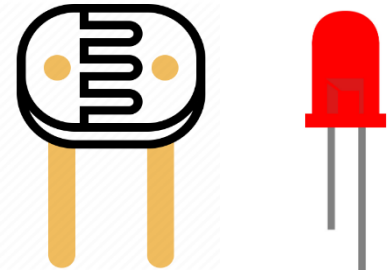
Unit 3: brightness, if and while with the TI-Innovator™ Hub | **Skill Builder 2: Make a Light Switch**

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

Objectives:

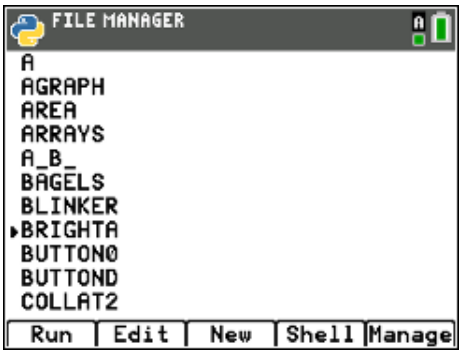
- Set up and monitor the brightness sensor
- Introduce the **if** statements
- Control the TI-Innovator Hub light (the red LED) using the brightness sensor.

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.



1. Make a copy of the program you used in Skill Builder 1 of this Unit.
   To copy a program (from the Editor or Shell), select **<Files>** to go to the File Manager, use the arrow keys to point the selection arrow on the screen to your BRIGHTA program (shown) and select **<Manage>**. Choose **Replicate Program** and type the new program's name, BRIGHTB **[enter]**.

   Your new program appears in the Editor and will appear in the <Files> list later.



2. The **if** statements:

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

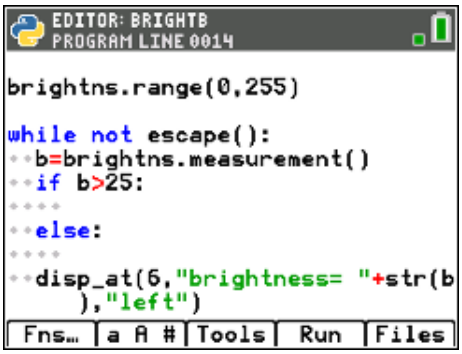

```
if <condition>:
    block

if <condition>:
    block
else:
    block

if <condition1>:
    block
elif <condition2>:
    block
else:
    block
```

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

   Note that **if :** and **elif :** require a condition between the word and the colon**. else:** does not.

3. Immediately after reading the brightness in your program, insert the **if..else** structure from **<Files> Ctl**.
   The **<condition>** placed after the word **if** will depend on the brightness variable **b**.

   ♦♦**if b > 25:**
   ♦♦♦♦ TRUE block
   ♦♦**else:**
   ♦♦♦♦ FALSE block



   The 'greater than' operator (>) is found on the **[test]** menu (**[2nd] [math]**) along with all the other *relational and logical operators*. Be sure to leave the colon (**:**) at the end of the **if** statement.

   The value 25 is only a sample value. You will change it to adapt to your lighting situation.

   Note: **if** and **else** are indented two spaces because they are inside the **while** loop. But the **if :** and **else:** *blocks* are indented *another* two spaces. Indentation is the Python way of indicating these special blocks of code. See the **<Tools>** menu for **Indent** and **Dedent** (un-indent) options or just place spaces (or delete spaces) at the beginning of a line to control indentation. The gray diamonds are this Editor's method of indicating the indentation. Improper indentation can result in either a syntax error or a programmer error.

4. In order to control the light on the TI-Innovator Hub you must **import light.** Place this statement at the top of your code along with the other import statements. Find import light on **<math> ti_hub… Built-in devices**.

5. Complete the two missing (**if** and **else**) blocks: One will turn the **light** (the red LED) on and the other will turn it off. Study the logic of the structure to decide which action goes in which block. In the screen to the right, we leave the answer up to you. There are **???** in the screen image for you to replace with the proper functions.

   After entering the proper statements, **<Run>** the program. Change the brightness reaching the sensor. You may have to adjust the threshold value of **25** in the **if** statement to suit your lighting situation and your **brightns.range( )** setting.