



The SPIRIT Project

Educational Robotics

Lesson Building Block Template

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Directions: Directions: Definition of a Lesson Building Block: This is a “Lesson Building Block” from the SPIRIT educational robotics institute. A ‘lesson building block’ is in essence an educational activity that might be later turned into a more formal classroom lesson by a creative teacher. The SPIRIT Institute is striving to put a variety of “lesson building blocks” up on the web for the potential use of teachers as they try to prepare more formal educational lessons using the TekBot robotics platform.



I. Concepts *(Give a list of one or more concepts that might be taught using this activity)*

Infinite numbers

Multiplication of fractions

Division

II. Standards: *(Standards for Technological Literacy)*

OPS—Math 7 Standards 1 and 2 Adding, subtracting, multiplying, and dividing whole numbers and decimals. Adding, subtracting, multiplying, and dividing fractions and mixed numbers.

III. Learning Activity Context *(Describe the overall context for the learning activity)*

This lesson focuses on resistors and how they affect current flow. Students will create a circuit that lights and LED with Popsicle sticks and foil. Students will then add resistors in parallel and examine the effect on the brightness of the LED. Finally, students will compare resistors in parallel to multiplying with fractions and having an infinite set of fractions with which to multiply ($1/2$, $1/3$, $1/4$, etc...)

IV. Teacher and Student Suggestions/Tips

- Teach separately what resistors do to current flow
- Have students measure resistors to reinforce decimals and provide another context for understanding resistors
- Do a separate activity with resistors in series; compare the two LED brightness of both activities
- For the activity, use the same size of resistors

V. Teacher Questions

(Give a list of questions that teachers might ask students during the activity)

- What happens to the current flow when a resistor is placed into the circuit?
- Can you describe what happens to the current flow when 2 resistors in parallel are placed in the circuit?
- What about 3 resistors?
- How many resistors do you think could be placed in the circuit and still have the LED light? Why?
- How might resistors in parallel be compared to a fraction when you consider what resistors in parallel do to current flow?
 - What if there are 2 resistors in parallel?
 - What about 3?
 - How many do you think could be placed in a circuit? What value would each one have?

VI. Assessment Ideas

(Give an idea or two about how the lesson activity might be assessed)

Students will:

- write a paragraph of comparison of resistors in parallel to multiplying by fractions
- write what is happening from the point of view of the current flowing through resistors in parallel
- draw a circuit with resistors in parallel that includes measurements of current flow
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VII. Other Information

(Give any other information that might be useful or a visual or two)

This lesson is perhaps best used as a supplement to multiplying fractions. Students often need real life examples of multiplication of fractions and why the final value gets smaller. This lesson is to reinforce fractions and may not be ideal to introduce the idea.

VIII. A materials list