

Example 1 – Physics: Projectile Motion

This demonstration should be assigned following an in-class demonstration and discussion of projectile motion. There should also be time to practice the demonstration adequately in class, given the difficulty of achieving near-simultaneous launch of the quarters.

A common demonstration in physics class is to show that an object launched horizontally and one dropped simultaneously from the same height will strike the ground at the same time.

One way to introduce the topic and initiate discussion is with the following question:

Which hits the ground first: a bullet fired horizontally from a gun or a bullet dropped from the same height as the gun?

After discussion, have students make a prediction, observe a demonstration using quarters (see below), and then together explain what they saw. Give them the assignment of repeating the demonstration at home with a parent or another adult watching.

Quarter demonstration:

The independence of horizontal and vertical motion can be demonstrated using two quarters. Place one just overhanging the edge of a table and then set the second quarter an inch from the first (but not overhanging the table edge). Flick the second quarter with your index finger so that it knocks off the first quarter as it leaves the table. The quarters will leave the table nearly simultaneously, but with different horizontal speeds.

Have students practice this demonstration in class—a good hands-on way for them to see for themselves that the two hit the ground at the same time. As homework that night, they can show the demonstration to a parent or another adult, but not before asking him or her to make a prediction.

Guidelines to send home with students:

1. Ask a parent or another adult: If one cannonball is fired horizontally from a cannon, and another is dropped from the same height next to the cannon, which one will hit the ground first? Why?
2. Explain to the family member that his or her answer can be tested with a demonstration. Explain that you will be launching two quarters from a table so that they leave the table at the same time, but one will be traveling with a greater horizontal velocity.
3. After explaining the setup, ask your adult conversation partner to predict which coin he or she thinks will hit the ground first. Record his or her prediction, as well as the reasoning behind it.
4. Perform the demonstration. If possible, do so above a hard floor, rather than carpet, so that the sound of the coins hitting the ground is audible.
5. If your adult conversation partner's prediction was correct, but their explanation was lacking, take some time to share the related concepts covered in class today. If his or her prediction was incorrect, explain the physics behind the motion of the two coins.

Example 2 – Chemistry/Physical Science: Dissolving an Alka-Seltzer Tablet

This demonstration would fit best prior to an in-class discussion of dissolution, molecular motion, and reaction rates.

Provide students with two Alka-Seltzer tablets in order to carry out the following demonstration at home with a parent or another adult.

Guidelines to send home with the student:

1. Prepare two containers: one with hot water, one with cold water.
2. Together with a parent or another adult, you will be dissolving Alka-Seltzer tablets in cold water and hot water. Before you begin, invite the adult to predict how the tablet's rate of dissolution will compare in cold versus hot water. Summarize the adult's prediction.
3. Make a table in which to record both qualitative and quantitative observations. Think about what key things you will want to be looking for and measuring as you carry out the experiment.
4. Drop one tablet in each container. Record observations as the tablets dissolve.
5. With your adult conversation partner, record how your results compare with his or her prediction. If things were different than expected, how might you explain the outcome?
6. What follow up questions do you and/or your adult conversation partner have related to this experiment?