down on the ball, resulting in a greater speed of the ball at the bottom.

- The higher the release point, the more distance gravity has to pull down on the ball, resulting in a greater speed of the ball at the bottom.

Both of these answers are acceptable, and both are based on the premise that an unbalanced force can change the speed of the object. Students have used this approach in the 6<sup>th</sup> grade *Forces That Cause Motion* unit and will most likely fall back on this approach here. The purpose of this unit is to look at changes in motion from a different perspective, using the concept of energy.