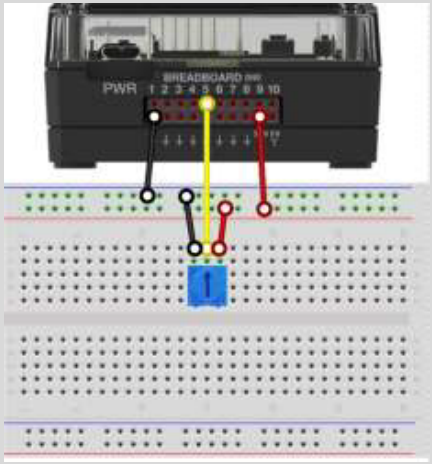
April 18, 2017

the TI Innovator ™ Hub with TI Launch Pad ™ Board



Practices in Mathematics, Science, and English Language Arts*		
M1. Make sense of problems and persevere in solving them.	**S1.** Asking questions (for science) and defining problems (for engineering).	**E1.** They demonstrate independence.
M2. Reason abstractly and quantitatively.	**S2.** Developing and using models.	**E2.** They build strong content knowledge.
M3. Construct viable arguments and critique the reasoning of others.	**S3.** Planning and carrying out investigations.	**E3.** They respond to the varying demands of audience, task, purpose, and discipline.
M4. Model with mathematics.	**S4.** Analyzing and interpreting data.	**E4.** They comprehend as well as critique.
M5. Use appropriate tools strategically.	**S5.** Using mathematics, information and computer technology, and computational thinking.	**E5.** They value evidence.
M6. Attend to precision.	**S6.** Constructing explanations (for science) and designing solutions (for engineering).	**E6.** They use technology and digital media strategically and capably.
M7. Look for and make use of structure.	**S7.** Engaging in argument from evidence.	**E7.** They come to understanding other perspectives and cultures.
M8. Look for and express regularity in repeated reasoning.	**S8.** Obtaining, evaluating, and communicating information.	

*The common Core English Language Arts uses the term "student capacities" rather than the term "practices" used in Common Core Mathematics and the Next Generation Science Standards.

CCSS + NGSS = NGSS

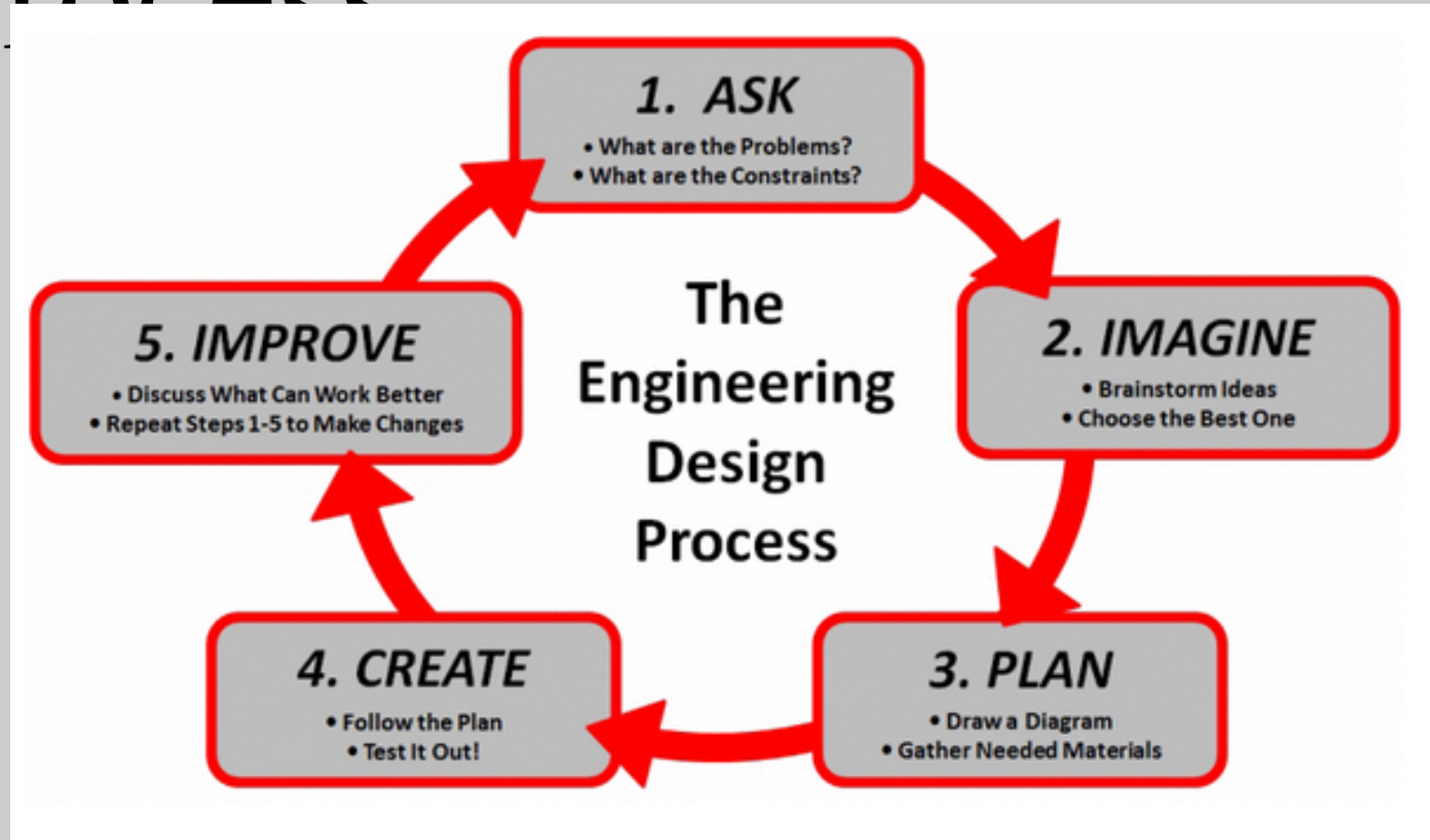
CCSS Says

- Make sense of problems, persevere in solving them
- Reason abstractly and quantitatively
- Construct viable arguments and critique the reasoning of others
- Model with mathematics
- Use appropriate tools

NGSS Says

- Asking questions and defining problems
- Using mathematical and computational thinking
- Engaging in argument from evidence
- Developing and using models
- Planning and carrying out investigations
- Analyzing and interpreting

Engineering Design Process



Program:

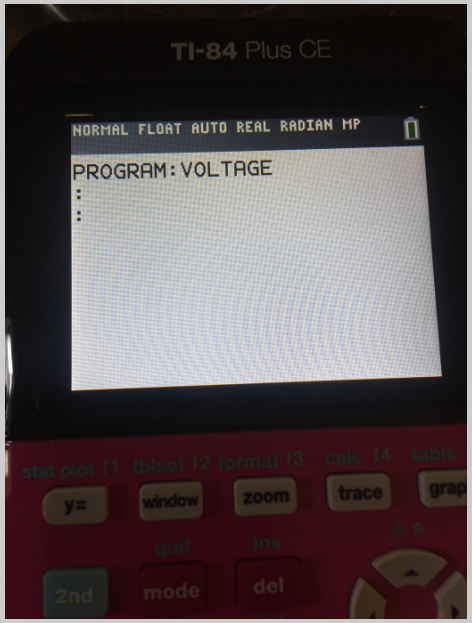
Program

NEW

1: Create NEW

VOLTAGE

enter



Program:

Program

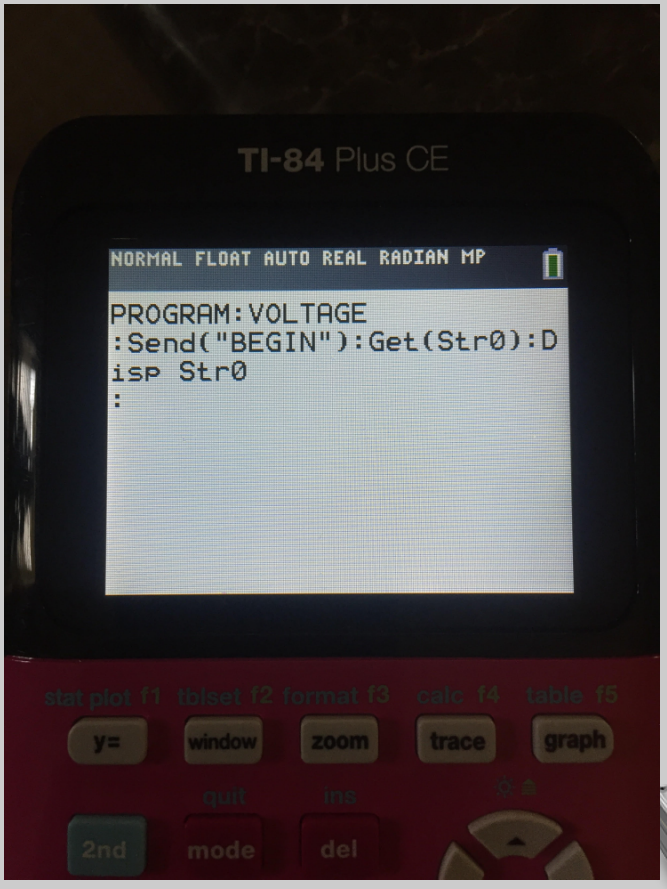
Hub

D: Manage

1 - Send(“BEGIN”):Get(Str0):Disp Str0

Enter

Enter again to get to the next line



Program:

Connect analog (potentiometer) to breadboard:

Program, HUB, 8: Send (“CONNECT - Input…

Input is C , analog.in, enter to select

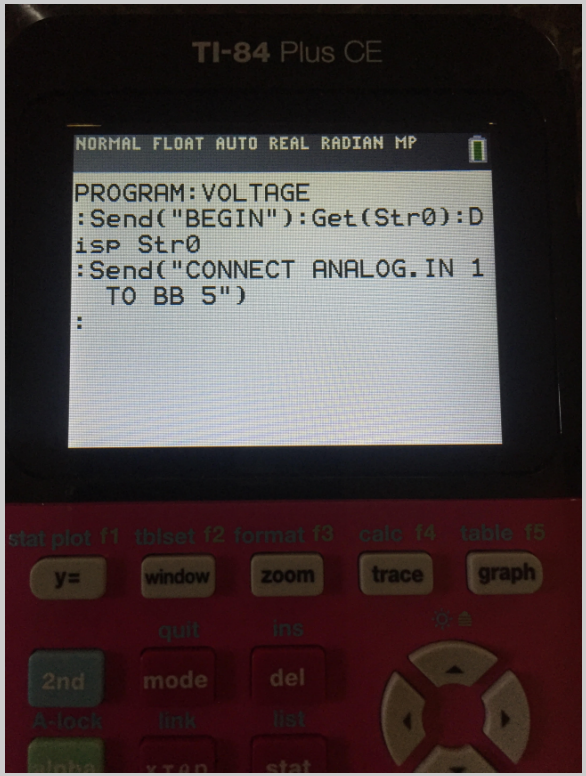
Type 1 space

Program, HUB, 3 Settings, 3 TO, space

Program, HUB, 9 Ports, B - BB 5, close parenthesis

Enter

Enter again to move to the next line



Program:

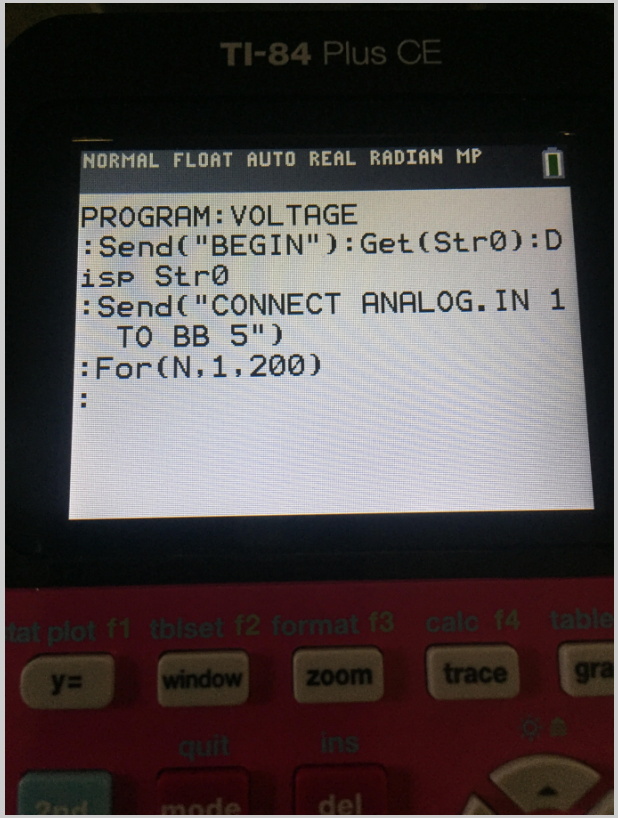
For statement - For range of N - 1-200:

Program

CTL, 4 - For(

Type N, 1, 200)

Enter



Program:

Send message to read analog

in pin 1:

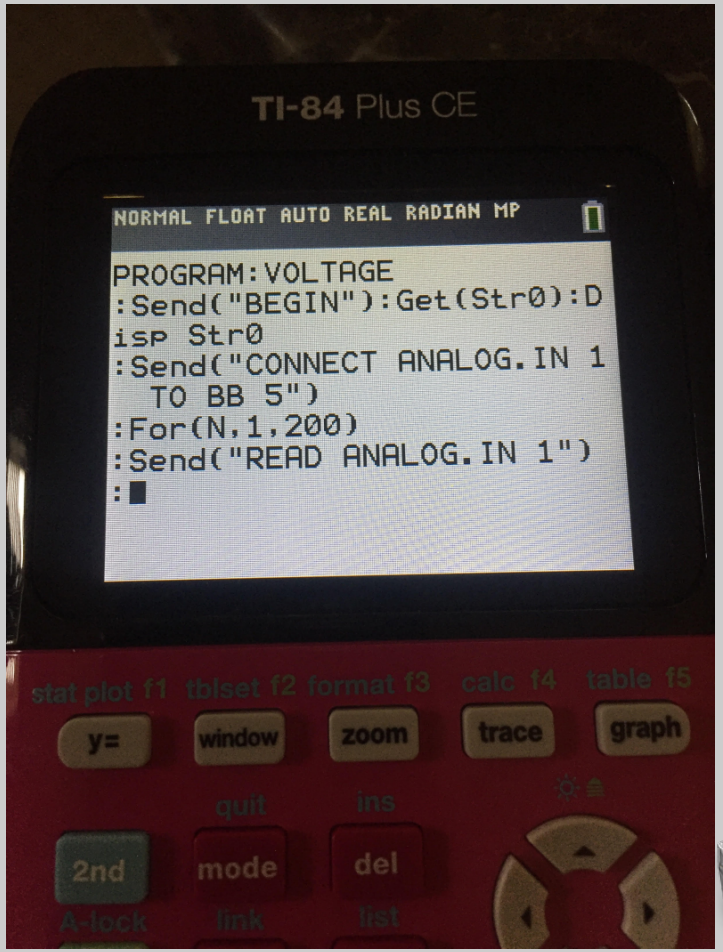
Program

HUB, 2 Send (“READ…

C, ANALOG.IN

Type 1, close quotes, close parenthesis

Enter



Program:

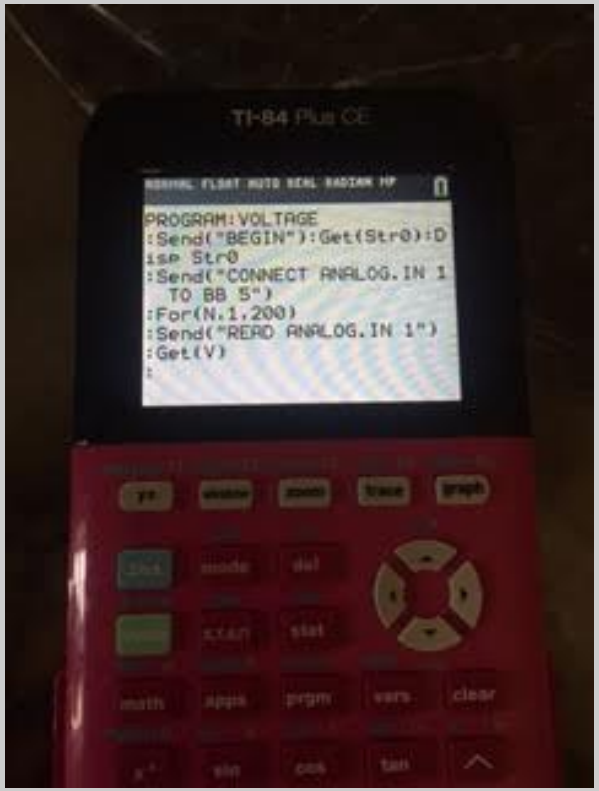
Get analog in:

Program

I/O - A - Get(

Type A for analog, close parenthesis

Enter



Program:

Set display and value for analog in=A:

Program, I/O

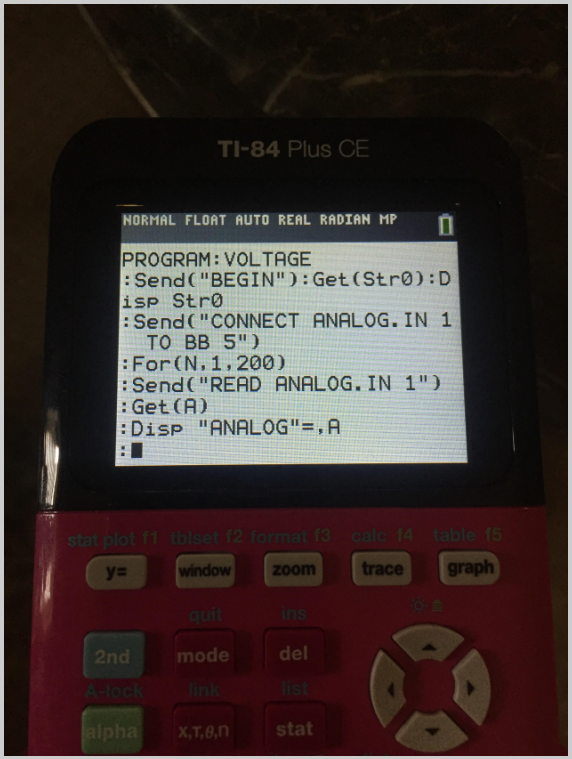
3: Disp

Type - “Analog space

2nd 0 (catalog) up until you get to the = sign

Then type ”,A

Enter



Program:

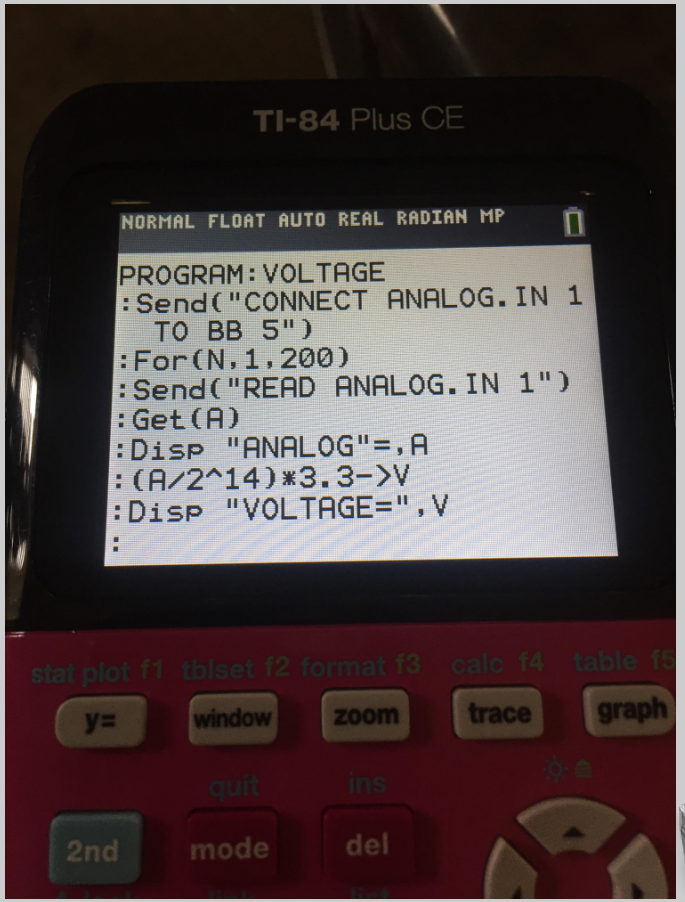
Convert the 14 bit “raw” analog input

Value into volts using A = (V/2^14)x3.3

Enter

Display Voltage = V

PRGM, I/O, 3: Disp “VOLTAGE=”,V



Program:

Tell to Wait .1 sec and then end:

Program

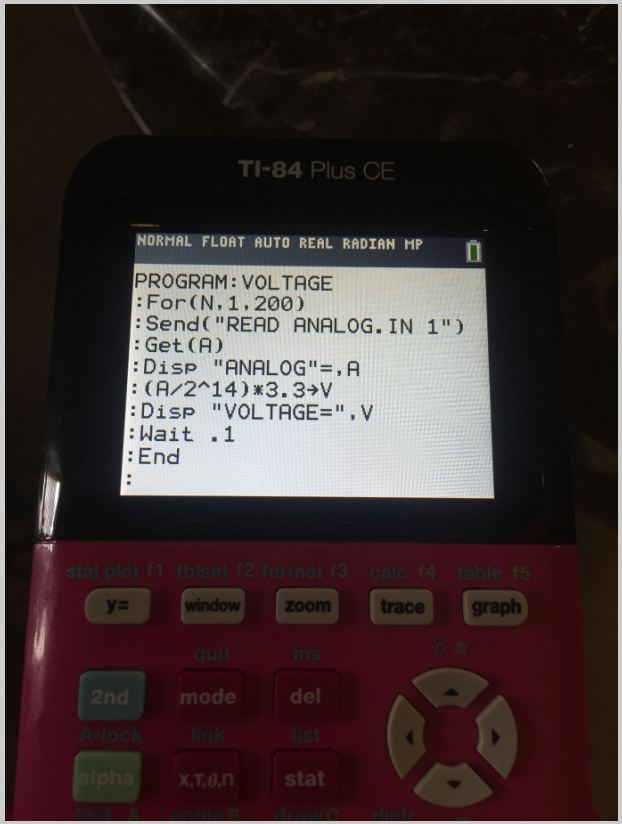
HUB

4: Wait

Type .1 Enter

Program, CTL, 7: End

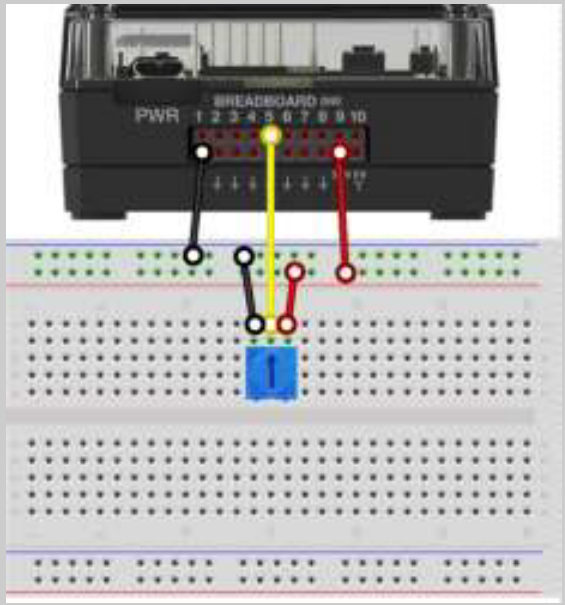
Enter



Innovator Design:

Materials:

- TI -84 Plus CE
- TI- Innovator Hub with USB Cable
- TI Innovator Breadboard
- Male to Male jumper wires (2 red, 2 black, one yellow)
- One potentiometer



Innovator Design:

Place the potentiometer with Knob on the breadboard. Be sure each leg is in a different column.

Innovator Design:

Use a yellow Male to Male Jumper Cable to connect from BB5 (an analog input) on the TI-Innovator Hub to the center leg of the Potentiometer with Knob.

Innovator Design:

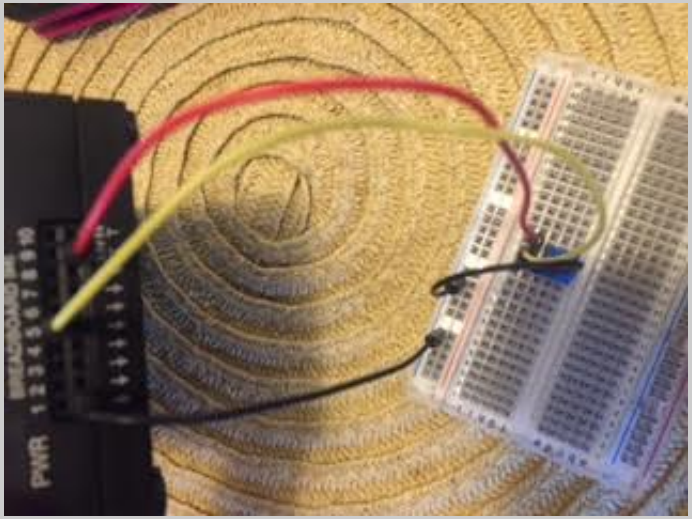
Use a black Male to Male Jumper Cable to connect the ground pin on the blue ground breadboard bus to any ground pin on the Innovator.

Innovator Design:

Use a black Male to Male Jumper Cable to connect the left leg of the Potentiometer with Knob to any ground pin on the blue ground breadboard bus.

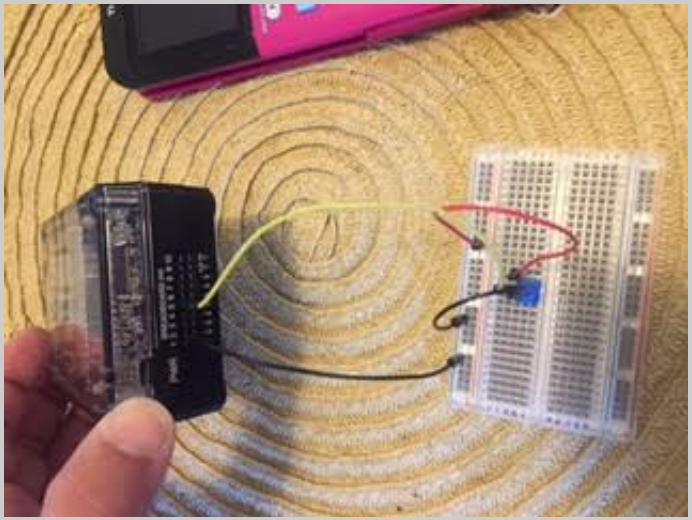
Innovator Design:

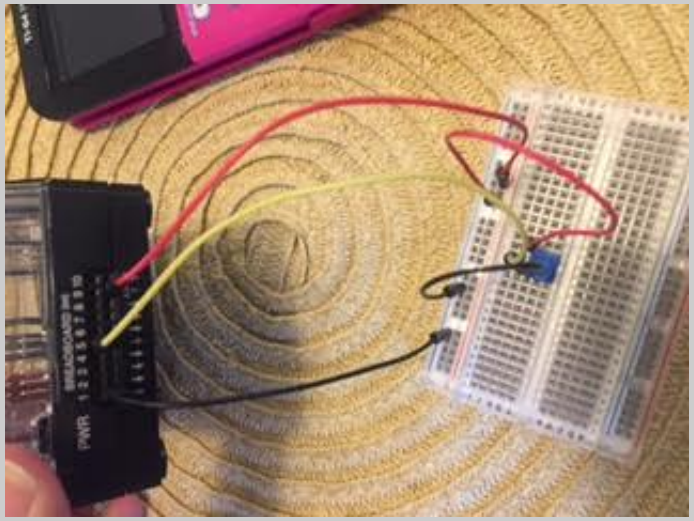
Use a red Male to Male Jumper Cable to connect the right leg of the Potentiometer with Knob to the 3.3 V red breadboard bus.



Innovator Design:

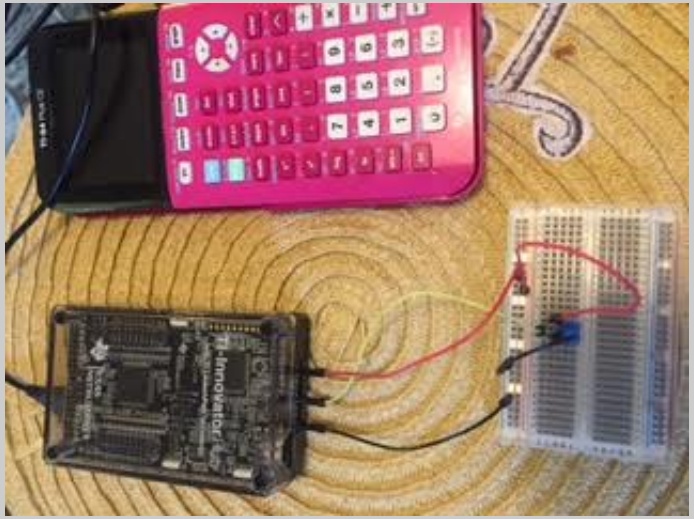
Use a red Male to Male Jumper Cable to connect the red breadboard bus to the 3.3 V pin on the TI-Innovator Hub.





Innovator Design:

Plug the B end of the “unit to unit” USB cable into the TI-Innovator Hub and then the A end into the handheld device.



TIME TO TEST!!!

2nd mode

Program

EXEC VOLTAGE

Enter

Resources:

TI Codes: https://education.ti.com/en/activities/ti-codes

TI Innovator and I/O Packs: https://education.ti.com/en/products/micro-controller/ti-innovator

Path to STEM Projects:

https://education.ti.com/en/activities/stem/path-to-stem