INTERMEDIATE PROGRAMMING LESSON

LOGIC OPERATIONS & DECISION MAKING

By Sanjay and Arvind Seshan
Lesson Objectives

Learn what the Logic Block does
Learn how to use the Logic Block

Prerequisites: Data Wires, Sensor Blocks
Logic Operations Block

The Logic Block does a Logic operation on its inputs, and outputs the result.

A Logic Block takes inputs that are True or False, and produces a True or False output.

Logic values can be used as inputs into loop exists and switch conditions.

It is found in the Red Programming Pallet tab.
### Different Modes in the Logic Block

<table>
<thead>
<tr>
<th>Icon</th>
<th>Mode</th>
<th>Inputs</th>
<th>Output/Result</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="AND icon" /></td>
<td>AND</td>
<td>A, B</td>
<td>• True if both A <strong>and</strong> B are both true, otherwise the result is False</td>
</tr>
<tr>
<td><img src="image" alt="OR icon" /></td>
<td>OR</td>
<td>A, B</td>
<td>• True if either A <strong>or</strong> B (or both) is/are True. The result is False if both A and B are False</td>
</tr>
</tbody>
</table>
| ![XOR icon](image) | XOR | A, B | • True only if one (and exactly one) of A and B is True  
| | | | • The result is False if both A and B are True  
| | | | • The result is False if both A and B are False |
| ![NOT icon](image) | NOT | A | • Outputs the opposite of what you input.  
| | | | • The result is True if A is False  
| | | | • The result is False if A is True |

The icons are Venn Diagrams. The dark shaded areas identify what needs to happen for the block to output True.
Logic Blocks in Three Easy Steps

**CHALLENGE:** Make your robot drive forward until EITHER the Touch Sensor is pressed or the Color Sensor detects black.

**STEP 1:** Turn the motors on

**STEP 2:** Add the Logic and Sensor Blocks
- A. Use a Logic Block in the OR mode
- B. Add the inputs: Take a color sensor and a touch sensor blocks and wire them into the Logic Block as inputs

**STEP 3:** Add a Loop and loop exit condition:
- Place the Sensor and Logic Blocks in a loop
- For the exit condition of the loop, select logic. Wire the result of the Logic Block into the exit condition
- If the result of STEP 2 is True, you should exit the loop and stop the robot
STEP 1

This program is designed to keep the robot moving until the touch sensor is pressed OR the color sensor sees black.

STEP 2

Take the data from the touch sensor and the color sensor and wire them to the inputs in the Logic Block

STEP 3

The Logic Block is in OR mode. The results are wired into the exit condition for the loop.

Exit the loop only when the output of the logic block is True.

Turn motors on

Turn motors off
Credits

- This tutorial was written by Sanjay and Arvind Seshan
- More lessons at www.ev3lessons.com

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