**Projectile Motion – Dart Gun**

We will use a toy dart gun to explore the range of a projectile. Since the speed of the dart is too large to use in the room (it can hit the ceiling), we will decrease its speed by attaching some modeling clay to the dart.

Measure the dart speed:

Fire the dart (with clay) straight up into the air and measure its maximum elevation. Then calculate the speed using ½ mv02 = mgh.

Now let’s explore how the range of the dart depends on the angle at which it is fired. Let’s define the range as the horizontal distance traveled over level ground. So, the dart must land at the same elevation at which it was fired.

*Question*: What launch angle gives the greatest range?

Check your prediction by measuring the range for several angles between 0o and 90o. Use a protractor to set the launch angle.

Projectile motion simulation: Go to <http://walter-fendt.de/html5/phen> and find the projectile motion simulator. Use it to explore how the range of a projectile depends on angle.

**Video Analysis of Projectile Motion**

Toss a ball and use the iPad app *Video Physics* to record and analyze the motion of the ball. Open *Video Physics* and go to help (?) to get instructions on how to record and analyze the video. Export the data file to *Graphical Analysis* and curve fit the data to determine the acceleration of gravity, g.