Transition Activity

**Transition Activity:** Merging current unit of fifth grade Force and Motion with fourth grade Standard of Energy.

This activity will address the 4-PS3-1 and 4-PS3-3 and Science and Engineering Practices. Use evidence (i.e., measurements, observations, patterns, etc.) to construct an explanation.

Our district uses the SEPUP program, an inquiry and hands-on program. This investigation is number #76 Speed and Collisions.

**Probing Question to Investigate:** Does vehicle speed affect the forces involved in a collision?

**Materials:** 2 track pieces, 1 ramp, 1 cart, 1 block, 1 meter stick (fifth grade uses quantitative measurement).

**Procedures:**
1. In science notebook, create a chart to record data on the effect of speed on block motion.
2. Set up ramp.
3. Mark the track at 5 cm from the bottom edge of the ramp (Adjust that measurement in future experiences to allow students to predict how outcomes will change.)
4. Hold the cart so its rear axle (many students are unfamiliar with the concept of axle) is on Notch A (highest height) on the ramp.
5. Release the cart and observe what happens. Measure the distance that the block moves down the track. Record. Repeat steps 4 and 5 for trials 2 to 5.
6. Predict what you think will happen to the block if the cart starts from Notch B and record prediction in science journal. Then hold the cart so the rear axle of the vehicle is at Notch B on the ramp and conduct 5 trials. Record data.
7. Repeat step #6 with the cart starting at Notch C. Record prediction and conduct 5 trials. Record data.
8. Using data collected, calculate average distance.
9. Analyze data and draw conclusions.

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Effect of Speed on Motion

<table>
<thead>
<tr>
<th>Speed</th>
<th>Distance Block Moves (cm)</th>
<th>Average Distance (cm)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Trial 1</td>
<td>Trial 2</td>
</tr>
<tr>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
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<tr>
<td>C</td>
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Students will discover that the faster moving cart moves the block further. The more speed the cart has, the more energy the cart possesses to move the block. Students will conclude by using different release heights, that the highest height (Notch A) produces the greatest speed; and the lowest height (Notch C) produces the slowest speed. (Students could extend this idea with runners going uphill or downhill in terms of speed/energy.) Students will also conclude that the greater the speed, the more damage will occur in a collision (block and cart collision).

This experience will lend itself to students asking questions, refining their thinking, and designing their own models to demonstrate their understanding of the concepts and content, and to demonstrate they have met the Performance Expectations.

In conclusion, what I learned from crafting a lesson to meet the performance standards is that a “lesson” will extend for several days and class periods to reach a point of summative assessment. Prior knowledge, at least initially, will need much developing. Demanding that students think critically will be arduous and needs to be incrementally developed. Student designs to demonstrate understanding will take much patience with gathering of materials, acquiring resources, and finding space to execute and store projects. But the rigor of NGSS will serve our students well into the future and be worth all our efforts.