



The SPIRIT Project

Educational Robotics

Lesson Building Block Template

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Grade Level: ___ Date: __Aug 1, 2006__

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*)
- II. Prior knowledge:
Powers of Ten

Lesson: Electronics
Part II: Resistors

Anticipatory Set: Complete the chart.

10^6	10^5	10^4	10^3	10^2	10^1	10^0	10^{-1}	10^{-2}
1,000,000	100,000	10,000	1,000	100	10	1	$\frac{1}{10}$	$\frac{1}{100}$
(6 zeros)	(5 zeros)	(4 zeros)	(3 zeros)	(2 zeros)	(1 zero)	(0 zeros)	(1 zero)	(2 zeros)
1.0×10^6	1.0×10^5	1.0×10^4	1.0×10^3	1.0×10^2	1.0×10^1	1.0×10^0	1.0×10^{-1}	
1.0×10^{-2}	1.0×10^{-3}	1.0×10^{-4}	1.0×10^{-5}	1.0×10^{-6}				

Scientific Notation: Web site <http://www.nyu.edu/pages/mathmol/textbook/scinot.html>

II. Standards: (Standards for Technological Literacy)

PA 08: Apply the mathematics in this class to solve relevant real-life problems.

PA 01: Convert values among fractions, decimals, and percents.

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

Context: ___ Moving Tekbot Pre-build Building a Tekbot X Engineering/ Notebook

Abstract: 1. Students will review prior knowledge, then apply those skills to the resistor unit.

(Note: Students need to be able to read a resistor before they can use them to build a Tekbot.)

2. Resistors are passive electronic components used to limit current on circuit boards. Students will need to determine the value of resistance (in ohms) as well as their manufacturing tolerance of individual resistors by reading the color coded strips.

3. Students will create their own mnemonic to remember the color sequence. (Review: Pemas mnemonic)

4. Students will practice reading resistors in small groups, then compete in board races for practice assessment.

IV. Teacher and Student Suggestions/Tips

To help them remember the first color of the sequence - remind them that **BLACK** and **ZERO** have **NOTHING** in common.

V. Teacher Questions

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

1. The teacher walks around the room with picture color cards - asks student the resistor and tolerance values.
2. If a resistor has a large manufacturing tolerance (say +/- 20) is the manufacturer allowing a bigger or smaller window of imperfection on the assembly line?
3. Name a strip on a resistor 1st, 2nd, 3rd, or 4th - students will identify it as the 1st digit, 2nd digit, multiplier, or tolerance. (The fifth band refers to the quality band)
4. Body colors white and blue are used to mark non-flammable and fusible resistors.

(Non-flammable resistors and fusible resistors are designed so that they don't catch fire when they overheat. When a fusible resistor overheats it cuts the current flowing like a fuse. Do not replace these fuses with regular fuses - they could cause a fire if something goes wrong in the circuit.)

VI. Assessment Ideas

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

VII.

1. Peer quizzes in small groups using flash cards
2. Memory card game
3. Board game (Capture the Crown-board races)
4. Pencil paper quiz from pictures
5. Have students create their own 3-dimensional resistor

VII. Other Information

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

Web page for Resistor Calculations: (4 Band, 5 Band, 6 Band)

http://samengstrom.com/nxl/3660/4_band_resistor_color_code_page.en.html

A.

What is the tolerance range for this resistor? _____ to

VII. Application:

Aim for the Stars at UNO.

1. The Lesson was presented to first group of students.
2. Students calculated the ohms for the resistors installed on their Tekbots.
3. They used their multi-meters to check their work.

VIII. A materials list