# Derby Racer

*Physical Science and Technology*

In this project, you will design and build a racecar, which you will use to examine the concepts of displacement, velocity, and acceleration. After your racecar is built, we will use computers and sensors to make measurements as it rolls down a ramp and you will analyze those measurements with an Excel spreadsheet that will be posted to your web site.

*The specifications for your racecar are as follows:*

1. You must design and build the chassis for your racecar (the wheels, axles, and underlying support). If you choose, you may use some pre-made parts for the top of your racecar (check with your instructor for approval).
2. Your racecar should be no taller than 25 cm, no longer than 40 cm, and no wider than 20 cm (including wheels and axles).
3. Your racecar should roll freely and will be powered only by gravity.
4. The Arduino will need to be mounted on your racecar. It will need to be easily removed so other classes can use the Arduino even while we are working on this project. The Arduino will be connected to small LED lights that you will program to blink. (Requirements for the lights will be given later.)

*Here are the steps you should follow before you start to build your racecar:*

1. **Individually**, make four thumbnail sketches of different ideas or views of your racecar.
2. **Individually**, make two drawings your racer. Each drawing should fill one side of an 8.5 x 11" sheet of paper. One drawing should show the top and the other should show the side of your vehicle. These drawings do not need to be full-scale, but they should be matched (in other words, what measures 6 cm on one drawing should also measure 6 cm on the other drawing). Include all important details, including dimensions in centimeters (the lengths of each piece) and materials if necessary. Your drawing should include written notes that describe parts, design choices, and methods of attachment for various pieces.
3. **Choose a partner** and report to your teacher. We will approve your partner choice and check your drawings. Then, you and your partner can pick one design to use and begin building your racecar.