**Vernier Labquest Replacement Investigation**

**Grade 7 Kit: SEPUP Force and Motion Investigation #s 76 & 77**

**Grade 7 Kit: FOSS Force and Motion Investigation # 8 part 1**

**Title of investigation:** Speed and Collisions & Mass and Collisions

(FOSS Momentum)

**Authors:** Tim Braunsdorf

**Guiding Questions:** How does speed affect the force of collision? How does mass affect the force of collision?

**Summary of activity:** Related to all seven physical science standards 7.1.1 to 7.1.7, but not much related to 7.1.4: How speed or direction of motion changes when a force acts upon it.

**Equipment used:**

Per group: Vernier Labquest with motion detector and Dual-Range force sensor, SEPUP ramp (or meter-long ramp with board and books), toy car/cart, meterstick.

Consumable: none

**Description of Procedures, notes (teacher manual):**

Each group sets up a ramp, and clamps a motion detector at the top of the ramp. Clamp a Dual-range force sensor at 5 cm from the bottom edge of the ramp.

Measure the time taken for an object to reach the bottom of the ramp. Allow

Variations: repeat measurement at different ramp angles: use different sliding blocks/toy cars/marble.

Find the angle at which the speed is constant.

**Scientific questions:**

How does speed affect force of collision/momentum?

How does mass affect force of collision/momentum?

What is acceleration?

What energy transfers and transformations are occurring? Is energy conserved?

**Connections:** Where does the energy come from and how is it used in different types of transportation – cars, trains (electric and diesel), airplanes…

How does speed and mass affect a car in a collision?