



## Inquiry Approaches - Physics

### Initial Inquiry

What is the difference between speed and velocity?

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.

If an object is thrown off the top of a building, 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.

### Experimental Procedure Inquiry

What happened to the trajectory of the rocket when you changed the angle? What launch angle launches the rocket the furthest horizontal distance? The furthest vertical distance?

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.

Were you able to get the rocket to land in the same spot three times in a row? What obstacles might have prevented you from doing so? How could you improve the activity procedure to get the rocket to land in the same spot?

For the rocket to land in the same spot three times, it is easiest to launch it from the same spot and the same angle. If the base or the clip shifts between launches, the rocket will land in a different spot. The same amount of force needs to be exerted on the bellow pump each time; if the same force is not exerted, then the rocket will land in a different spot. To ensure the rocket follows the same trajectory each time, the base, clip and bellow pump could be secured in place so they do not shift between launches. To control the amount of force exerted, an object could be dropped on the pump to launch the rocket, or a pump with a gauge could be used.

What improvements could you make to the launch system so that the rockets would fly further?

A launcher with minimal friction will allow for an easier take off. The addition of a release mechanism that causes pressure to build up before the rocket is released will also allow the rockets to fly further.

### In-Depth Inquiry

Do heavy objects fall faster than lighter ones?

Acceleration due to gravity is the same for all objects, regardless of their mass. If someone were in a vacuum and dropped a feather and a hammer, they would fall at the same rate. We do not observe this in our day-to-day life because of air resistance.