LESSON FIVE: LIGHT SENSORS

OBJECTIVES

- Modify and program a car to follow a path into a garage.
- Use a light sensor to signal a car to stop in a dark space.

MATERIALS

- LEGO Team Challenge kit (one to two groups of students per kit)
- ROBOLAB software 1.5 or higher- Pilot Level 4
- Cars from Lesson One
- Pilot Level 4 Plan Sheet -*Resource Section*
- Pilot Level Icon sheet - *Resource Section*
- Rubrics (optional) - *Resource Section*
- Box with small opening
- Journal Resource page or paper
- Computers
- Infrared towers

TIME

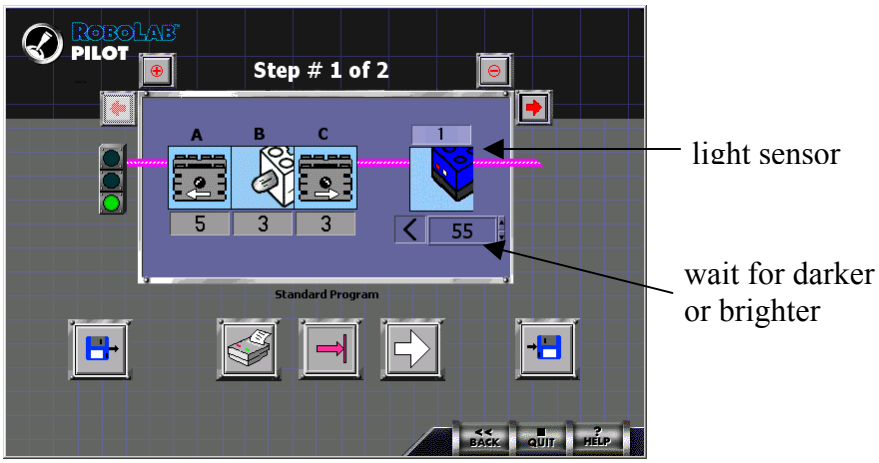
Two to three forty-five minute class periods.

VOCABULARY

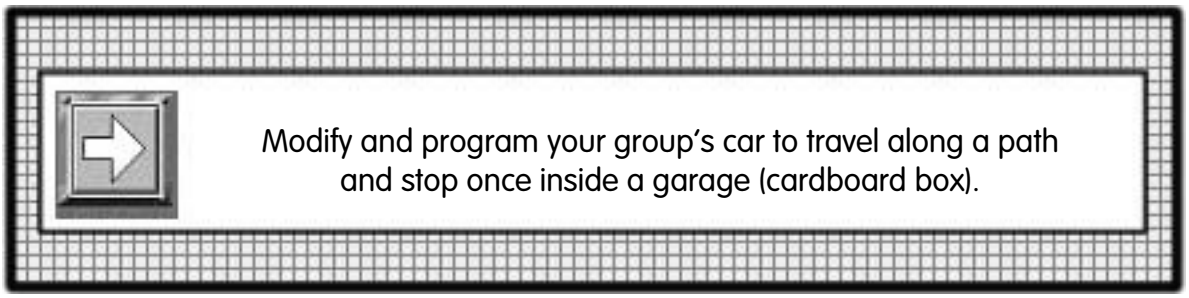
light sensor percent light value

Introduction

1. Discuss how a light sensor could be used on students' cars.



2. Assign the design challenge:



* The path can be straight, or may include turns and obstacles. A challenging course will require students to apply skills learned earlier.

3. Students will need to know how to read light values in order to make adjustments to their programs. Set up a light sensor on an RCX ahead of time. Turn on the RCX and press the view button until it points to the light sensor port. Have students identify the light value of the classroom. Next determine the light value of the inside of the cardboard box and compare.

Designing

4. Students will need to modify cars to include a light sensor. The light sensor should be placed so that the car will stop once it is completely inside the box.

5. Provide each group with a Pilot Level 4 Plan Sheet and Icon Sheet. Students will cut out icons they need and place them on the plan sheet to show what their program will look like.

Programming and Testing

6. Once ROBOLAB plan sheets are approved, students may program on the computer. Go to designated area to test cars. Revise ROBOLAB programs until cars can complete the task or time is up.

7. Hold a demonstration so groups can present their cars.

ASSESSMENT

1. Each group's car should be able to travel into the box and stop once completely inside.

2. Each member of the group should be able to explain the program, problems that occurred along the way, and how the group solved the problems.

3. Students should individually record their experiences in a journal, on the Journal Entry Resource page, or paper. Lower grade level students may illustrate their responses. Suggested journal questions:

    a. *Explain your ROBOLAB program. How was your group able to make the car complete the task?*
    b. *How did your group modify the car to include a light sensor? What problems, if any, did you experience?*
    c. *Describe what your car did when you tested it for the class. Was your group satisfied with the outcome? Why or why not? How would you improve your car?*
    d. *Explain the vocabulary words your group used while completing the project.*

EXTENSION IDEA

Make a path of black electrical tape on the floor. Students will program cars to follow the path using a light sensor.

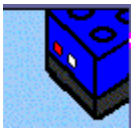
TEACHER TIPS

1. Light sensors read values from one to 100. A lower number indicates darker light. A higher number indicates a brighter light.

2. The outcome may change if light values in the room change. Be sure students are testing their cars with consistent light conditions to ensure the cars will perform correctly.

3. Make the opening of the box small enough to keep the inside of the box dark. The light sensor will be the most effective when there is a distinct difference between room light and the light inside the box. If the two light values are close, the car may perform inconsistently.

4. New icons:



Light Sensor

Greater than- waiting for percent value to become greater than the value shown.

Less than- waiting for the percent value to become less than the value shown