Meet the TI-Rover
with Geometry Challenges
TI-Nspire CX Family
TI-Basic

Texas Instruments

@ticalculators

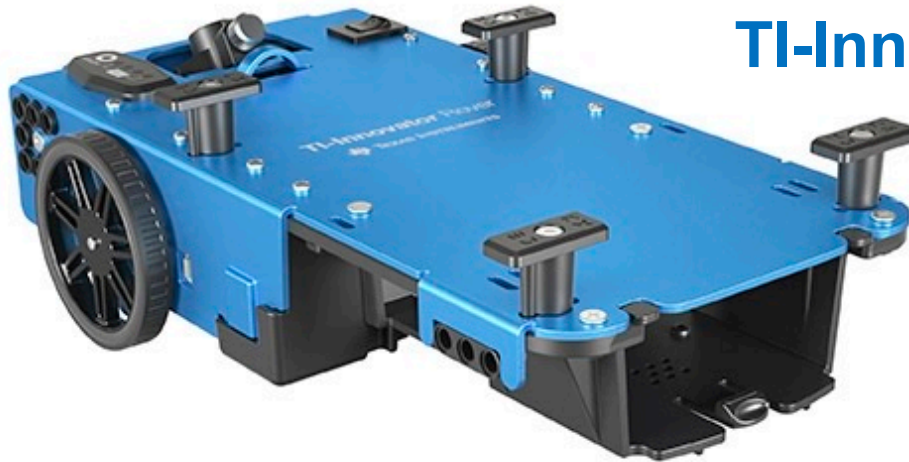www.TIstemProjects.com

TEXAS
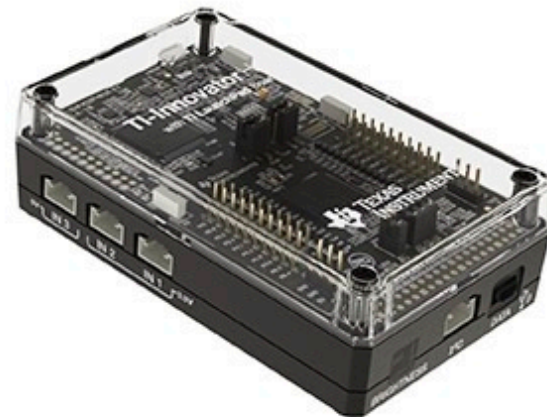INSTRUMENTS

Meet the TI-Innovator™ Rover

TI Graphing Calculator

TI-Innovator™ Rover
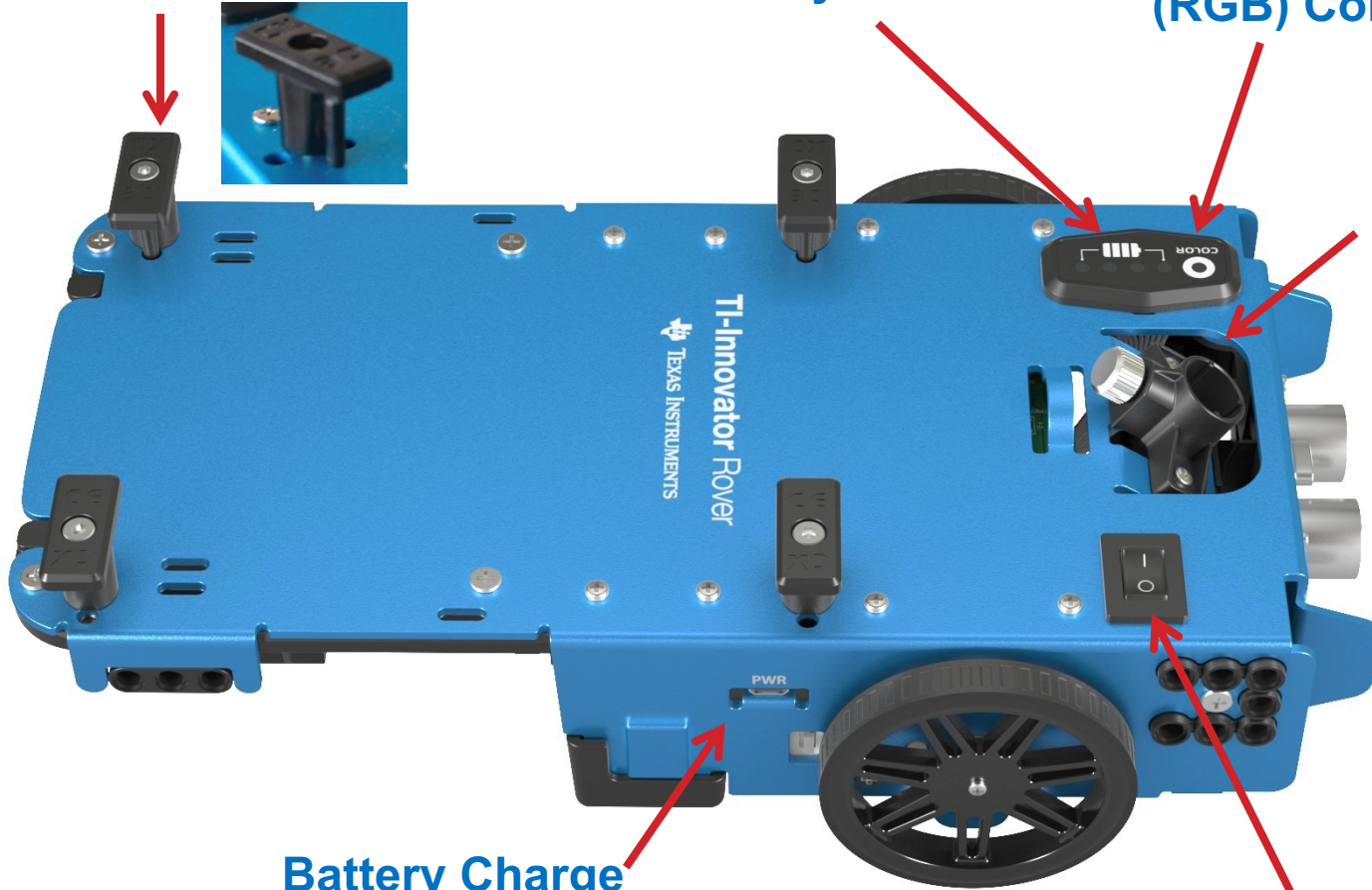
TI-Innovator™ Hub

Rover from the top

Calculator holder posts.
Lift and twist to CE or CX side.

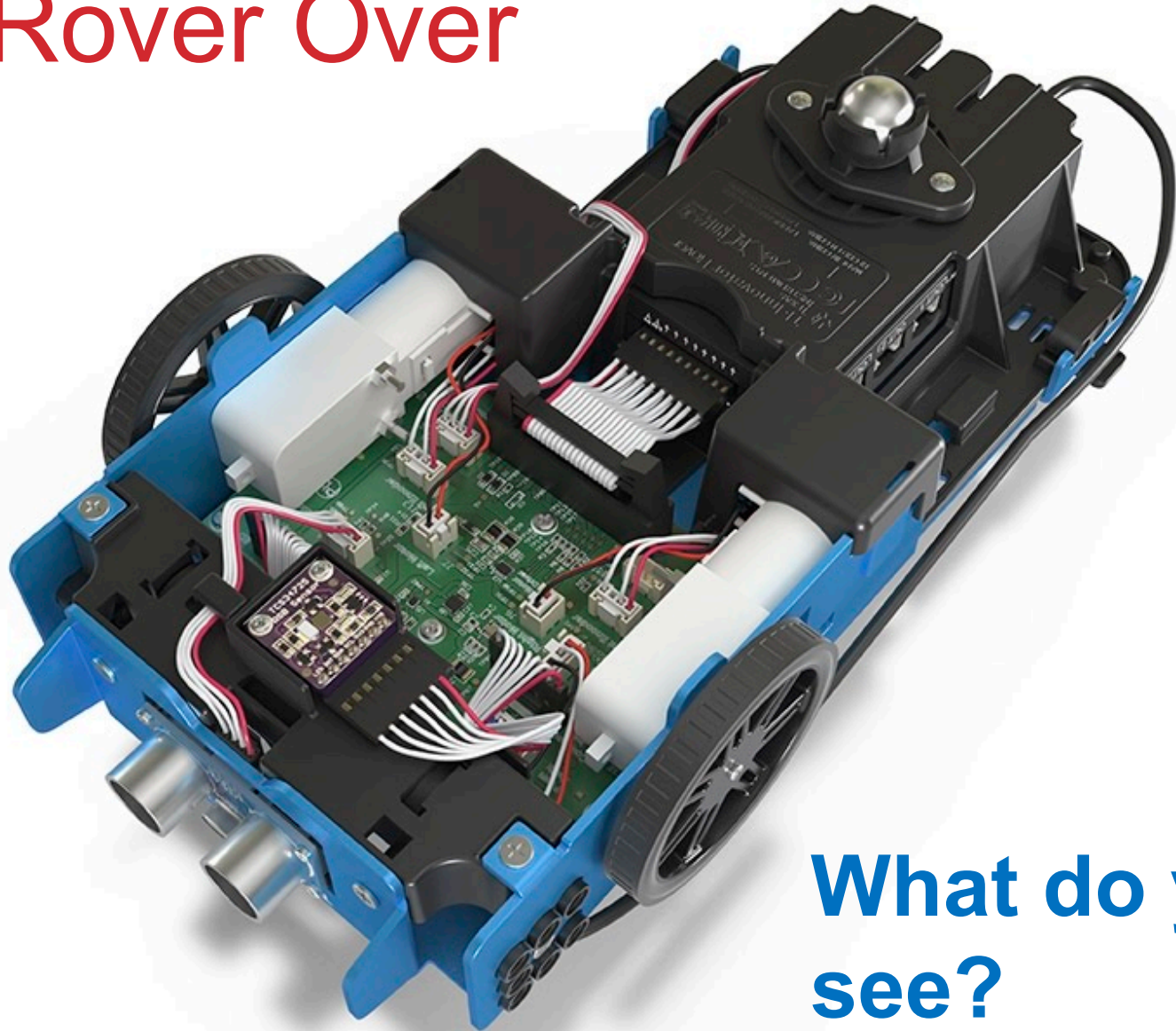**Battery indicator**

Red-Green-Blue (RGB) Color LED

Marker holder
(Expo Fine and Ultra Fine sizes)

Battery Charge with USB micro to wall adapter.
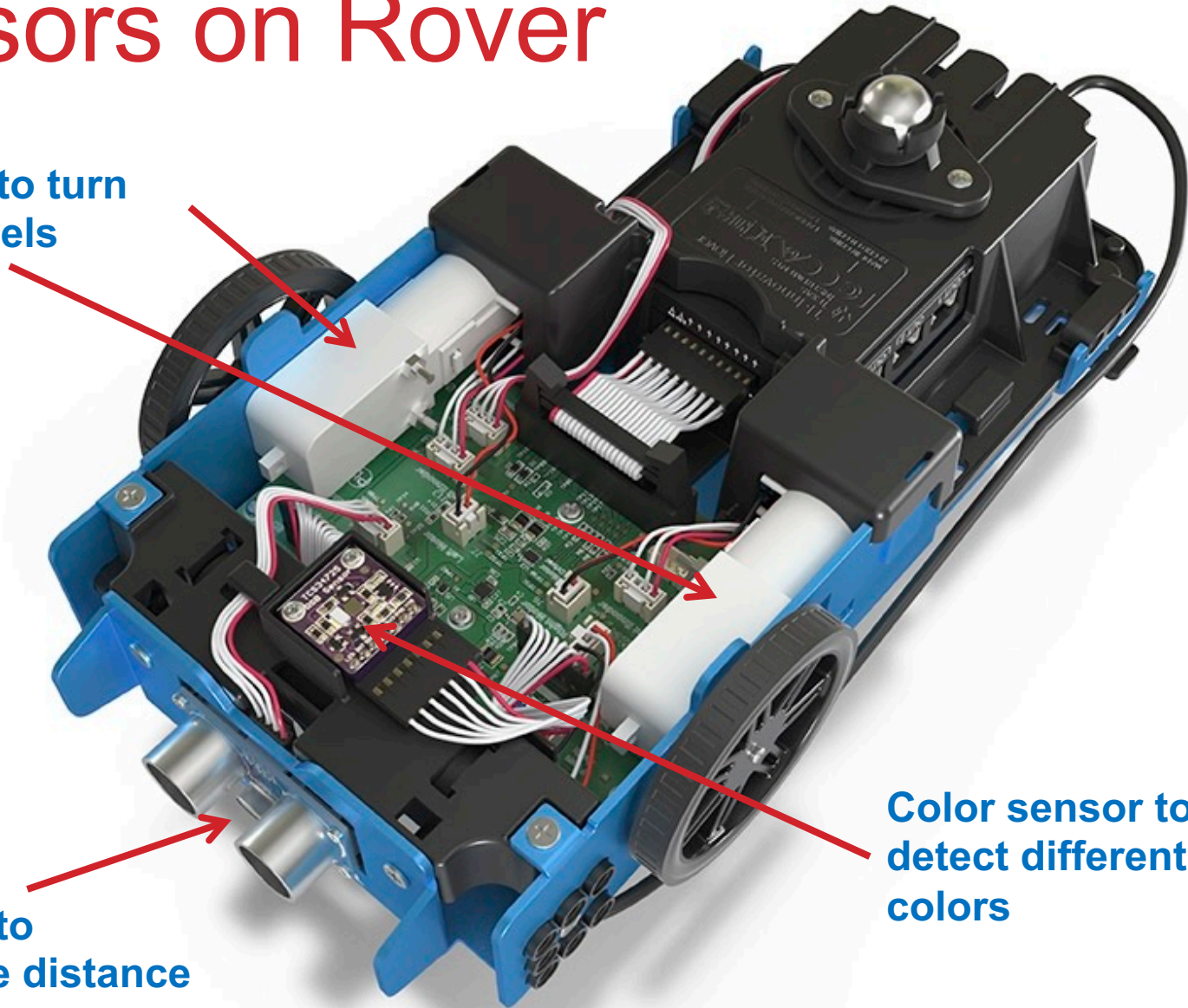
On/Off Switch

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Turn Rover Over

What do you see?

Sensors on Rover

Motors to turn the wheels

Color sensor to detect different colors

Ranger to measure distance

TEXAS INSTRUMENTS

TI-Rover orientation and virtual grid
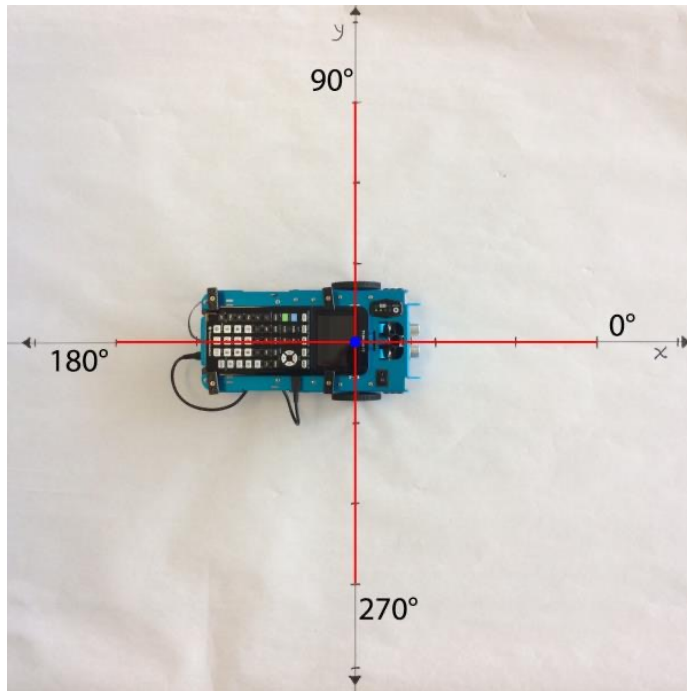
Rover programs set the initial position as the origin and the heading as 0 degrees measured from the x-axis.

Note: The Rover tracks its position on a virtual coordinate grid with a unit value of 10 cm. The coordinate grid position applies to the RV TO XY, RV TO POLAR, and RV TO ANGLE on the Drive RV Drive menu. The virtual grid also applies to the RV Path menu functions.

Connecting Rover to your calculator

3 **Make sure that your Rover is switched on and on floor ready to roll before running the program.**

1 **Plug B side into USB B port of the Rover Hub.**

2 **Plug A side into port on calculator the Rover Hub.**

Unit-to-unit cable

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Connecting your calculator to the Rover

Initial Connection

» Step 1: Make sure that Rover is switched ON

» Step 2: plug unit-to-unit cable into Hub

  » (Use end of cable labeled B)

» Step 3: plug unit-to-unit cable into the calculator

  » (Use end of cable labeled A)

Troubleshooting

Try the following as a fast fix:

» Step 1: unplug the unit-to-unit cable from the hub and the calculator.

» Step 2: re-connect in the order of first Hub then calculator second.

If the fast fix does not work, try these steps:

» Step 1: unplug unit-to-unit cable from both the hub and the calculator

» Step 2: Switch Rover OFF

» Wait a second

» Step 3: Switch Rover ON

» Step 4: plug unit-to-unit cable into Hub
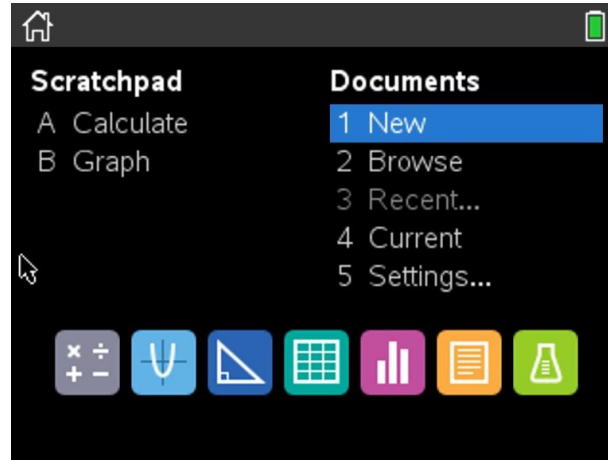
» Step 5: plug unit-to-unit cable into the calculator

Creating a new TI-Nspire document

1

Press the **[home/on]** key to display the home screen.

2
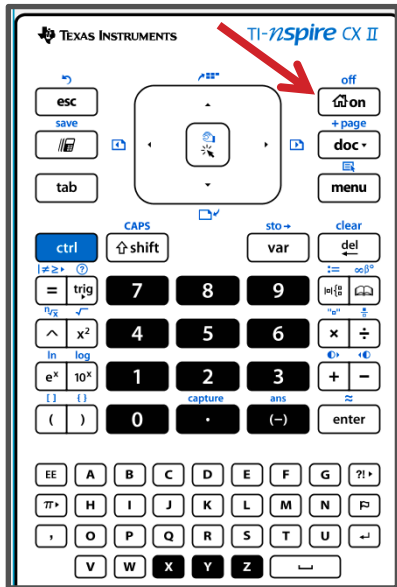
Use **arrow keys** and **[enter]** or Press **[1]** to select 1 New document.

3

See next slide for steps to add a program.

TEXAS INSTRUMENTS

Creating a Rover Program

1

Press **[menu]** to bring up a menu of applications to add to the page.

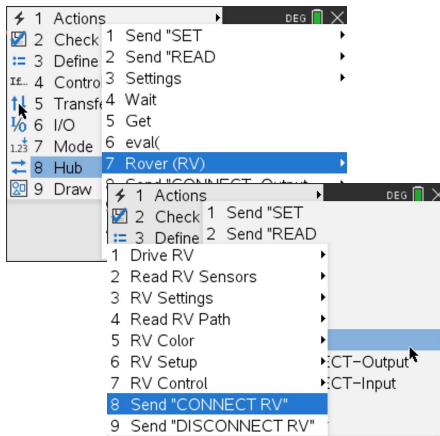Note: You can also add a new page to the document by pressing **[ctlr] [doc] +page**.

2

Press **down arrow** repeatedly then press **[enter]** or press **[9]** to select Add Program Editor.

3

Select 1: New by pressing **[enter]** or **[1]**

4

Enter your program name and press **[enter]**.

5

You begin on a blank program line.

6

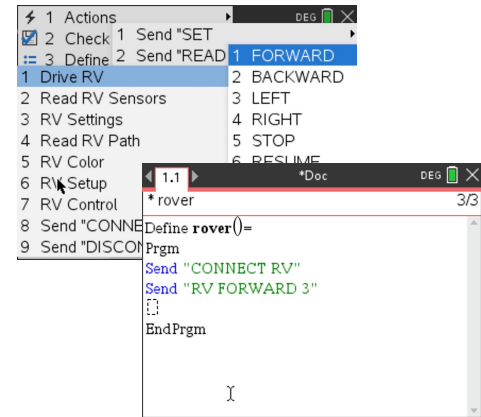Press **[menu]** then **[8]** Hub **[7]** Rover (RV) **[8]** Send "Connect RV"

7
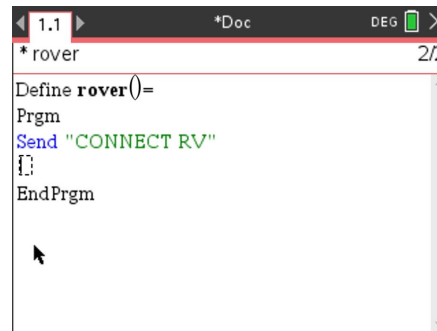
The Connect RV command is required at the beginning of every Rover program. **Note: Right arrow** to the end of the line and press **[enter]** to complete the statement.

8

Press **[menu]** then **[8]** Hub **[7]** Rover (RV) **[1]** Drive RV **[1]** FORWARD to paste to the edit line. Type a value for units to drive. **Right arrow** to the end of the line and press **[enter]** to complete the statement.
Press **[ctrl] [R]** to run the program in a calculator app on the next page.

TEXAS INSTRUMENTS

Running a Rover Program

1

Press **[ctrl] [R]** to paste the program name ready to run in a Calculator app on the next page.

Note: **[ctrl] [R]** also checks syntax and stores program changes. **[ctrl] [B] is another option for checking syntax and storing.** * before the program name indicates that changes have not been stored.
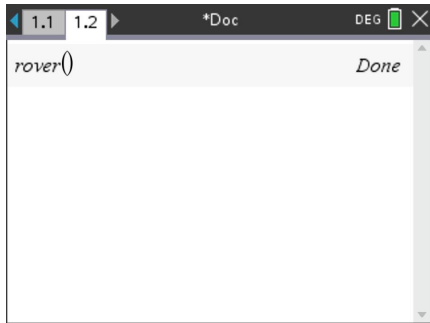
Before running the program
make sure that
- Rover is connected to the calculator
- Rover is switched on
- Rover is on a flat surface ready to roll

2

Press **[enter]** to run your program in the Calculator app.

You can re-run the program in the Calculator app by pressing **[enter]**.

TEXAS INSTRUMENTS
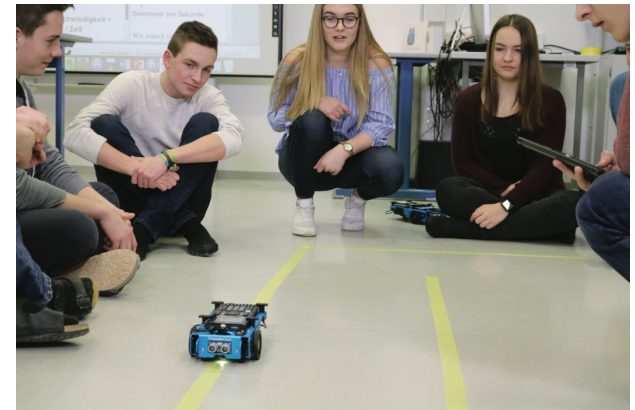
Editing a Rover Program

1
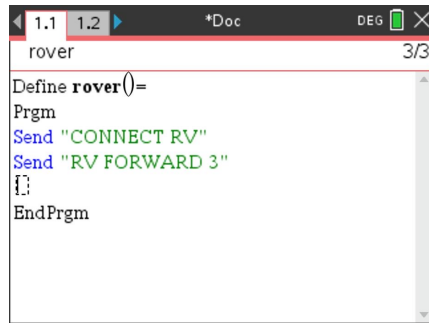
Press **[ctrl] left** to go back to your editor page.

2
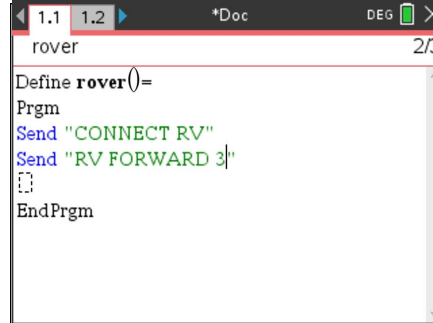
Use the arrow keys to position the cursor to change the value of the forward distance.

3
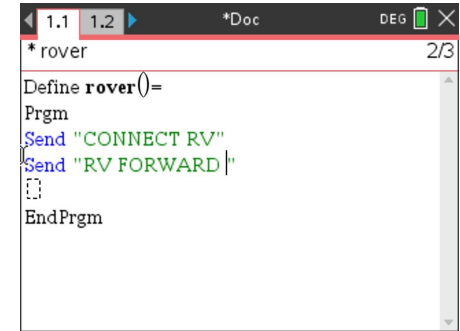
Press **[del]** to backspace over the 3.

4
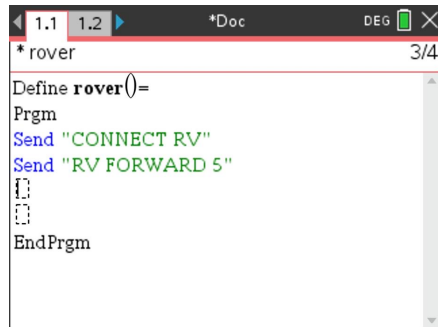
Type in a new value for distance, **right arrow** to the end of the line, then **[enter]** to move to the next line.

5

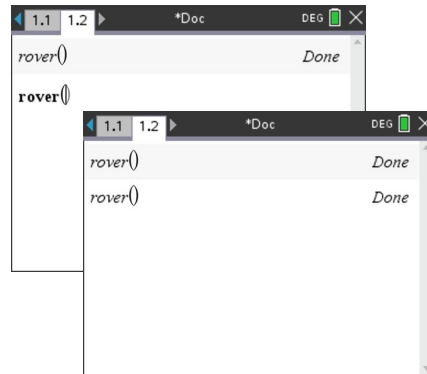Press **[ctrl] [R]** to paste the program name ready to run in a Calculator app on the next page.

6

Press **[enter]** to run your program in the Calculator app.

TEXAS INSTRUMENTS

Saving a TI-Nspire document file

Folder where file will be saved.
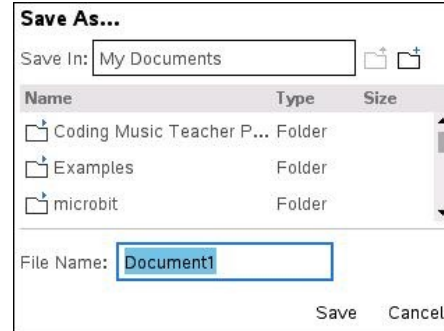
1
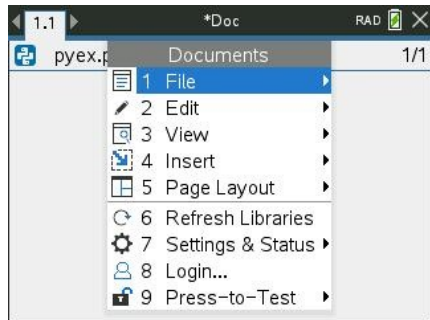
Press **[doc]** then select 1 File from the menu by pressing **[enter] or [1].**

2
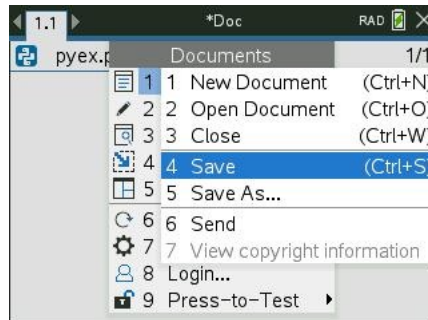
Select 4 Save or 5 Save As… from the menu.

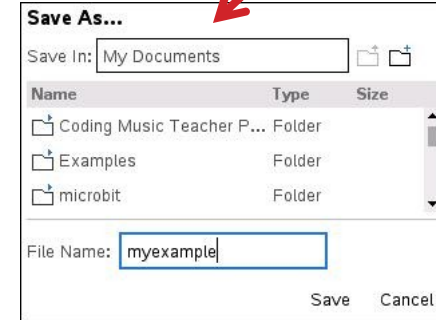**3**

Type in your file name using alpha and numeric characters.

Note: The name must begin with an alpha character.

4

Press **[enter]** to save the file to the folder indicated above.
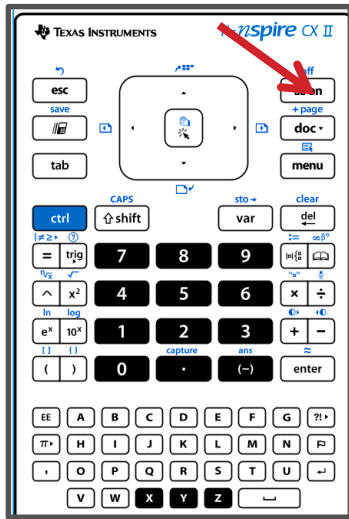
To change the folder press the **[UP]** arrow key and then use **arrows** and **[enter]** to select a folder before pressing **[enter]** to save the file.

Press **[esc]** to cancel the save dialogue.

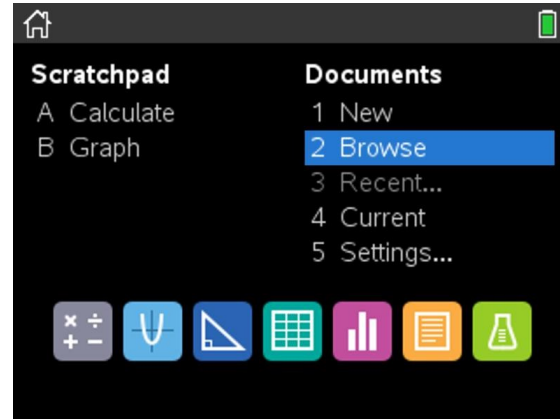You can use **[ctrl] [S]** as a shortcut to save the TI-Nspire document file.

TEXAS INSTRUMENTS

Opening an existing TI-Nspire document file

1

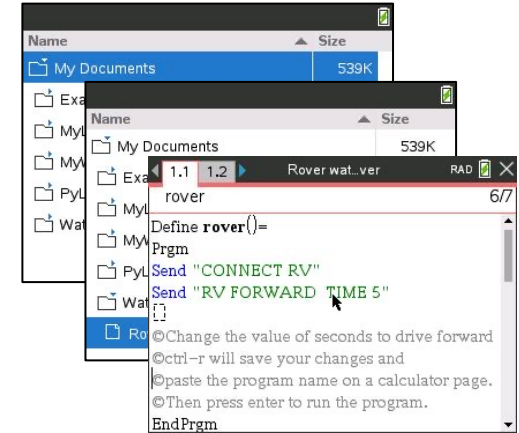Press the **[home/on]** key to display the home screen.

2

Use **arrow keys** and **[enter]** or Press **[2]** to select 2 Browse files.
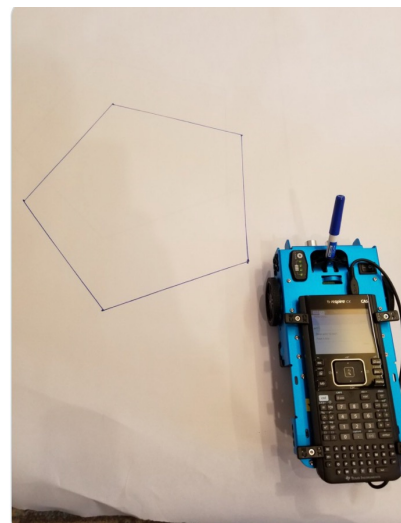
3

Use **arrow keys** and **[enter]** to select a folder and a file.

Note: Pressing the **[home/on]** key repeatedly toggles between the home screen and the current document.

TEXAS INSTRUMENTS

Drawing with the TI-Rover

Use Expo Fine or Extra Fine dry erase markers.
The markers drop into a slot on the front of the Rover.
Note: The Texas Instruments Workshop Loan Rover cases include markers.

Drawing surface: We recommend butcher paper held in place with painters tape on a hard surface.

TEXAS INSTRUMENTS

MAKE IT MOVE!

New Program:

Enter value for number of units to drive.

Right arrow to the end of the line and press **[enter]** to complete the command and move to the next line.
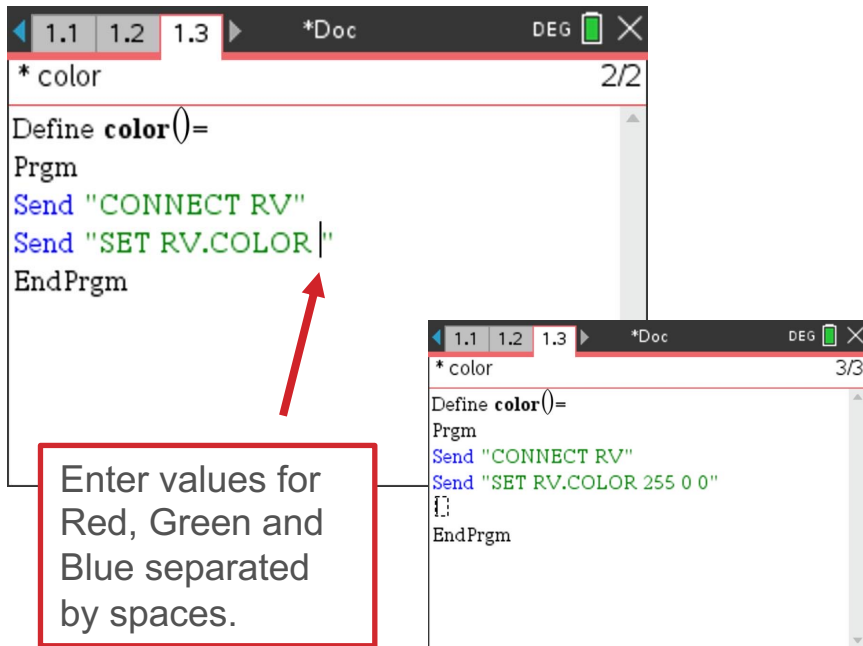
Press **[menu]** key to see TI-Basic Program Editor options.

Press **[ctrl] [R]** to paste the program name ready to run in a Calculator app on the next page. Press **[enter]** in the Calculator app to run the program.

Use **[ctrl] left** to move from the Calculator page back to the editor page.

Task: Discover how far Rover drives per unit.

Use differing values (1-20) to determine what 1 Rover unit is.

Find "CONNECT RV" on the 8:Hub>7:Rover menu.

Find FORWARD on the 8:Hub>7:Rover>1:Drive RV menu.
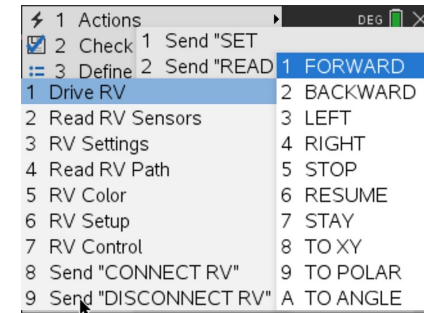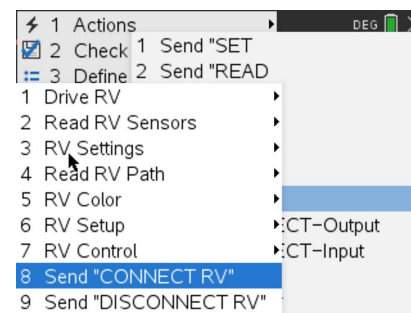
TEXAS INSTRUMENTS

Set the color

Enter values for Red, Green and Blue separated by spaces.

Press **[menu]** key to see TI-Basic Program Editor options.

Press **[ctrl] [R]** to paste the program name ready to run in a Calculator app on the next page. Press **[enter]** in the Calculator app to run the program.

Use **[ctrl] left** to move from the Calculator page back to the editor page.

Task: Set the color output of the RGB LED.

Each color takes a value (0-255).

Challenge Task: Try to make Yellow

Find RV.COLOR on the 8:Hub>7:Rover>5:RV.Color menu.

Separate the values for Red, Green and Blue with spaces.
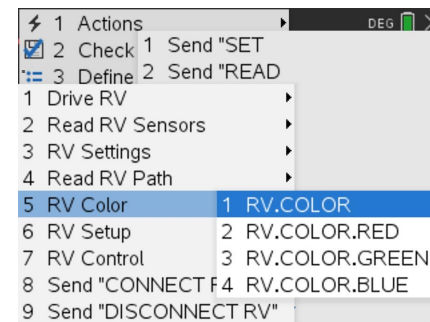
TEXAS INSTRUMENTS

Explore angles

```
Define drive()=
Prgm
Send "CONNECT RV"
Send "RV FORWARD "
Send "RV LEFT "
Send "RV FORWARD "
Send "RV LEFT "
Send "RV FORWARD "
Send "RV LEFT "
Send "RV FORWARD "
Send "RV LEFT "
EndPrgm
```

Task: Drive a square.

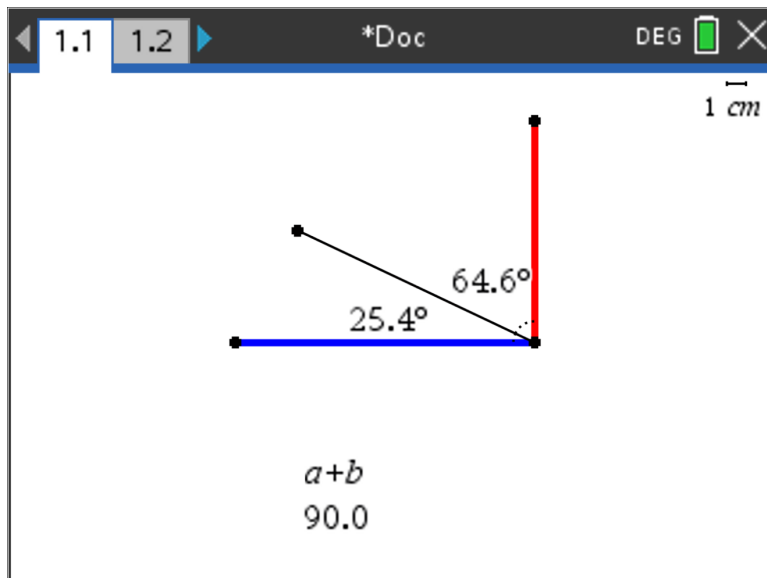**Challenge Task:** Try to drive an equilateral triangle.

The program above is a framework for driving a square.
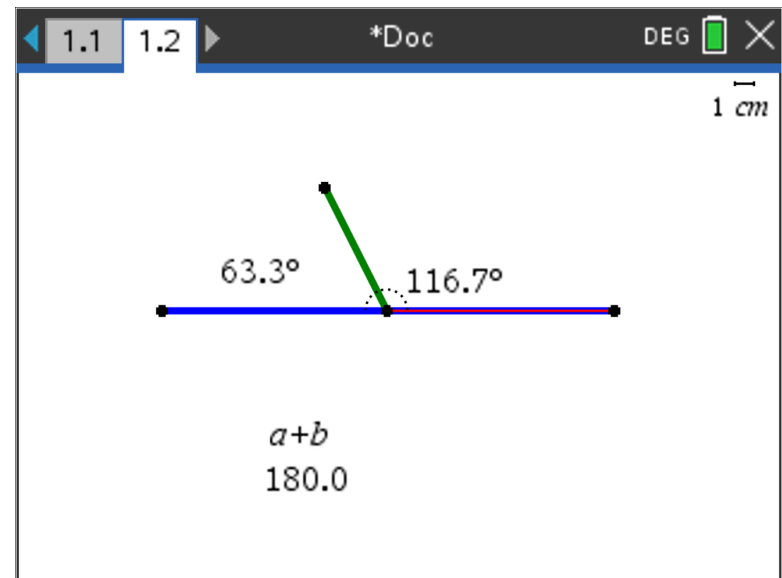
Enter values for distance and turn angle.

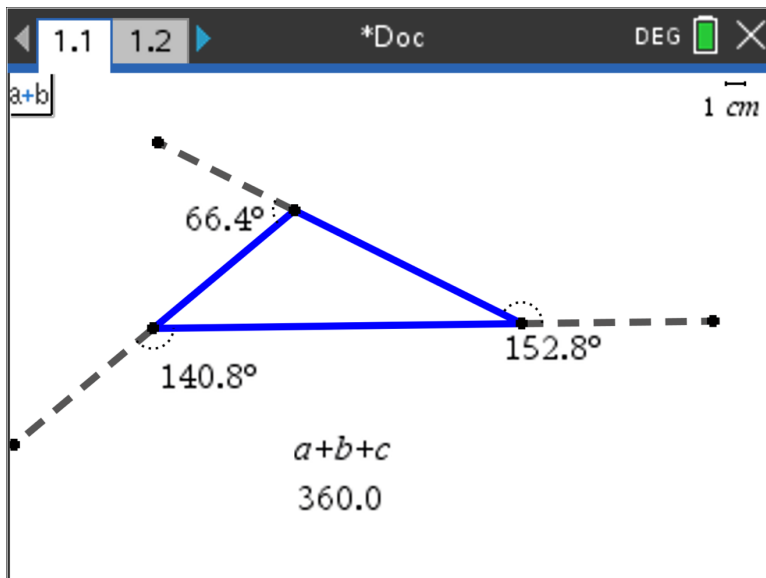TEXAS INSTRUMENTS

Quick Math Reminders

» Complementary Angles:

   » Sum to 90 degrees

» Supplementary Angles:

   » Sum to 180 degrees
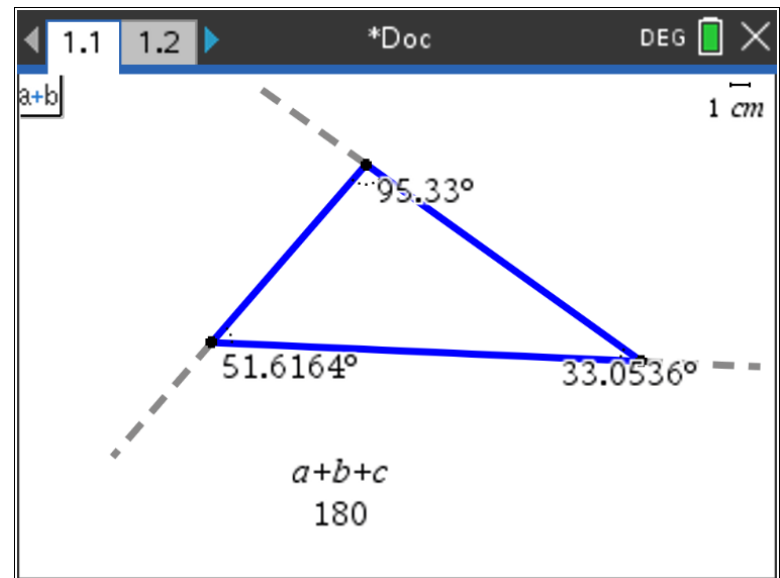

TEXAS INSTRUMENTS
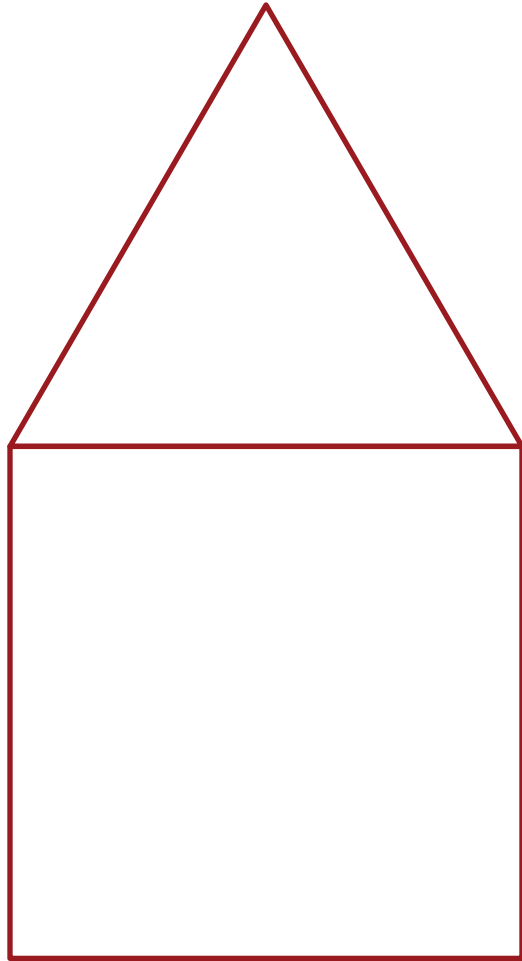
Quick Math Reminders

» Exterior angles:

» Interior Angles:
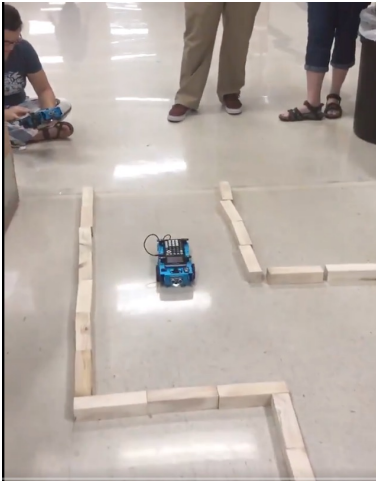
Logic Challenge

Task: Drive the figure shown without crossing any lines or going back over a line and without picking up the pen.
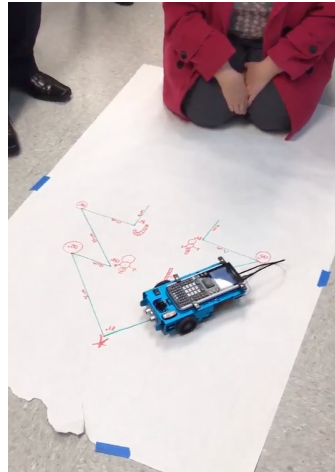
When you are ready put the pen in and trace your path
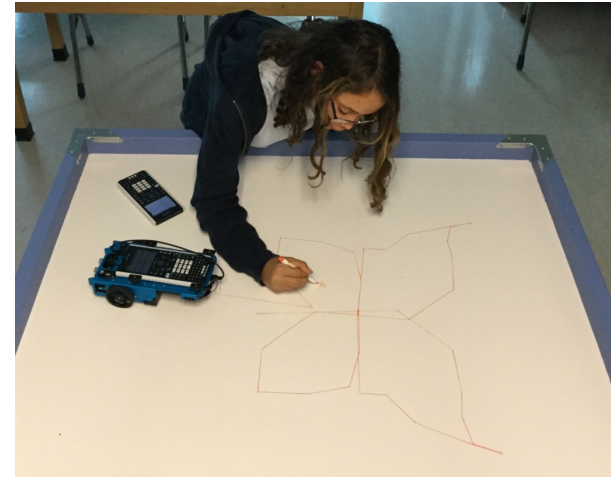

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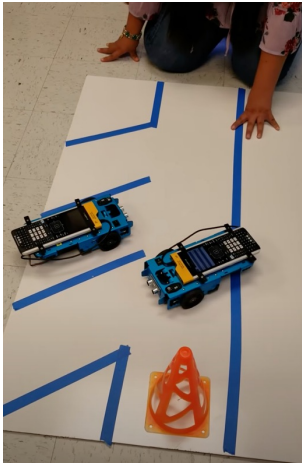# Where can you go next with TI-Rover?

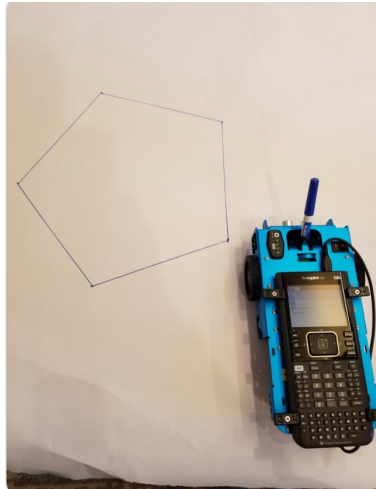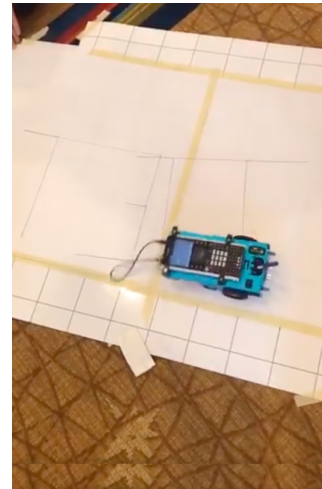Drive an obstacle course

Drive a design

Draw artwork

Park your Rover

Use a For loop
to draw polygons

Write your name

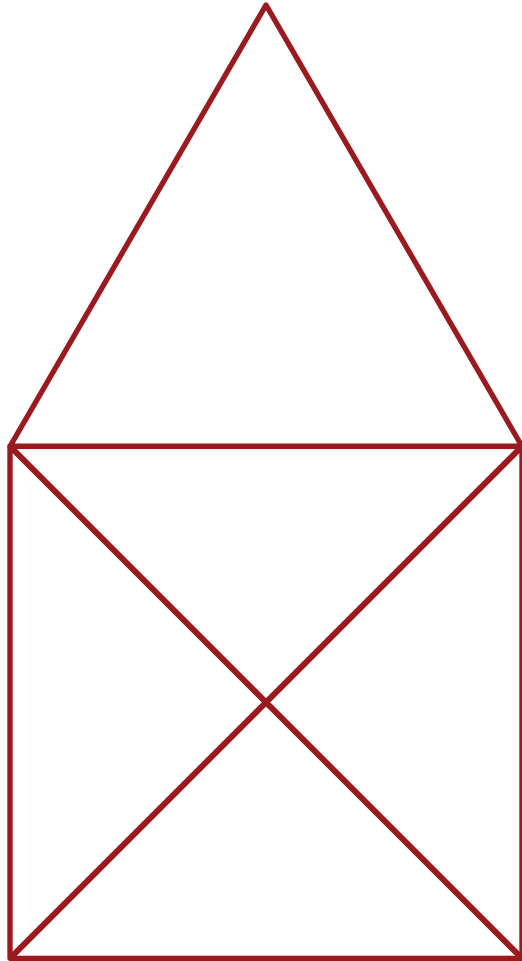Navigate a map

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Quick Math Reminders

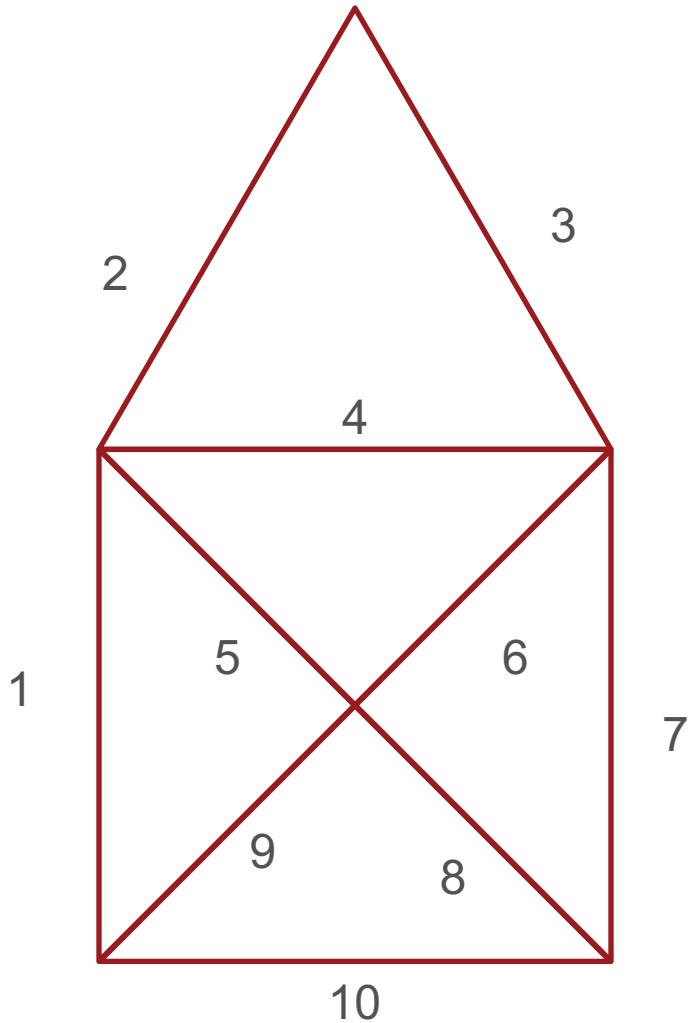» Pythagorean Theorem

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Logic Challenge 2

Task: Drive the figure shown without crossing any lines or going back over a line and without picking up the pen.

When you are ready put the pen in and trace your path

Logic Challenge 2

Thank you!

See www.TIstemProjects.com for more TI STEM and coding activities and projects.