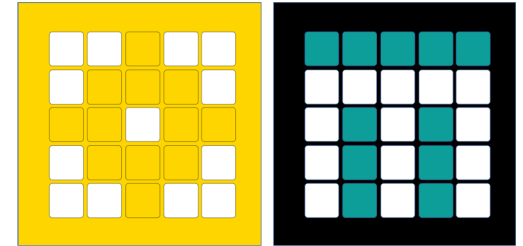


PRIME LESSONS

By the Makers of EV3Lessons



EXPRESSIONS & CONDITIONALS

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This lesson uses SPIKE 3 software

LESSON OBJECTIVES

Learn how to have your robot make choices

Learn how to use conditionals

EXPRESSIONS

Identify if something is True or False

Is the sky blue? → True

Is Newton still alive → False

In code, we can compare variables or two items to each other

There are different comparison operators

Equal (==), not equal (!=), greater than (>), less than (<), greater than or equal to (>=), less than or equal to (<=)

Helpful tip: use “not” in front of an operator to inverse the value (i.e. True → False)

```
>> x = 7
>> print(x==7)
True
>> print(x==5)
False
>> print(not x==7)
False
```

COMBINING EXPRESSIONS

Identify if two or more statements hold

Is the sky red AND Newton invented calculus? → False

Is the sky red OR Newton invented calculus? → True

Two operators to combine: “and”, “or”

Place in between statements to evaluate

Order of operation do apply (to an extent) so it is helpful to sometimes place parentheses around groups of statements

```
>> x = 7
>> y = 5
>> print(x==7 and y==5)
True
>> print(x==7 and y==3)
False
>> print(x==7 or y==3)
True
```

CONDITIONAL STATEMENTS

Ask the robot a question and do something different based on the answer.
It is like a True/False Statement

Example:

If the robot detects black, move forward. Else, move backward.

An if statement requires an expression. If the output, is True, the code below will run

```
if (expression):
```

Code

Note that the level of code indentation is very important in Python

All statements at the same level of indentation will be considered part of the block of code. Both `print("Yay!")` and `print("x=7")` run in the example on the right.

You can add an else statement to run code if the expression is False

```
if (expression):
```

Code to run if True

```
else:
```

Alternate Code if False

```
x = 7
if (x == 7):
    print("Yay!")
    print("x=7")
```

Output:

```
Yay
x=7
```

```
x = 7
if (x == 8):
    print("Yay!")
    print("x=7")
else:
    print("boo")
```

Output:

```
boo
```

ELIF STATEMENTS

elif stands for “else if”. The elif condition can be used to check another condition, given the previous condition was False, and before resorting to the code in the else condition.

if expression:

#Code

elif expression2:

#Code 2

Code 2 will only run if expression is false but expression2 is true.

You can use multiple elif statements in a row, but only one if and else statement.

if expression:

#Code

elif expression2:

#Code 2

elif expression3:

#Code 3

else:

#Code 4

```
x = 7
if (x == 8):
    print("Yay!")
    print("x=7")
elif (x==7):
    print("boo")
else:
    print("sad")
```

Output:

boo

CHALLENGE: EVEN OR ODD?

Create a variable x and assign it a value

Display the word “even” or “odd” depending on the value of variable x

You will need to use the modulo operator, and an If Else Statement.

Modulo computes the remainder from division. For example, $8 \% 3 = 2$ since when you divide 8 by 3, you have a remainder of 2



CHALLENGE SOLUTION

```
from hub import light_matrix
import runloop

async def main():
    # This creates the variable x and sets it to 51
    x = 51
    # x%2 computes the remainder when x is divided by 2.
    # This should be 0 if x is even
    if ((x%2) == 0):
        await light_matrix.write("even")
    else:
        await light_matrix.write("odd")

runloop.run(main())
```


ALTERNATE SOLUTION

This solution uses a string variable and a ternary operator, which is a compact if-else statement and useful for simple binary conditions.

```
from hub import light_matrix
import runloop

async def main():
    # Alternate - use a string variable and ternary operator
    # Ternary operator is a compact If-Else statement
    x = 20
    text = "even" if (x%2) == 0 else "odd"
    await light_matrix.write(text)

runloop.run(main())
```

CREDITS

This lesson was created by Arvind and Sanjay Seshan for Prime Lessons

Additional contributions by FLL Share & Learn community members.

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