

SciGirls Activity 3

Rollin' Robots!



Icebreaker:
Develop some "souper"
engineering know-how with
this Can Derby activity!



You'll need:

- a shelf or board to use as a ramp, wide enough for two cans to race side-by-side
- books or blocks, to stack about a foot high
- cans of food out of the cupboard, various sizes, shapes, and weights

SciGirls Skill: Interpreting

Guide your girls as they:

- 1) Stack a few books and lay one end of the shelf on them to make a ramp.
- 2) Grab food cans of many different sizes, shapes, and weights. We're talking everything from stew to broth to tuna to peaches. Make some guesses about which cans will be the "winners."
- 3) Now it's race time. Take two cans at a time, set them on their sides at the top of the ramp, and let them roll.
- 4) Which can is the fastest? Find the speediest can in the cupboard! Why was this can the real grocery go-getter?



SciGirls Suggestion: This is a great group activity. Encourage girls to switch off between roles of timer, recorder, ramp design-tweaker, etc. Talk about why you think the first can across the finish line was the winner. If any of your girls are really curious about the outcomes, check the results with a physics teacher.



For more information on this can-do activity, surf to pbskids.org/dragonflytv/superdoit/soup_can.html

Investigation:

LEGO Robots

Build engineering skills by designing, modifying, and testing a competitive robot!

We're Sasha, Claire, and Emily, and we're members of our school's GEMS team. GEMS stands for Girls in Engineering, Math and Science. Our team prepared to participate in a robotics competition, building a robot that completes two tasks. Our SciGirls question: **How do we design a robot that moves quickly and turns in a tight circle?**



For each group of three girls, you'll need:

- LEGO robot kits, including programmable micro-processor (see LEGO® MINDSTORMS™ Robotics Invention System™ technology, at <http://mindstorms.lego.com/>).
- If you don't have access to the MINDSTORMS robotics kits, you could do a similar investigation with any other r/c (remote-controlled) vehicle with interchangeable parts.



Visit pbskids.org/dragonflytv/show/gems.html to learn more about this GEM of an investigation! Then surf to pbskids.org/dragonflytv/contact/index.html to tell us about your investigation!



Check out this investigation on Tape 1, Segment 3.



SciGirls Want to Know: How do we design, build, and program a LEGO Robot to perform specific tasks?

Guide your girls as they:

- 1) Follow the LEGO instructions to design two versions of a robot, one with three wheels, and one with four.
- 2) Program the robot to do a simple turn, and measure the turning radius for each wheel design.
- 3) Design two latch arms, one long, one short.
- 4) Program the robot to activate latch arm and pull a latch. Run repetitive tasks to judge how effective each design really is (and don't forget to write down the results of your tests).
- 5) Design a scoop to drop a ball into a bin. Program the robot to go to the bin and drop the ball from the scoop into the bin. How effective is each design at this little robo-job? (Remember to write down your findings!)
- 6) Select the most effective design features, and program your robot to navigate the competition's course, doing all three tasks: turning, pulling the latch, and dropping a ball into a bin.



SciGirls Secret:

Seeing is believing: Girls need to observe creative, successful women working in the fields of science and engineering to believe that they, too, can achieve their dreams. Check into local mentoring programs, or go directly to your local university or science-based corporation to find mentors who will model science savvy for your girls.





SciGirls Synthesize: Data and Analysis

After a lot of trial and error, Sasha, Claire and Emily found that a three-wheel design worked better because it had the smaller turning radius. They chose a long latch arm because it engaged the latch more reliably, and a long scoop arm was also required to successfully get the ball into the bin. What did YOU find?



SciGirls Suggestion: There are many skills at play in this investigation, including building the robot, designing the course, programming the computer, and more. Girls can try each task to determine their favorites. Also, remember that technological design requires lots of testing, double-checking, and re-testing before anyone actually achieves success. In other words, tell your girls that it's okay (and even expected) to flop a lot before you fly.

Keep Exploring!

Participate in your local First LEGO League competition. To find one near you, see <http://www.firstlegoleague.org>.

Design a robot meant to explore strange new worlds... such as under your bed! Even if you can't actually build, at least draw it on paper, and describe what features it needs to successfully navigate in the dark, or to deal with alien dust bunnies!