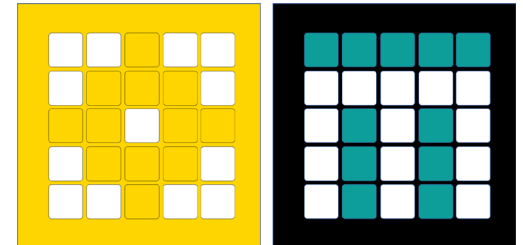


PRIME LESSONS

By the Makers of EV3Lessons



EXPRESSIONS & CONDITIONALS

BY SANJAY AND ARVIND SESHAN

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 you when you divide 8 by 3, you have a remainder of 2



CHALLENGE SOLUTION

```
# this imports the right libraries and creates a hub instance
from spike import PrimeHub, LightMatrix
hub = PrimeHub()

# this creates the variable x and set 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):
    hub.light_matrix.write("even")
else:
    hub.light_matrix.write("odd")
```


CREDITS

- This lesson was created by Arvind and Sanjay Seshan for Prime Lessons
- More lessons are available at www.primelessons.org



This work is licensed under a [Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License](https://creativecommons.org/licenses/by-nc-sa/4.0/).