Does Wheel Size Matter: Starter Kit

In this lesson, students will use the Vex Robotics System in a laboratory setting and conduct scientific inquiry-based experiments to determine the effect wheel size has on the speed reached in a set distance.

Students will be able to describe:

- How to construct and operate a robotic test bed.
- Independent, dependent, and control variables in this investigation.
- The various points of experimental procedure

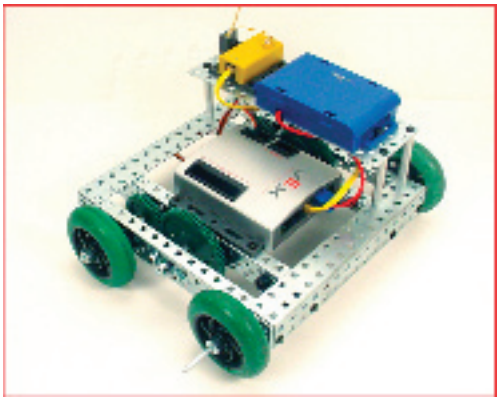
Please note

If you have ever downloaded ROBOTC firmware (or programs), you will now have to download a ROBOTC sample program, "Dual Joystick Control." Alternately, you can re-download the Vex Default Firmware.

- Select File/Open Sample Program
- Browse to Radio Control Transmitter/Dual Joystick Control and download it.
- Turn the robot on and off. The robot should now work with the remote control as it did out of the box.

Note that if you have never downloaded anything onto your VEX microcontroller, you can skip this step.

1. Modify the Squarebot with the first wheel condition. (small).



2. Prepare test area by adding a starting line and then a finish line 72 inches away:

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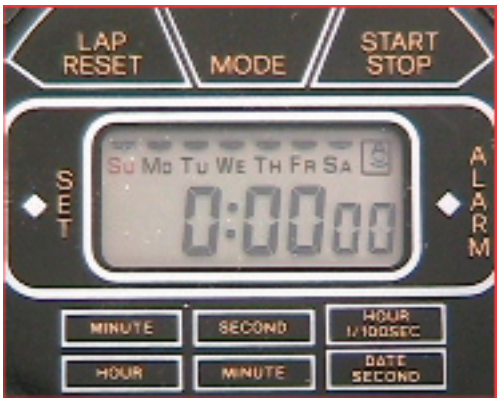
3. You will need a stopwatch handy for this experiment. At this point, gather any other materials you may need, such as a ruler, pen, and paper.



4. Identify who will run the robot and who will keep track of time.

5. Take turns with your partners driving the robot. Become familiar with the controls so you can have good trial runs.

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6. Click “Background/Resources/Example Data for Student Exercise.”

Click “Save” when prompted. Then create an appropriately named folder on your desktop so you can find it easily.

Save the file there.

Alternatively, if you are given this sheet as a printout, enter your data in the appropriate places there.

You will eventually fill in all the data in the shaded boxes.

Measure the wheel size and enter this number under Diameter (inches) for trials 1.1-1.5.

7. Use the following procedure to test your robot:

1. Set the robot behind the starting line.
2. When the robot crosses the starting line, start the stopwatch.
3. When the robot crosses the finish line, stop the stopwatch.
4. Record this time on the data table, in the box for Trial 1.1, Time(sec). Record seconds and tenths of seconds: for example: 3.1 seconds.
5. Repeat 4 more times, and enter the time for each run in the boxes for trials 1.2-1.5
6. Calculate the average speed of trials 1.1 - 1.5. (You do not need to calculate the average diameter, since this did not change in the trials.)
7. Enter this average as one point on the graph Time(s) vs. Wheel Diameter.

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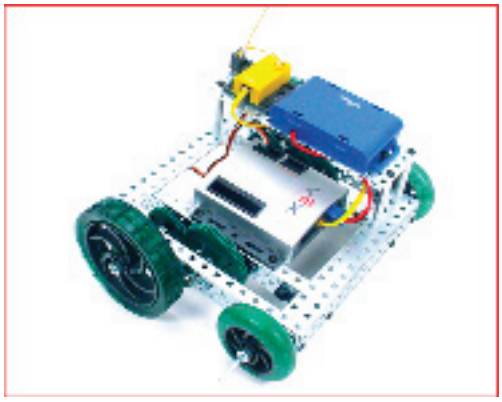
8. Modify your Squarebot so that it is equipped with medium-sized wheels on the rear axle as pictured. To do this, loosen, then remove the collars holding the small wheels, replace them with the medium size wheels pictured, and replace and tighten the collars.

Measure the wheel size and enter this number under Diameter (inches) for trials 2.1-2.5.

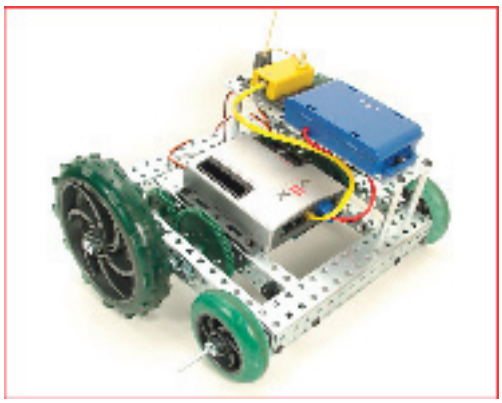


9. Estimate the robot's speed based on the wheel's size.

10. Take the robot with medium-sized wheels and repeat the procedure from step 7.

11. Modify your Squarebot so that it is equipped with large-sized wheels on the rear axle as pictured. To do this, loosen, then remove the collars holding the small wheels, replace them with the large size wheels pictured, and replace and tighten the collars.

Measure the wheel size and enter this number under Diameter (inches) for trials 3.1-3.5.



12. Take the robot with the large-sized wheels and repeat the procedure from step 7.