

## Achievements and Competencies

### Learning Outcomes

<b>Grades 10-12</b>
Motion
Force, Motion and Work

Achievements and Competencies are based on the Common Framework of Science Learning Outcomes (k-12) set by the Canadian Council of Ministers of Education (1997)

### Specific Expectations

#### **Grade 10**

#### PHYSICAL SCIENCE

##### Motion

114-3 Evaluate the role of continued testing in the development and improvement of technologies.

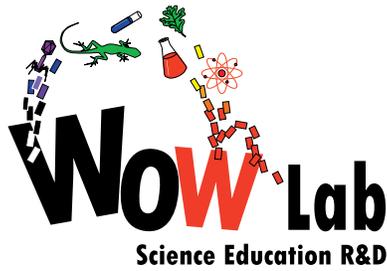
Students are asked to reflect upon what happened to the trajectory of the rocket when they changed the angle. What launch angle launches the rocket the furthest horizontal distance? The furthest vertical distance? The students then discover that the trajectory changed as the angle was changed. The rocket launches the furthest horizontal distance when angled at 45 degrees. It launches the furthest vertical distance when angled at 90 degrees.

212-4 State a prediction and a hypothesis based on available evidence and background information.

Students are asked to predict what will happen if an object is thrown off the top of a building, and to decide what factors determine how far away from the building the object will land. The height of the building and the initial vertical velocity of the object will affect how long the object will stay in the air, and how much time it will have to travel horizontally. The horizontal velocity that the object is thrown with will affect how far the object is able to travel in this time. The shape of the object and the presence or absence of wind will also play a role .

325-1 Describe quantitatively the relationship among displacement, time, and velocity.

In this activity students are asked to determine the difference between speed and velocity. They will discover that speed only describes how fast something is moving, while velocity describes how fast something is moving and in what direction. Two rockets launched in different directions but with the same angle and force will have the same speed, but different velocities.



a WOW Lab  
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## Indoor Rockets - Achievements and Competencies - Physics

### **Grade 11-12**

#### PHYSICS

##### Force, Motion and Work

213-2 Carry out procedures controlling the major variables and adapting or extending procedures where required.

In this activity students observe how the angle of the launcher varies with the placement of the clip and start with the launcher at a 45 degree angle. The students then alter the launch angle and determine how this affects the displacement of the rocket.

325-6 Analyse quantitatively the horizontal and vertical motion of a projectile.

In this activity students vary different aspects of their rocket, such as wing type and launch angle, to determine which set of variables would produce the furthest horizontal displacement of the rocket.

325-8 Apply Newton's laws of motion to explain inertia, the relationship between force, mass, and acceleration, and the interaction of forces between two objects.

All three of Newton's laws of motion are explored in this activity when students analyze the interaction between gravity and the force applied to launch the rocket. Students also analyze the relationship between the mass of the rocket and its horizontal and vertical displacements.