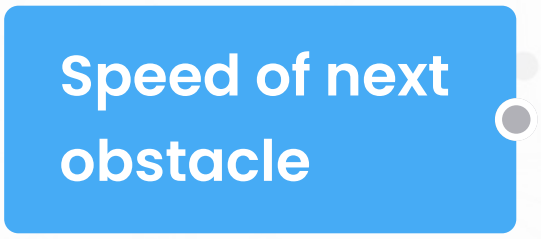
INTRODUCTION TO *FLOW* BLOCKS

SENSING BLOCKS

These blocks enable the robot to get information about its surroundings. There are five types of information:

- Distance to next obstacle
- Speed of next obstacle
- Elevation of next obstacle
- Height of next obstacle
- Width of next obstacle

All sensing blocks output *numbers.*

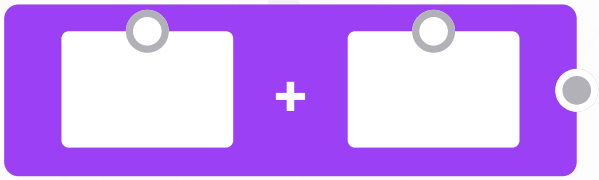


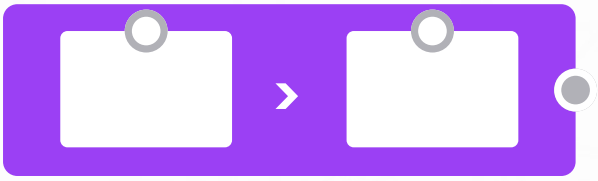
ACTION BLOCKS

These blocks enable the robot to perform two actions: jump and crouch.

OPERATION BLOCKS

Basic mathematic calculations such as addition, subtraction, multiplication, and division are available.





There are also greater than, less than, equal, and not-equal blocks for comparisons. These comparison blocks output either TRUE or FALSE, and can be used with conditional blocks (explained later).

All operation blocks take *numbers* as input.

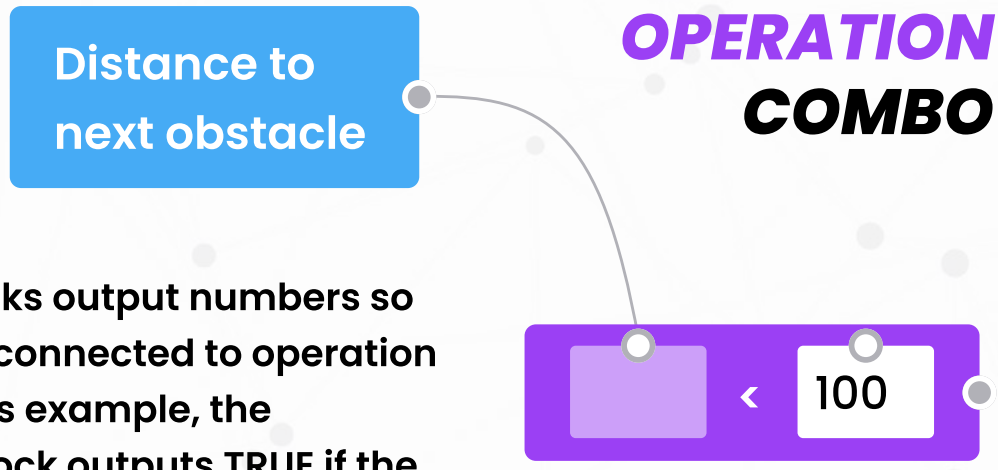
LOGICAL BLOCKS

The AND block outputs TRUE if both inputs are TRUE. Otherwise, it outputs FALSE.

The OR block outputs TRUE if one or both inputs are TRUE. Otherwise, it outputs FALSE.

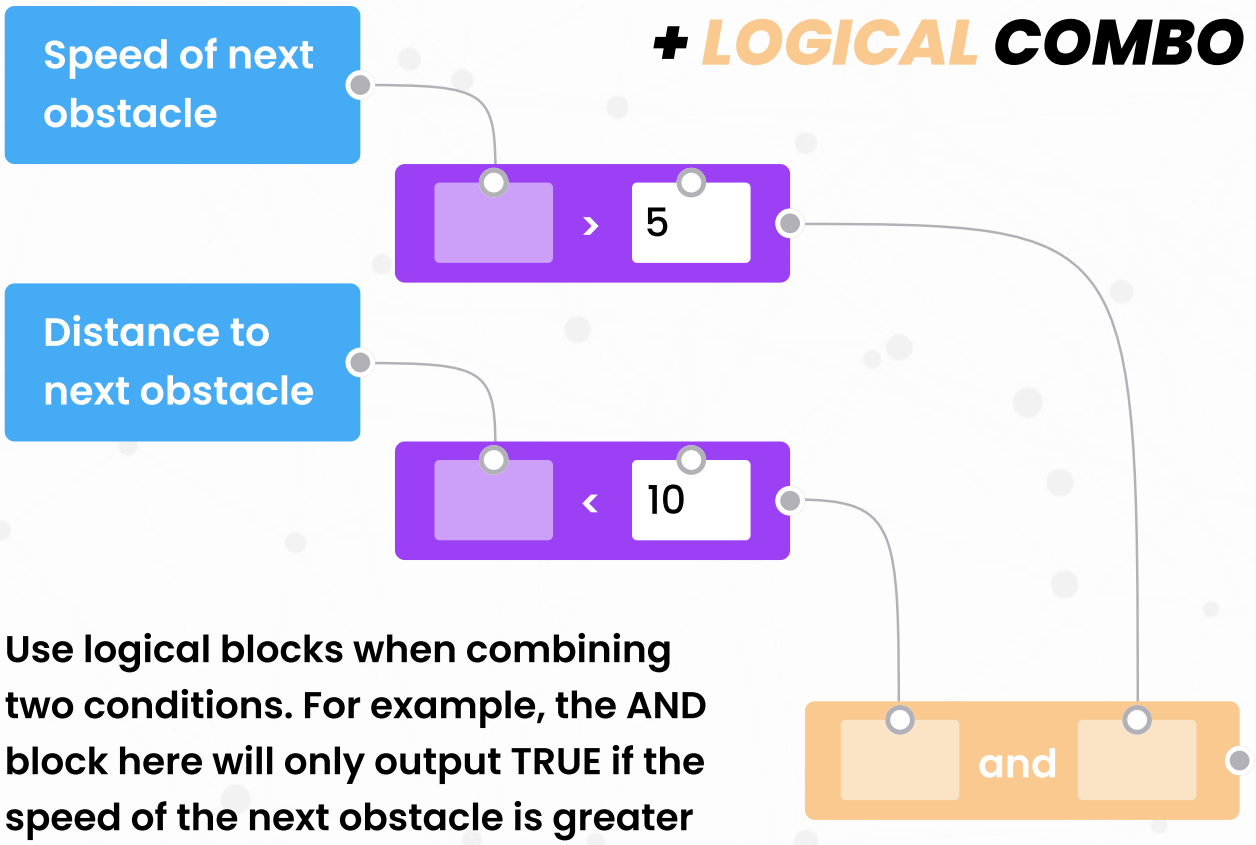
Logical blocks take *booleans* (TRUE or FALSE) as input and also output *booleans*.

SENSING + OPERATION COMBO



Sensing blocks output numbers so they can be connected to operation blocks. In this example, the operation block outputs TRUE if the distance to the next obstacle is less than 100 units, and FALSE otherwise.

SENSING + OPERATION + LOGICAL COMBO



Use logical blocks when combining two conditions. For example, the AND block here will only output TRUE if the speed of the next obstacle is greater than 5 AND the distance to the next obstacle is less than 10. Otherwise, the output is FALSE.

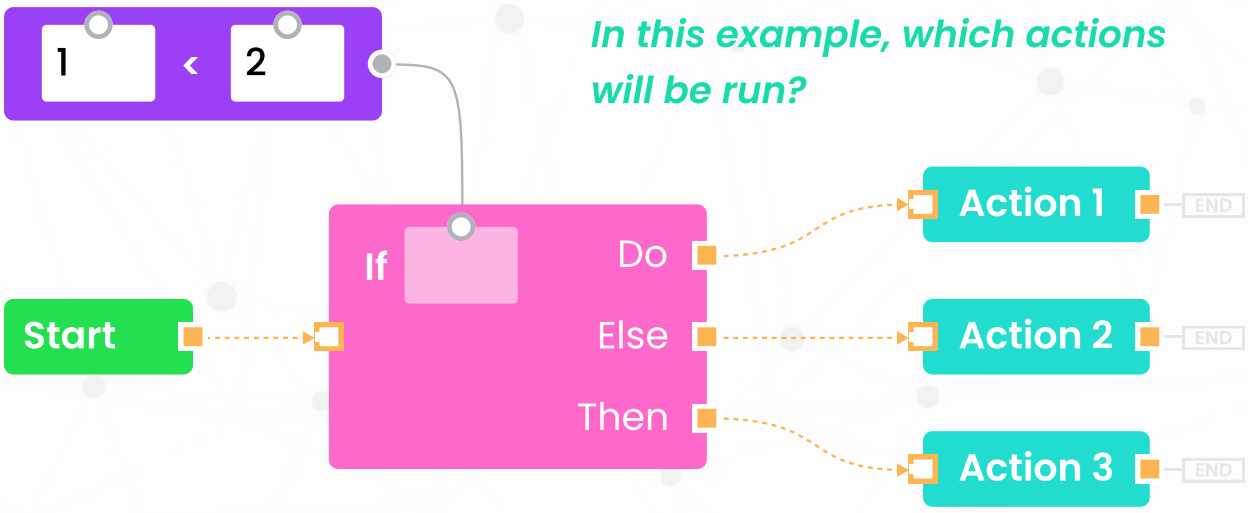
CONDITIONAL BLOCKS

Conditional blocks contain conditions that affect the running order of the code. There are three types:

- IF: one input and three output branches. If the condition is TRUE - go to DO. If the condition is FALSE - go to ELSE. After DO or ELSE is run once, go to THEN.
- WHILE: one input and two output branches. While the condition is TRUE, keep repeating DO. Only when the condition is FALSE go to THEN.
- REPEAT: one input and two output branches. Repeat DO for a specific number of times. Once done, go to THEN.

IF BLOCK

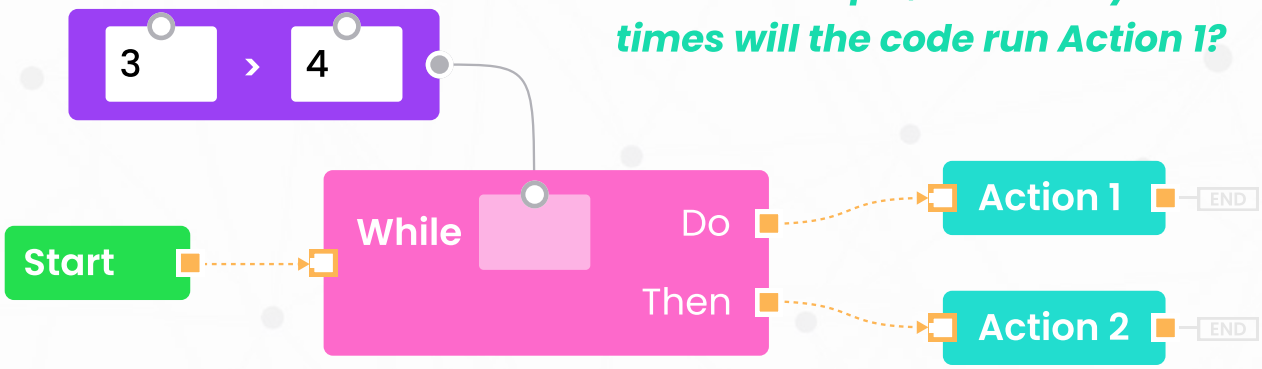
The IF block operates according to the input condition, which is always either TRUE or FALSE.
If the condition is TRUE, it will run the DO branch (Action 1) once.
If the condition is FALSE, it will run the ELSE branch (Action 2) once.
After running one of the two branches, the code will continue by running the THEN branch (Action 3).



WHILE BLOCK

The WHILE block runs DO (Action 1) while the input condition is TRUE. It will continue repeating this code forever until the input condition becomes FALSE. Only when the condition is FALSE will it continue to THEN (Action 2).
If the condition is FALSE to begin with, then Action 1 is never run. If the condition is TRUE to begin with, but never changes, then Action 1 will be repeated infinitely. This means that the condition must switch to FALSE or the code will never stop running!

In this example, how many times will the code run Action 1?



REPEAT BLOCK

The REPEAT block runs the DO code a certain number of times (Action 1 for 5 times in this example). Afterwards, it will run THEN (Action 2).

What's the difference between a WHILE block and a REPEAT block?