



# 10 Minutes of Code

## TI-NSPIRE CX WITH THE TI-INNOVATOR™ HUB

## UNIT 1: SKILL BUILDER 1

### TEACHER NOTES

#### Unit 1: Getting Started with TI-Innovator™ Hub

#### Skill Builder 1: Your First Program

In this first lesson for Unit 1, you will learn about working in the Program Editor to write a program that controls a light on the TI-Innovator™ Hub.

#### Objectives:

- Use the TI-Nspire™ Program Editor
- Use the Send command to control a light on the TI-Innovator Hub
- Introduction to the Wait statement
- Timing on the TI-Innovator Hub and the calculator

Connect the TI-Innovator Hub to the TI-Nspire CX. The calculator will come on. On the TI-Innovator Hub, a green light illuminates, indicating that the TI-Innovator Hub has power and is ready.

When learning to program a calculator with the TI-Innovator Hub, you will be learning to program in two separate but connected worlds: the calculator and the TI-Innovator Hub.

When writing a program on the calculator, you will use the Program Editor found on the Calculator application menu. The **Send** command is used to send commands the TI-Innovator™ Hub that produce a physical reaction (lighting up a light, making a sound, turning on a motor, etc.).

The TI-Innovator™ Hub commands are found on the Program Editor's menu under the **HUB** submenu.



**Teacher Tip:** Programming the calculator to control the TI-Innovator Hub requires OS 4.3 or above on the TI-Nspire CX. There is a special new **HUB** menu in the Program Editor which helps build commands for the TI-Innovator Hub.

Our first program will tell the TI-Innovator Hub to turn on the red LIGHT (LED) for 5 seconds.

1. To begin writing a new program in the Calculator app, press **menu > Functions and Programs > Program Editor > New**.
2. Type a name for the program (we use the name **light1** here), and press **enter**.



**Teacher Tip:** If you use a name that has already been used, then you will get an error message. To switch between two apps on the same page, use the mouse cursor to click on the app you want to activate. Alternatively, you can use **ctrl-tab**.

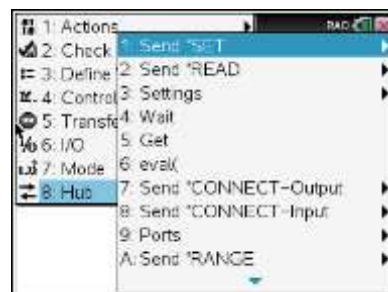
Your program consists of only one line of code:

**Send("SET LIGHT ON TIME 5")**

**LIGHT** is the name of the red LED.

To create this statement, you must:

3. Press the menu key, and select the **HUB** menu.
4. Select the **Send "SET..."** menu item.
5. Then select the **LIGHT** menu item.





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## UNIT 1: SKILL BUILDER 1

## TEACHER NOTES

**Teacher Tip:** The Program Editor is a normal text editor. The cursor is always in insert mode. To delete characters or commands, use the del key. To insert blank lines, go to the end of a line, and press enter. Blank lines have no effect on the run of the program.

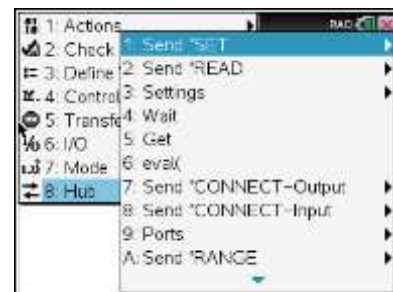
You can type in the calculator programming commands. All keywords in a program can be selected from the menu key.

The **Hub> toolbox** contains statements related to programming the TI-Innovator Hub. These statements can be typed in by hand, but it is usually easier to select them from the menu.

When you choose **Send "SET**, the next submenu contains the **LIGHT** object. Here you can find **ON** and **TIME** on the settings submenu.

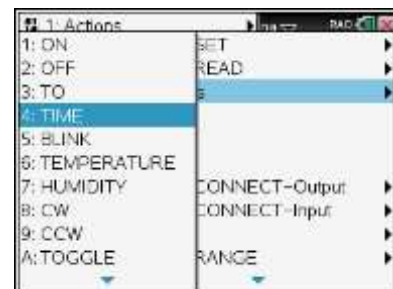
- Complete the statement by completing the rest of the command:

Send("SET LIGHT **ON TIME 5**")



**Teacher Tip:** You *can* type in all statements in the program editor, including the TI-Innovator Hub instructions, inside the quotes in the **Send** command. These instructions are just strings that are sent to the Hub to be processed.

- Find **ON** and **TIME** on **menu > Hub > Settings**.



The complete program is shown to the right.

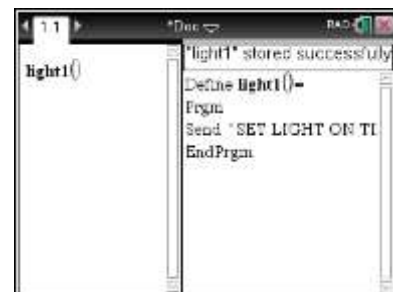
The **Send** command will send the *string* (the text in quotes) to the TI-Innovator Hub.



To run the program:

- Press ctrl+B to 'Check Syntax & Store' the program.
- Switch to the Calculator app.
- Press **VAR**, and select the program name from the list. This pastes the program name onto the home screen.
- Make sure your TI-Innovator Hub is connected to the calculator.
- Press **enter** to run the program.

If the command is written correctly, then the **LIGHT** (the red LED) will light up for 5 seconds. If there's an error, then the red light flashes once and a beep will sound.





## 10 Minutes of Code

### TI-NSPIRE CX WITH THE TI-INNOVATOR™ HUB

## UNIT 1: SKILL BUILDER 1

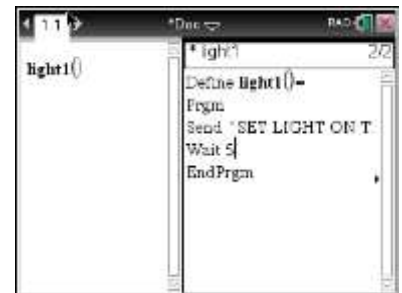
### TEACHER NOTES

The calculator displays 'Done' when the program ends. Notice that the program actually ends before the light goes off. To make the program end when the light goes off, we have to tell the calculator to Wait as long as the light is on.

**Teacher Tip:** In the Send statements of this program, there are actually *two* commands: Send( and SET. Send is an instruction to the calculator to send an item out the USB port. The SET command is an instruction to the TI-Innovator Hub to - in this case - turn the light on or off.

To add a statement to the program, we need to edit it:

1. Switch to the Program Editor.
2. Add a blank line to the program by placing the cursor at the end of the **Send** statement and pressing enter.
3. You'll find **Wait** on the Hub menu.
4. Add the statement **Wait 5** just before **EndPrgm**.



Quit the editor, and run the program again.

If the program was the last item on the Calculator app, simply press **[enter]** to rerun it.

The program will end at roughly the same time the red light goes off.

We can remove the **TIME** element of the Send instruction and control timing using the **Wait** command in the calculator.

**Teacher Tips:** If a program generates an **ERROR** message when it runs, then there is something wrong in the program. There are three options in the error box: View, Edit, and OK.

### Extensions

- To turn the light off, use the statement  
**Send("SET LIGHT OFF")**
- Add statements to the program to make the light blink many times.

