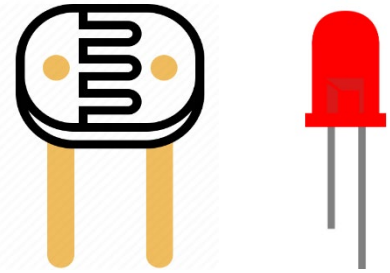
Unit 3: brightness, if and while with the TI-Innovator™ Hub | **Skill Builder 2: Make a Light Switch**

In this lesson, you will learn to use the brightness sensor to control the light (the red LED) automatically.

Objectives:

- Set up and monitor the brightness sensor
- Introduce the **if** statements
- Control the TI-Innovator Hub light (the red LED) using the brightness sensor.

Now that you can monitor the light coming into the TI-Innovator Hub, use that information to cause the onboard light (the red LED) to switch on/off when the brightness value changes.

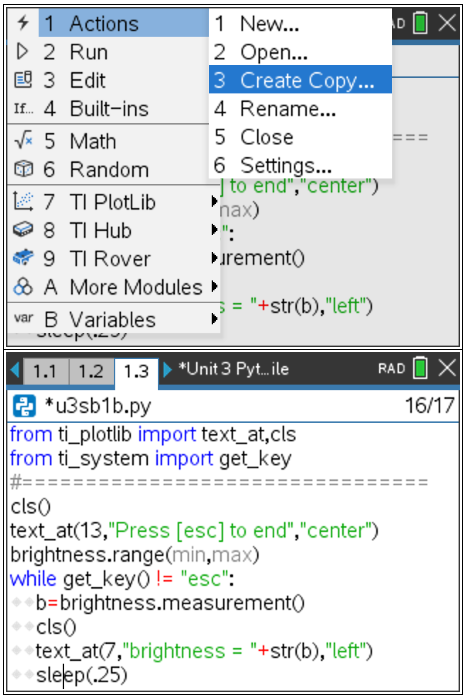


Teacher Tip: Working with a copy of the program ensures that changes won't modify the original program.

1. Make a copy of the program you used in Skill Builder 1 of this unit.
   To copy a program from the Editor, press **menu > Actions > Create Copy…**.
   *If 'Create Copy…' is not available, press **ctrl+B** in the Editor to store the program, and then try again. There should not be an asterisk (*) in front of the filename at the top.*

   The dialog box has a '1' added to your Python filename. If this is sufficient, press **enter**. Otherwise, change the name and press **enter**.

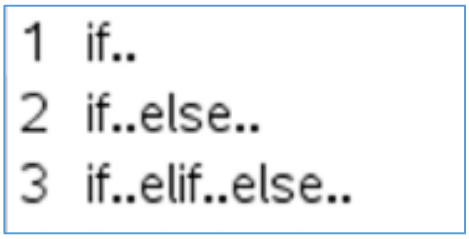
2. Your TI-Nspire™ document now has another Python Editor app with the copied program loaded on the page after the original program. Browse through the pages to confirm this, and make sure you return to the page with the copy of the program because we will make changes to this program.



Teacher Tip: Some confusion may arise with filenames: There's the TI-Nspire document name and then there are the Python filenames within the document. Each Python filename must be unique throughout the *entire* document.

The next step introduces the **if…** structures.

3. The **if** statements:



On **menu > Built-ins > Control**, there are three **if**… statements shown at the right. Each version is used in different situations in programs and all of them depend on one or more *logical* conditions (expressions that are either **True** or **False**):

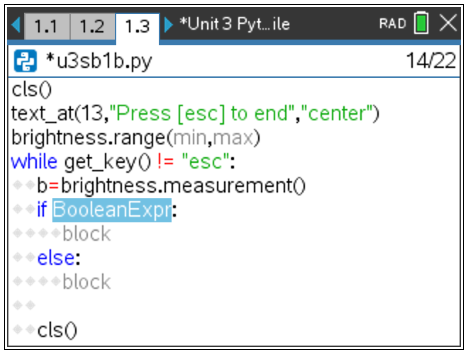
```
if <condition>:
    block

if <condition>:
    block
else:
    block

if <condition>:
    block
elif <condition>:

else:
    block
```

elif is Python's version of 'else if'.

Pasting one of these structures into your program will display **BooleanExpr** into the **<condition>** field. It means the same thing.

> **Teacher Tip:** BooleanExpr is an expression that returns True or False.
>
> True and False are valid built-in Python constants but are not on any of the TI-Nspire CX II menus. Note the capitalization!

4. Immediately after reading the brightness in your program, insert the **if..else** structure from **menu > Built-ins > Control**.

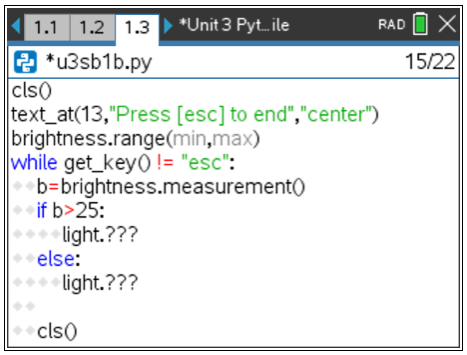


The **<condition>** or **BooleanExpr** will depend on the variable **b**.

```
if b > 25:
    block
else:
    block
```

Be sure to leave the colon (**:**) at the end of the **if** statement.
The value 25 is only a sample value. Change it depending on your lighting situation.

5. Replace the two **block**s: One will turn the light on and the other will turn it off. Study the logic of the structure to decide which action goes where. In the screen to the right, we leave the answer up to you. There are ??? in the screen image for you to replace.



Recall that you can find the **light.** statements on **menu > TI Hub > Hub Built-in Devices > Light Output**.

Run the program. Save your work!
You may have to adjust the threshold value of **25** in the **if** statement to suit your lighting situation and your **brightness.range()** setting.

Teacher Tip: When it is bright (if b>25), turn the LED off by using **light.off()**. When it is dark, turn the LED on by using **light.on()**.