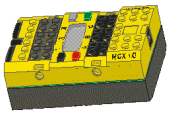
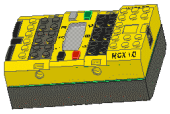






Instructors Guide to:

Propulsion: Part II gears

A great beginning exercise to introduce gears, motors, RCX, and propellers. This exercise also introduces the concept of propulsion. You could also introduce Investigator and data collection as a possible extension for this activity.

Introduce the LEGO RCX and motors. Explain how the computer, RCX, and LEGO motors communicate with each other. If the students haven't been introduced to programming, some sort of introduction may be required.

You will need a container of water with a testing area of at least 18" by 18".

In the Classroom:
Grade Level: K-8
Building Skills: Design

Time: 45-60 min
Programming Skills: Motors

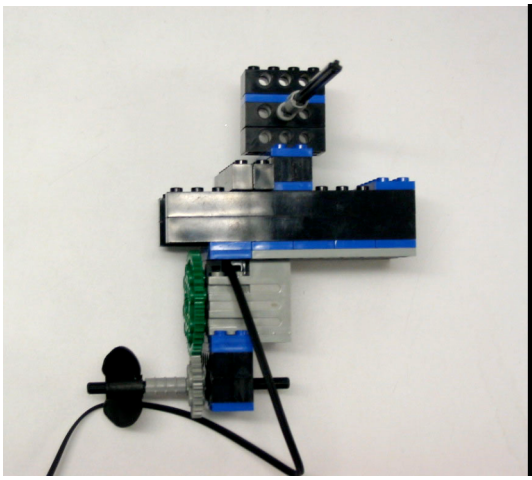
Propulsion: Part II gears

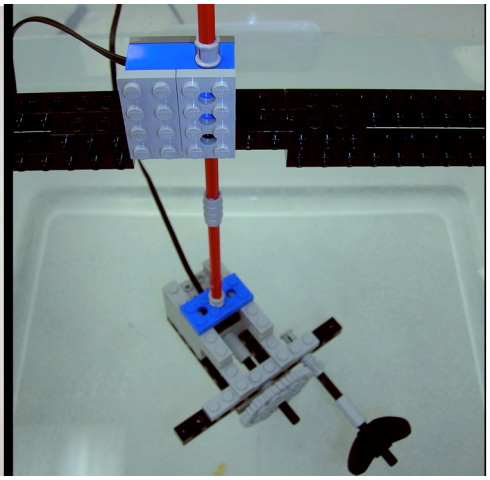
This activity introduces the concepts of torque, propulsion, and buoyancy along with some LEGO building basics.

Challenge

Build

Build a LEGO™ "boat" with one motor. The "boat" should be constructed in such a way that it will spin about an axle when turned on in the water (see pictures below for examples). Make sure the boat is constructed with gears. The students will need to be able to change the gear ratio for their experiment.



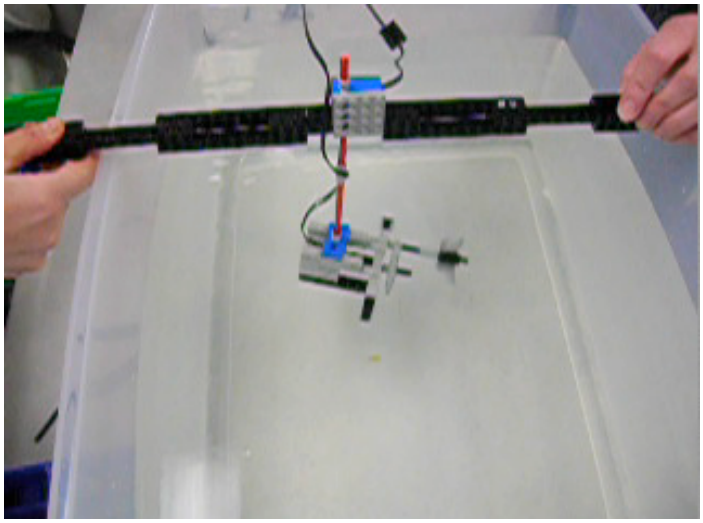


Hypothesize

Before testing, hypothesize what will happen when you use different gear ratios. Right down your hypothesis and explain why.

Test

With a stopwatch time how long it takes the boat to make two complete rotations. Then change the gear ratio and time how long it takes the boat to make two complete rotations. Do this for at least three different gear ratios. *(NOTE: Pay attention to the wires and make sure they aren't getting tangled in the motors or wrapping around too tight for the boat to spin.)(Extension: you could also you a rotation sensor and investigator programming to collect and analyze this data.)*



Analyze

Was your hypothesis correct? How can you explain what happened. (Possible extension: graph the results time vs. rotations)

Materials

LEGO™ pieces, RCX, motors.
Styrofoam strips to help the boats float (if necessary)
Propellers (modified hobby shop propellers with LEGO axles)
Stopwatch/clock with second hand

Skills Learned

Design, Building, Testing

Lego Tips

Snapping the LEGO bricks outside of the water traps air inside them. Likewise if the LEGOs are wet water may get trapped inside them reducing their buoyancy.