

# Reference Guide



TEXAS INSTRUMENTS

# Reference guide

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This guide has important information to help teams successfully plan and complete their projects. Please use it as a reference. If you have questions, contact us at [codescontest@ti.com](mailto:codescontest@ti.com).

## Provided materials

TI will provide materials outlined in this guide to teams that advance to the next round. Some materials are required; some you may use at your discretion.

## Grading rubric

This rubric is a reference to understand how the project plan and design will be evaluated.

## Additional resources

Additional references, such as educational resources, product guidebooks and optional-use sensors, are available.

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# Provided materials: Required use

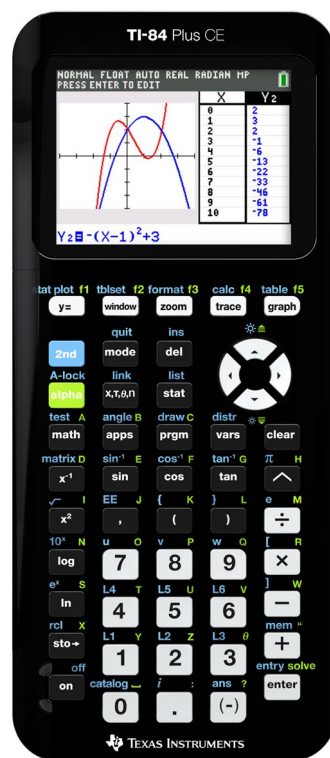
Your project **must** use a TI-Innovator™ Hub and/or BBC micro:bit, and a TI-84 Plus CE, TI-84 Plus CE Python or TI-Nspire™ CX II graphing calculator.

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TI-Innovator™ Hub  
and/or micro:bit



TI-84 Plus CE  
graphing calculator



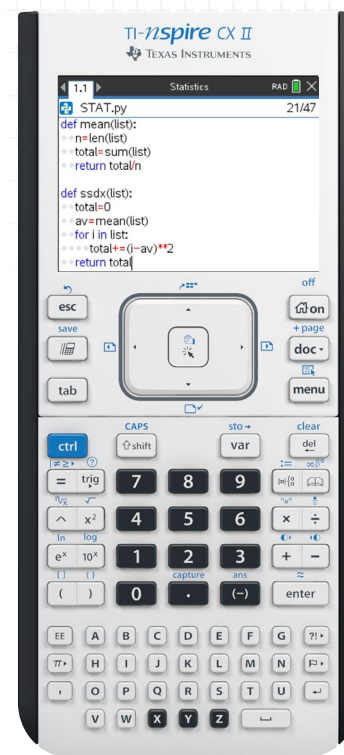
OR

TI-84 Plus CE Python  
graphing calculator



OR

TI-Nspire™ CX II  
graphing calculator



# Provided materials: Optional use

TI will provide these optional-use materials to advancing teams. Please use them as needed.

**Get more information on TI-Innovator™ Packs and modules »**

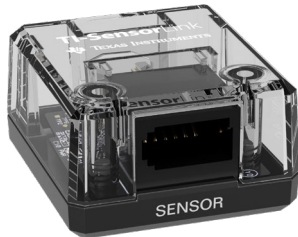
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## TI-Innovator™ Input/Output (I/O) Modules

- » Light sensor module
- » White LED module
- » Vibration motor module
- » Servo motor
- » Temperature sensor module
- » Hall sensor module
- » Temperature and humidity (DHT) module
- » Moisture module
- » Water pump
- » MOSFET module
- » Ultrasonic Ranger module

### TI-SensorLink Adapter

*(works with several Vernier analog sensors)*



### External battery for TI-Innovator™ Hub



### \$50 Gift Card

*(for any additional materials needed)*



# Provided materials: Optional use (cont.)

TI will provide these optional-use materials to advancing teams. Please use them as needed.

**Get more information on TI-Innovator™ Packs and modules »**



## TI-Innovator™ Breadboard Pack contents

*(ideal for experienced users)*

- » Breadboard
- » Male-to-male breadboard jumper cables (40)
- » Male-to-female breadboard jumper cables (10)
- » LEDs: green (5), red (10), RGB (2)
- » Resistors (10 each): 100 Ohm, 1K Ohm, 10K Ohm, 100K Ohm, 10M Ohm
- » Assorted capacitors: 100  $\mu$ F, 10  $\mu$ F, 1  $\mu$ F
- » Seven-segment display
- » 940 nm infrared transmitter and receiver
- » Thermistor
- » Analog temperature sensor
- » Potentiometer with knob
- » Small DC motor
- » Diode
- » Light sensor
- » SPDT slide switch
- » Eight-position DIP switch
- » 100 Ohm resistor SIP package (8)
- » Two-power MOSFET
- » Four AA battery holder



# Grading rubric

Projects will be evaluated using the criteria listed below.

Project planning:	Judging criteria	Max points
Description of the problem or opportunity	Selected an interesting problem or creative opportunity with application for society	15
	Clear and concise communication of the problem	10
Description of the solution	Relevancy to a happy planet/environment	20
	Use of TI technology to model solution/product	20
	Description of program to control solution/product and coding experience	10
	Efficient use of materials and spending	5
	Solution/product diagram	15
	Description of team work/roles	5

# Reference materials and resources

Here are some TI resources that may be helpful in the development of your project.

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## Online educational resources and product guidebooks

[\*\*TI Codes for TI handhelds \(Python or TI-Basic\) »\*\*](#)

[\*\*On-demand T<sup>3</sup>™ Webinars \(Coding\) »\*\*](#)

[\*\*On-demand T<sup>3</sup>™ Webinars \(TI-Innovator™ Hub\) »\*\*](#)

[\*\*Connecting micro:bit to TI technology »\*\*](#)

[\*\*Micro:bit tutorials »\*\*](#)

[\*\*Insider tips blog post »\*\*](#)

[\*\*TI-84 Plus CE graphing calculator guidebooks »\*\*](#)

[\*\*TI-Nspire™ CX II graphing calculator guidebooks »\*\*](#)

[\*\*TI-Innovator™ Technology guidebooks »\*\*](#)

[\*\*STEM activities »\*\*](#)

[\*\*2022 TI Codes Contest winner and finalist videos »\*\*](#)

[\*\*2021 TI Codes Contest winner and finalist videos »\*\*](#)

[\*\*2020 TI Codes Contest winner and finalist videos »\*\*](#)

[\*\*2019 TI Codes Contest winner and finalist videos »\*\*](#)

[\*\*2018 TI Codes Contest winner and finalist videos »\*\*](#)

Packet submissions are subject to the **Official Rules** of the 2023 TI Codes Contest and Sweepstakes, including, without limitation, the right for Texas Instruments to use any project submissions to create future TI-Innovator™ projects/lessons during and after the contest period.

## Optional sensor examples

You are welcome to use any other sensors or materials as part of your project. Here are some example sensors other students have used in the past. However, none of these have been tested or approved for use with the TI-Innovator™ Hub, so use carefully at your own risk.

» Grove — Sweep Servo

» Grove — Solenoid

» Grove — PIR Motion Sensor

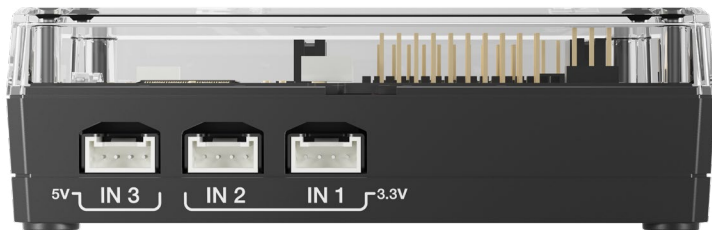
*(You may elect to use your \$50 gift card to purchase these optional materials.)*



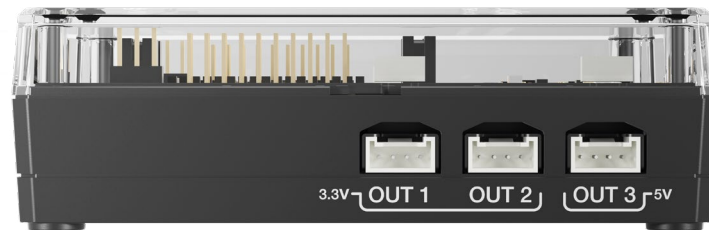
# Reference materials and resources (cont.)

These diagrams illustrate the input and output options on the TI-Innovator™ Hub.

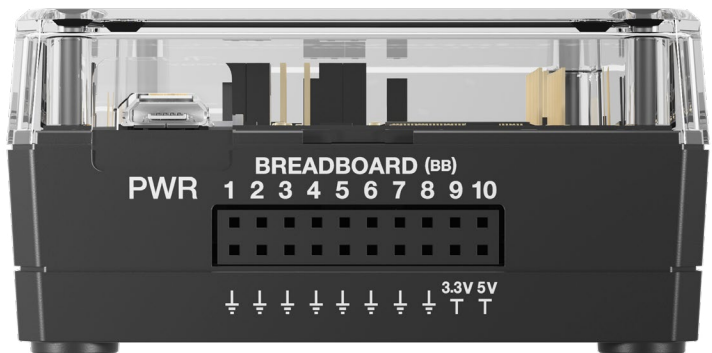
Input



Output



Breadboard Input



Additional Inputs

