LEGO® Education

Inside Outside

Unplugged Activity

Explore Boolean Operators with LEGO® Bricks

Teacher Facilitation Notes

Objective:
Students will be able to explore and define Boolean operators.

Audience:
Use with elementary or middle school students.

Suggested Duration:
30 – 45 min

CSTA Standards:

- **Elementary**
  - **1B-AP-10** Create programs that include sequences, events, loops, and conditionals.

- **Middle**
  - **2-AP-12** Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals.

Vocabulary:
- **Boolean operators** – are words or symbols that allow you to refine search conditions, such as AND, NOT, and OR
- **If/then Conditional** – a rule for programs that runs a certain action if true

Materials:
- Recommended: assorted LEGO® Bricks
- Alternatively: colored construction paper or other physical manipulatives that mirror the physical properties of the bricks in this activity.

Inside Outside

Student – Facing Slides

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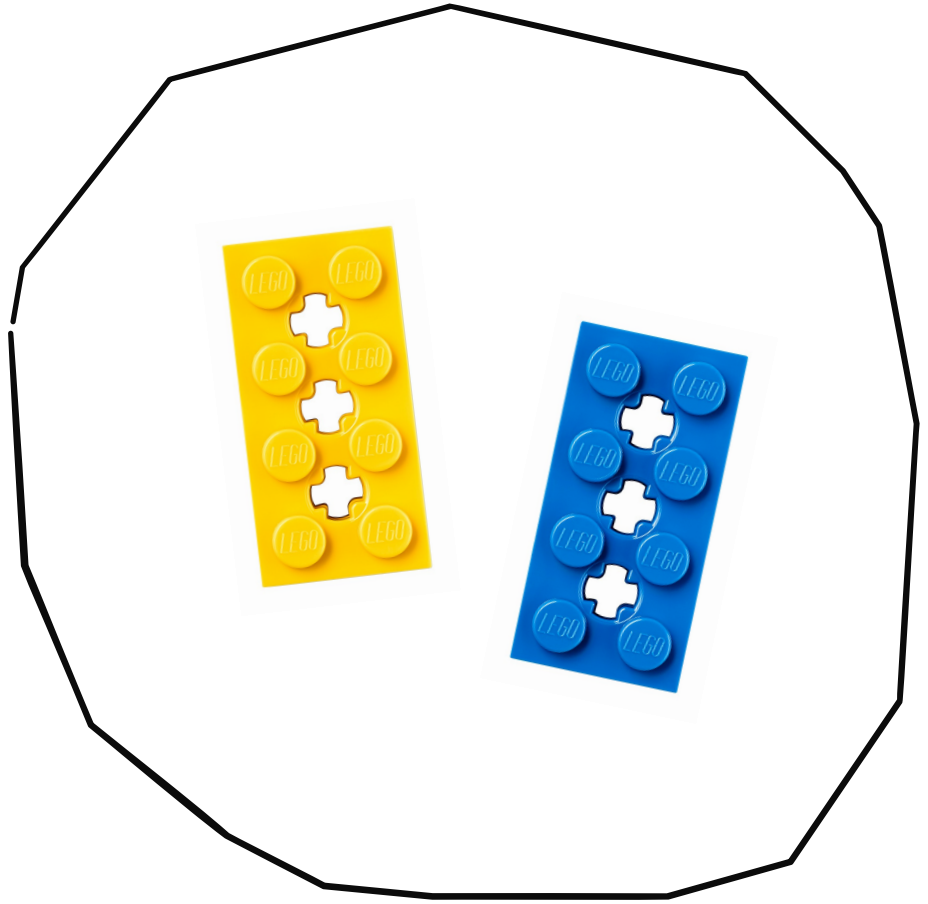
Let's Play!

For this partner activity,
each group will need:

- Two, 2x4 yellow LEGO® bricks
- Two of any additional yellow bricks or elements
- One 2x4 brick of any color
- Three additional bricks of any color

Draw a circle on a sticky note or a piece of paper large enough to place at least two bricks inside of it.



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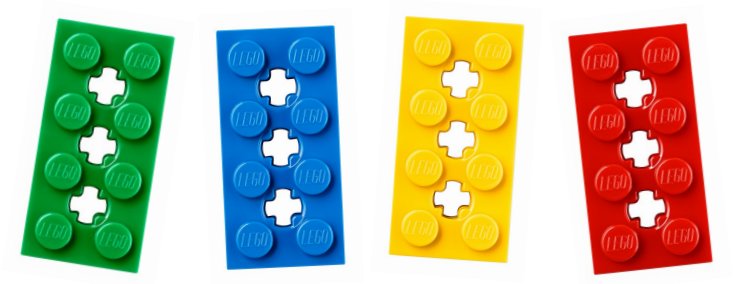
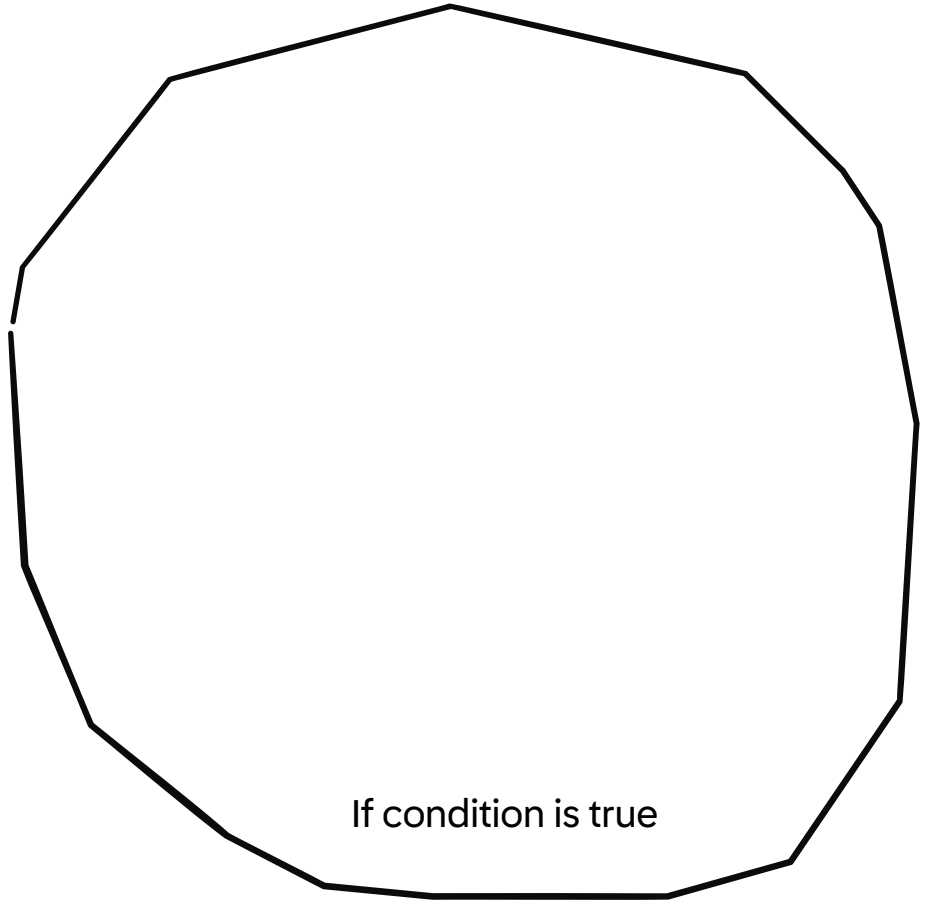
Example:
Condition: Color = Yellow





Else

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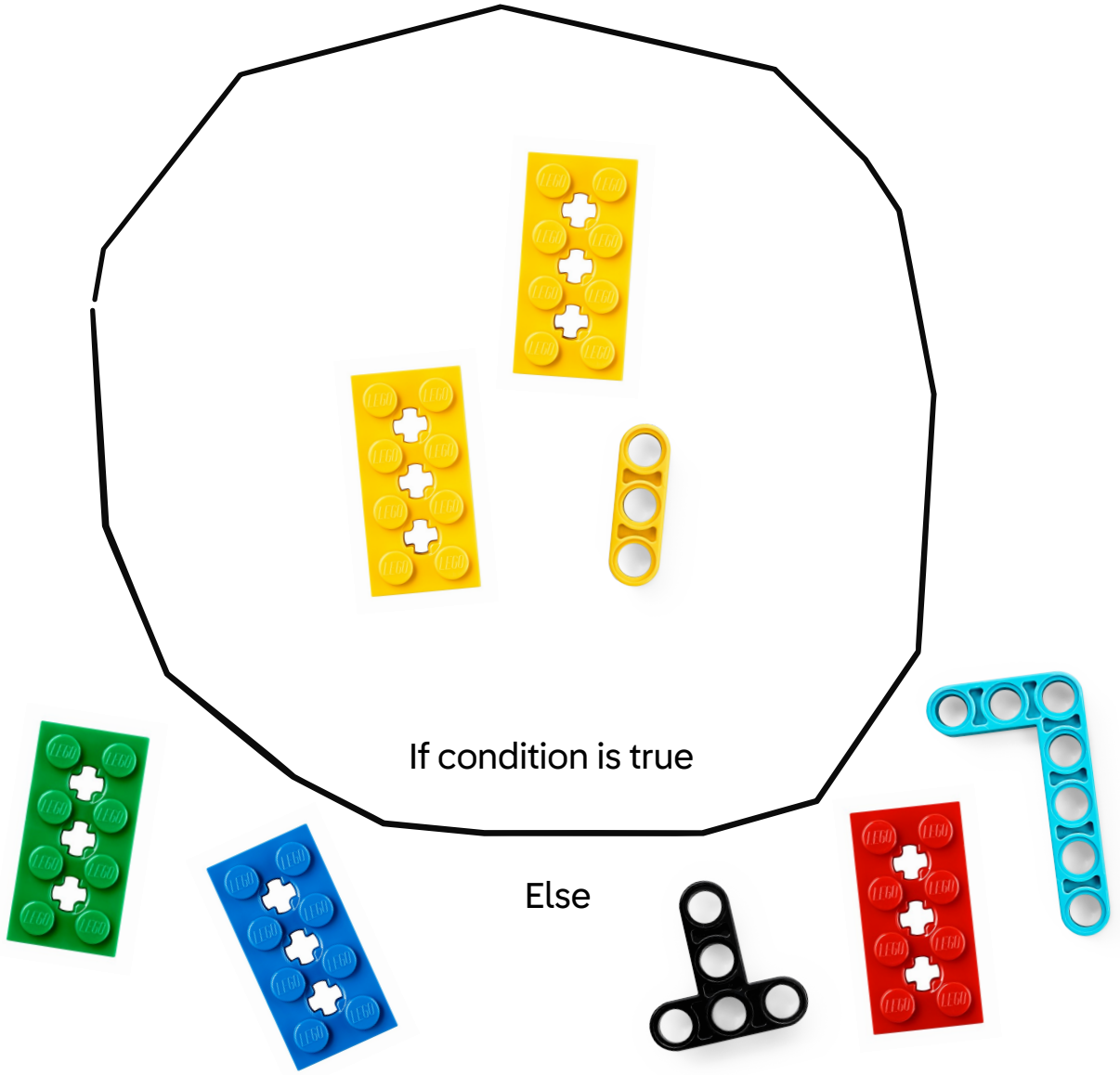
Example:
Condition: Color = Yellow



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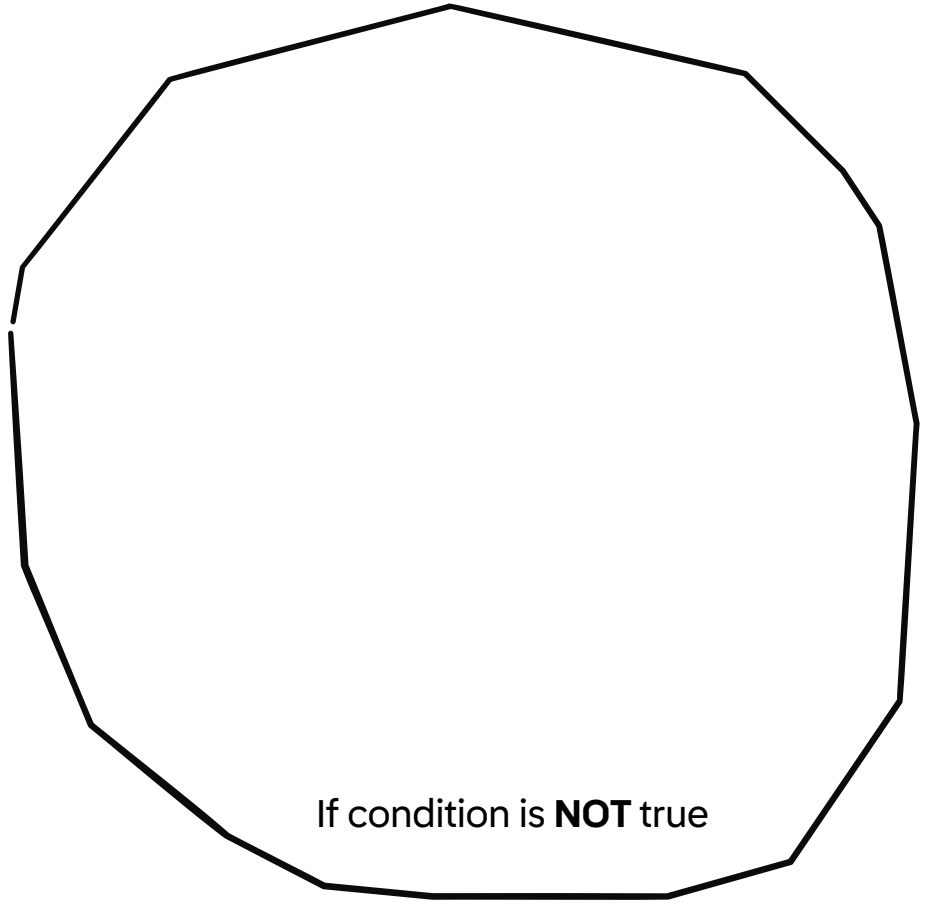
Condition: Color = Yellow



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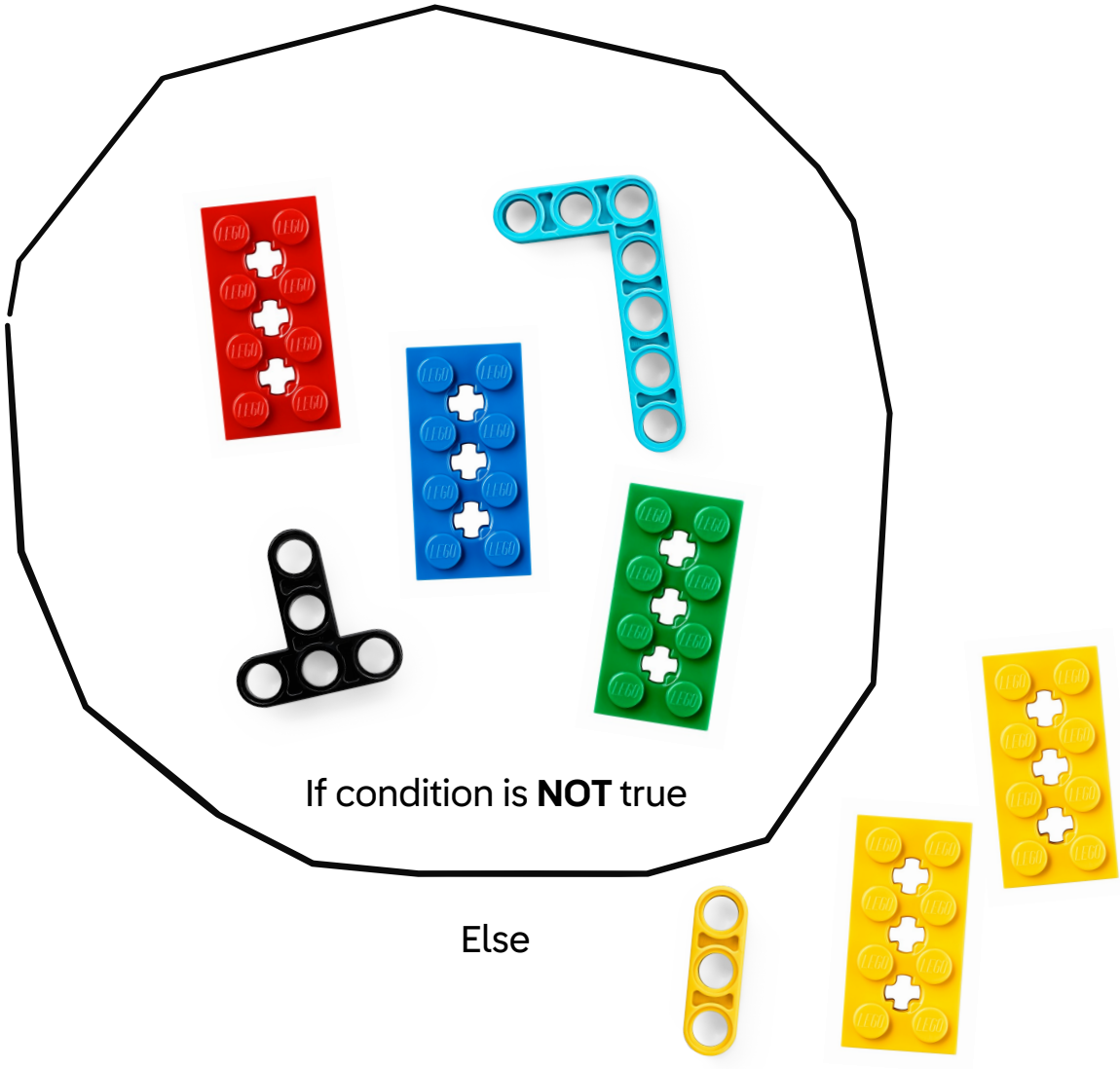
Condition: Color = Yellow



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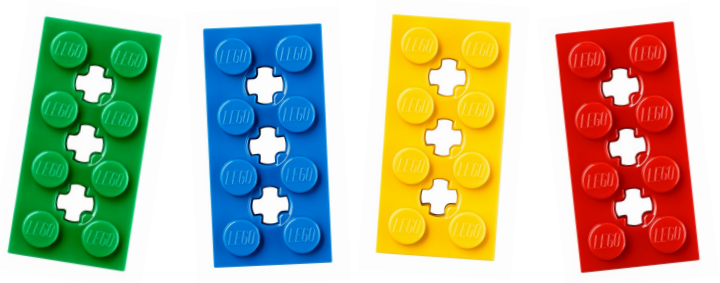
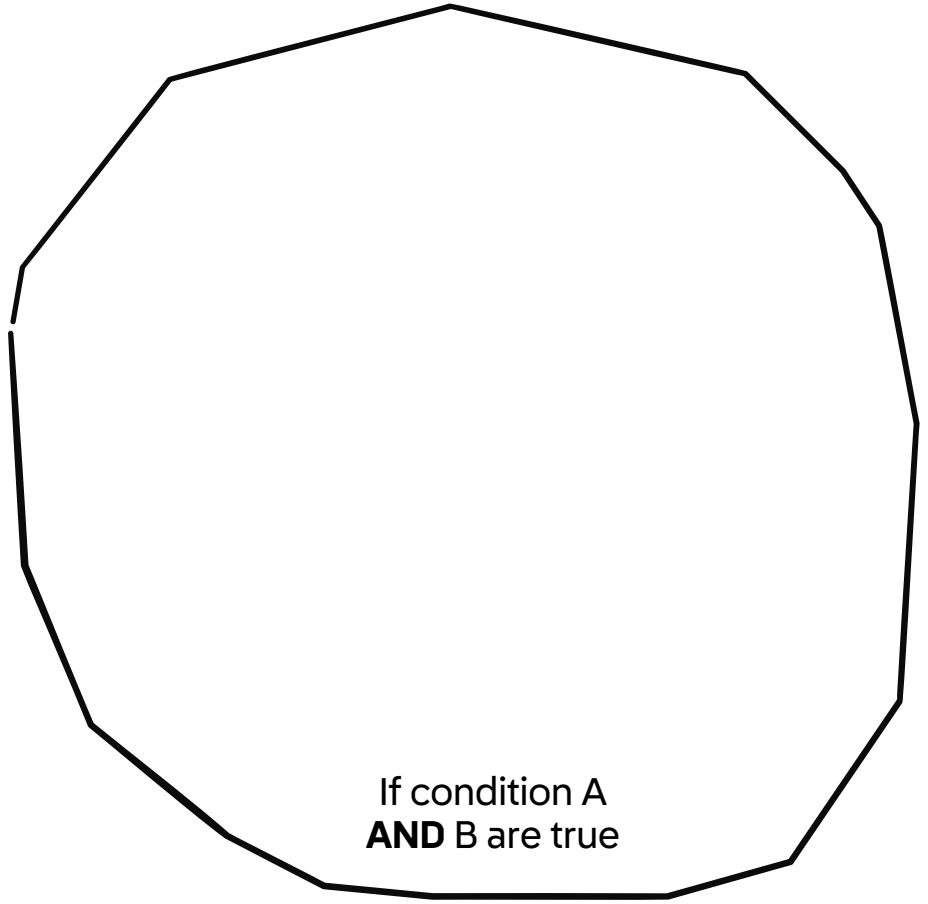
Example:
Condition A: Color = Yellow
Condition B: 8 studs





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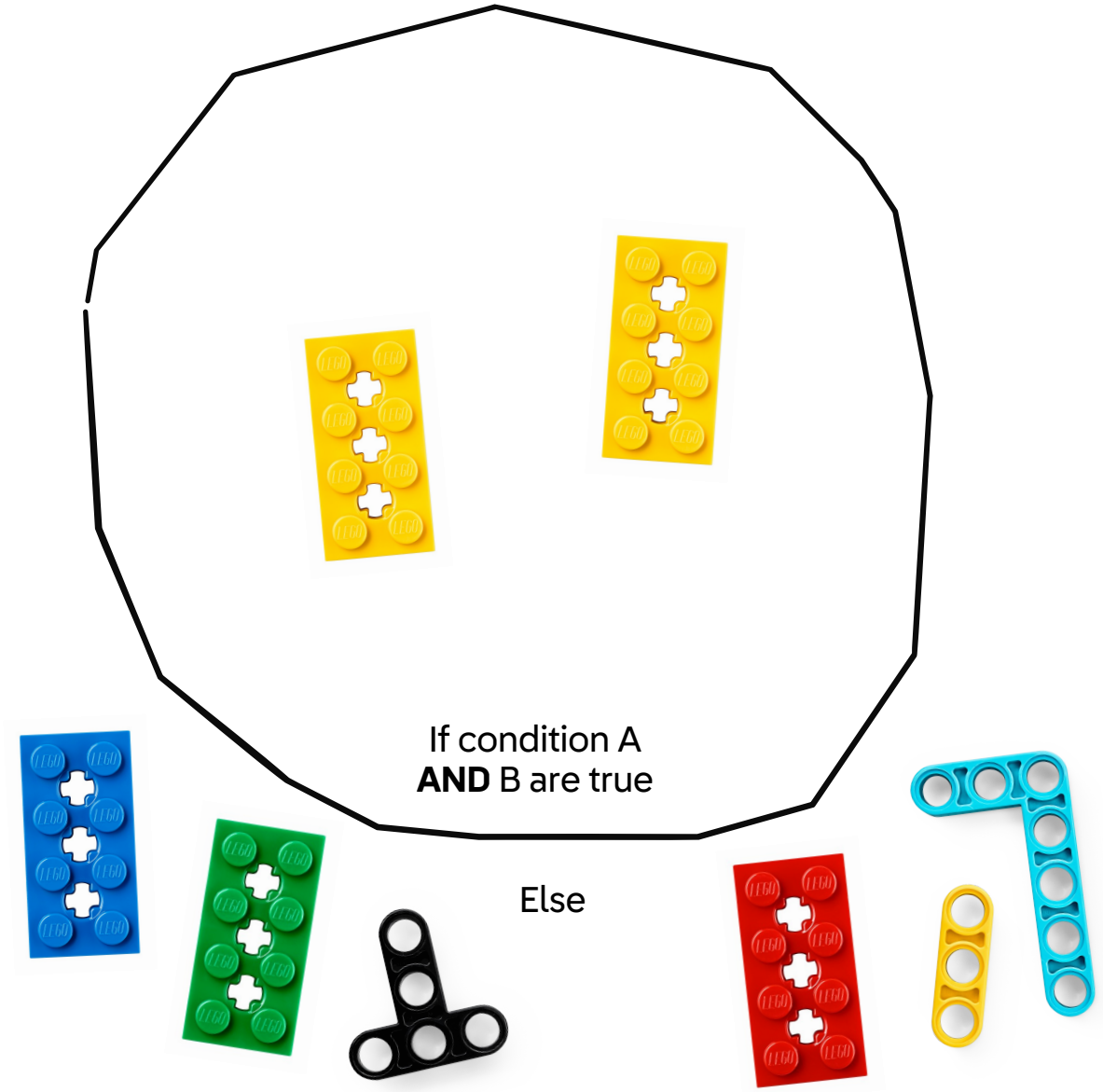

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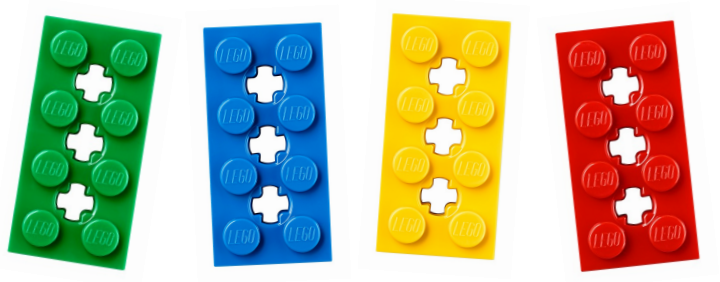

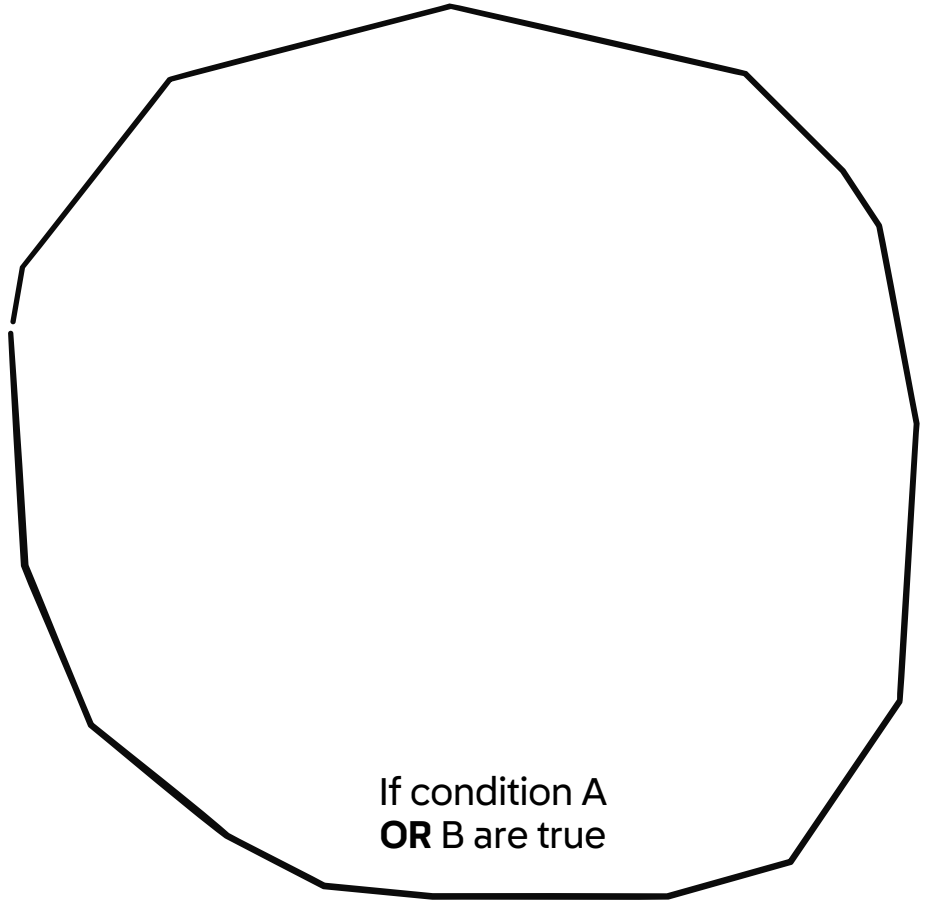

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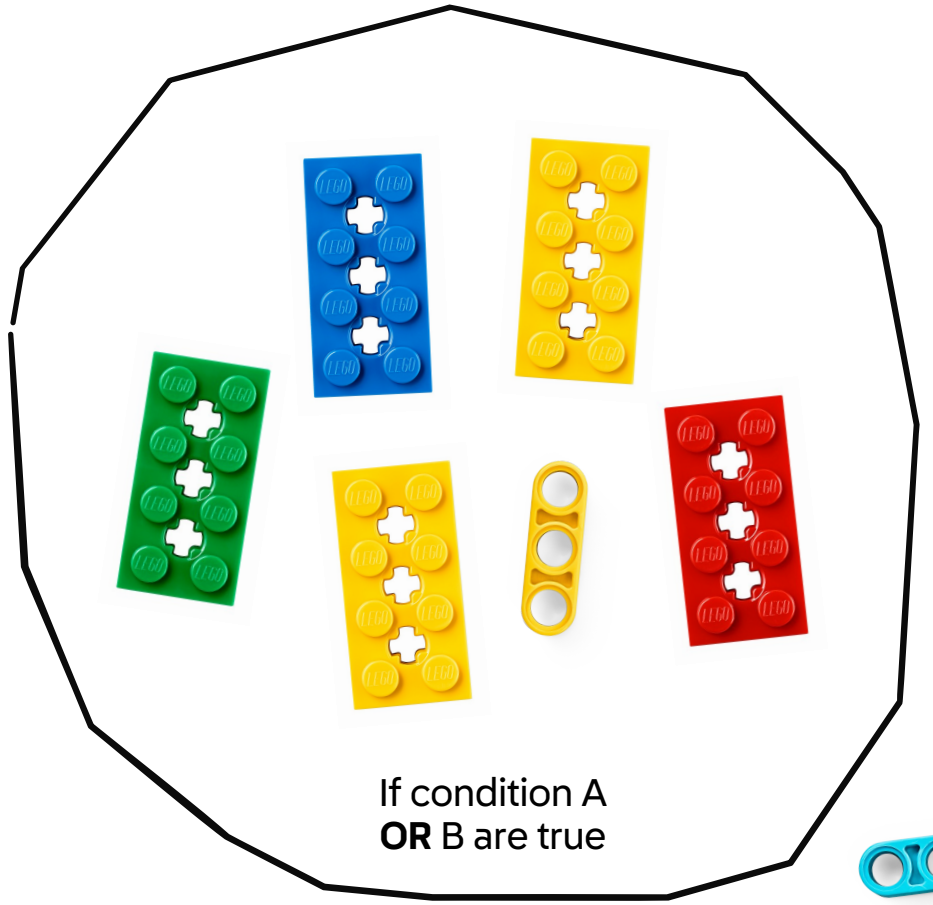

Else

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Advanced Programming
Control Structures

The understanding of **if/then logic and decision making** are building blocks related to the development of algorithms and programming.

A **conditional** is a feature of a programming language that performs different computations or actions depending on whether a programmer-specified Boolean condition evaluates to true or false.

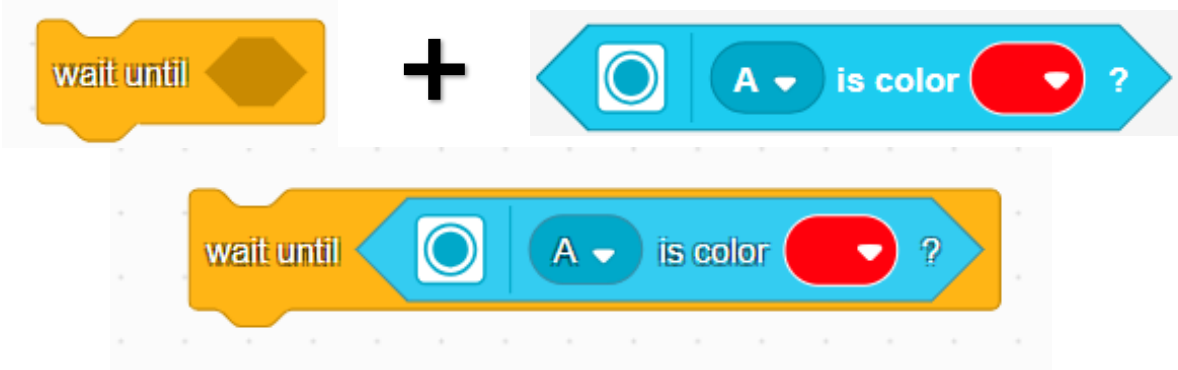
Boolean logic (e.g., AND, OR, NOT) can be used to specify the appropriate groups of instructions to execute under various conditions.

Conditional statements can have varying levels of complexity, including compound and nested conditionals.

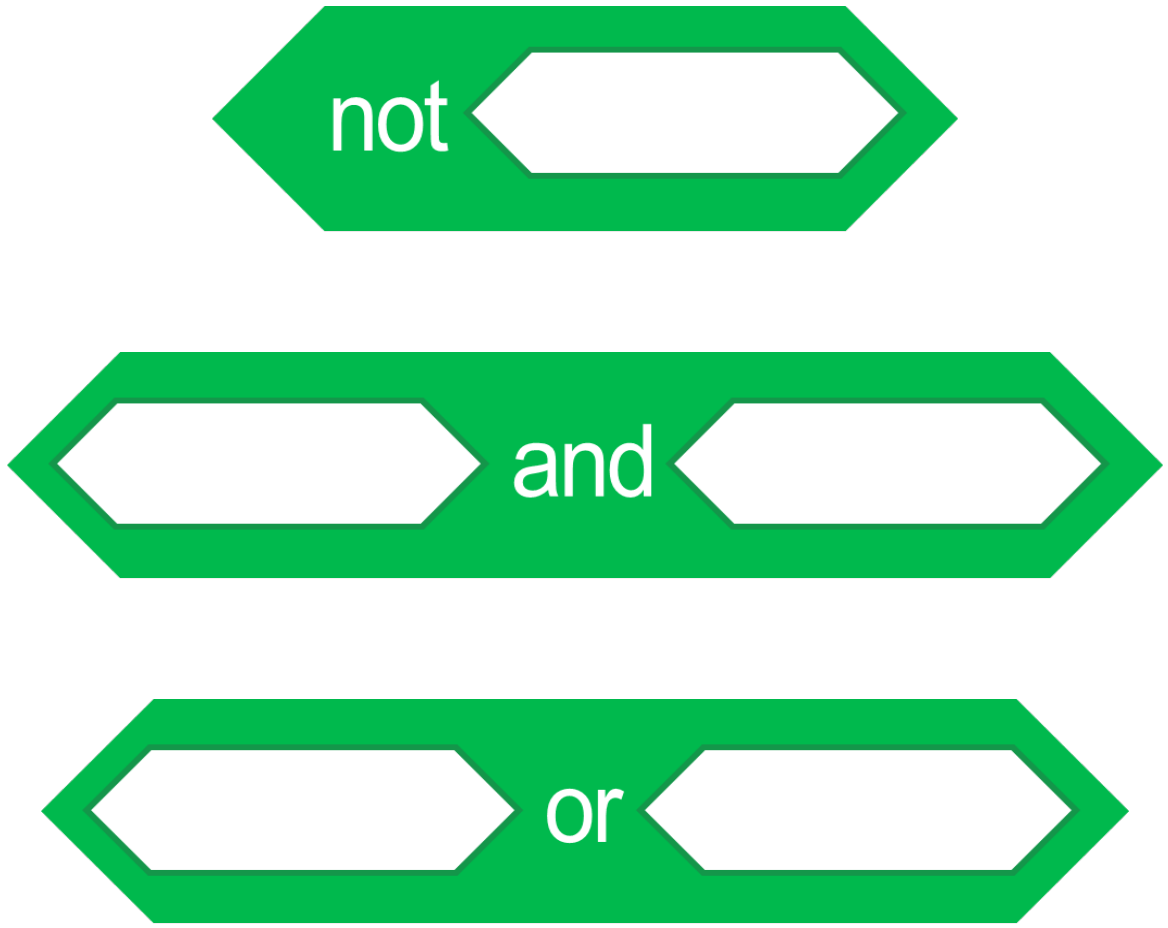
Boolean Blocks

In the LEGO Education SPIKE™ app word blocks, Boolean blocks are programming blocks that act like conditions and are recognizable by the shape of the block itself. They can hold and report “true” or “false” values.

These blocks will fit inside other blocks that have the same shape.



Appendix: Explore More



Explore more lessons that utilize operators

Explore More:

LEGO® Education SPIKE™ Essential Lessons:

- Avoid the Edge - explore if/then conditional statements and consider adding Boolean operators to define parameters
- Big Bus - explore using a Boolean block to navigate – uses the color sensor

LEGO® Education SPIKE™ Prime Lessons:

- Automate it! – explore **if/then** conditional statements
- Training Camp 3: Reacting to Lines - explore **if/then/else** conditional statements
- Keep it really safe! - explore operators
- Make a Safer Safe - explore operators - (LEGO® Education SPIKE™ Prime with Python)

LEGO® Education Community – Activities and Challenges