

Meet the TI-Rover with Geometry Challenges

TI-Nspire CX Family
TI-Basic

Texas Instruments
@ticalculators

Meet the TI-Innovator™ Rover



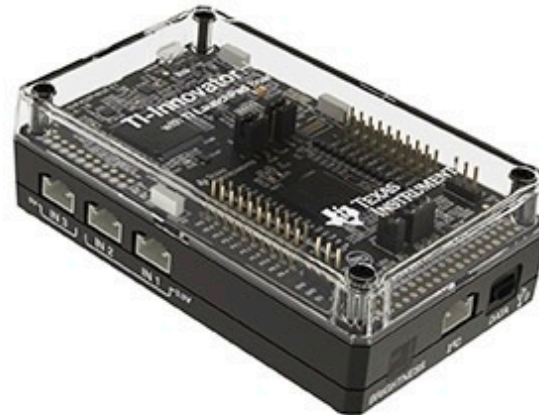
TI Graphing Calculator



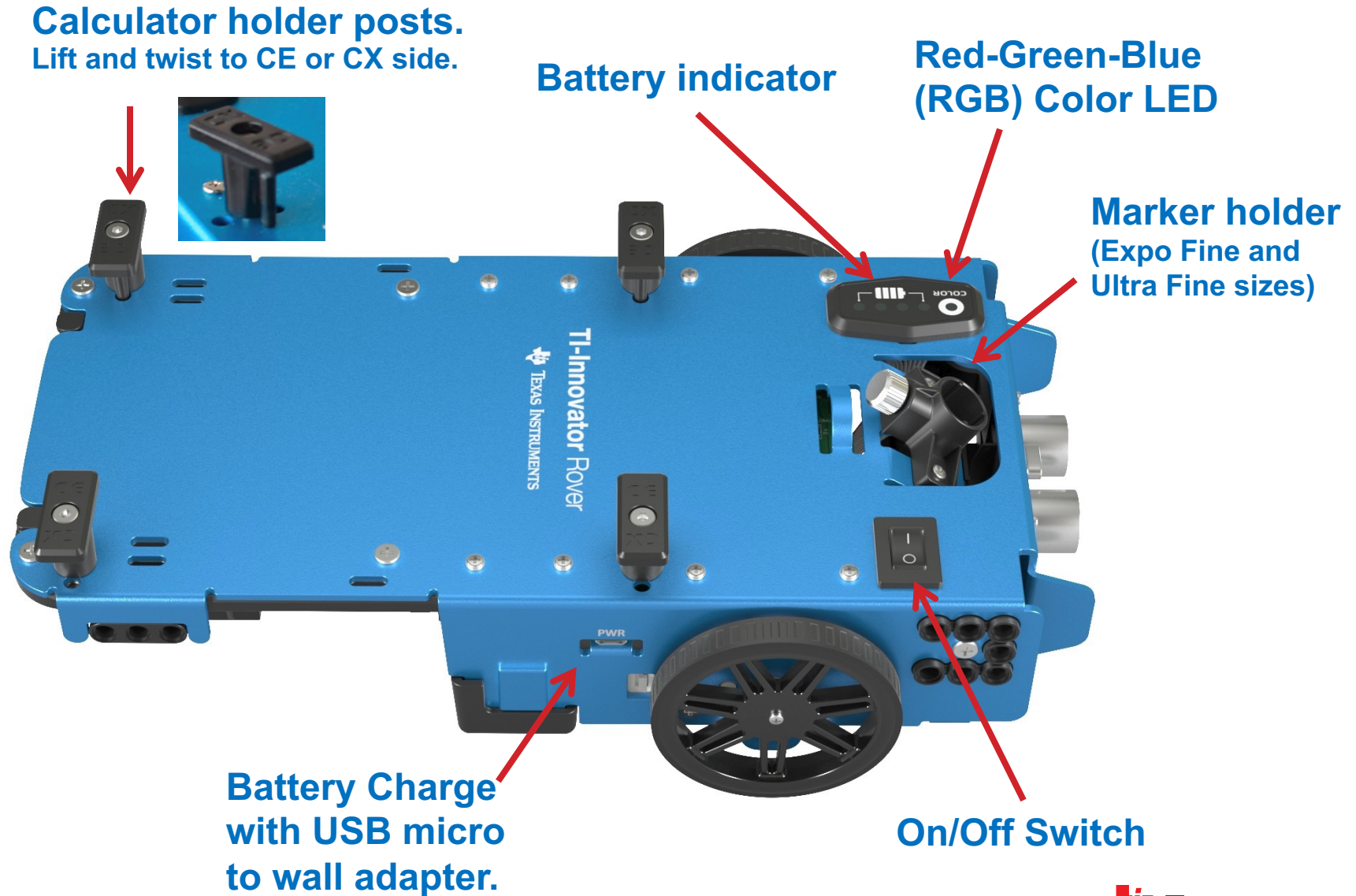
TI-Innovator™ Rover



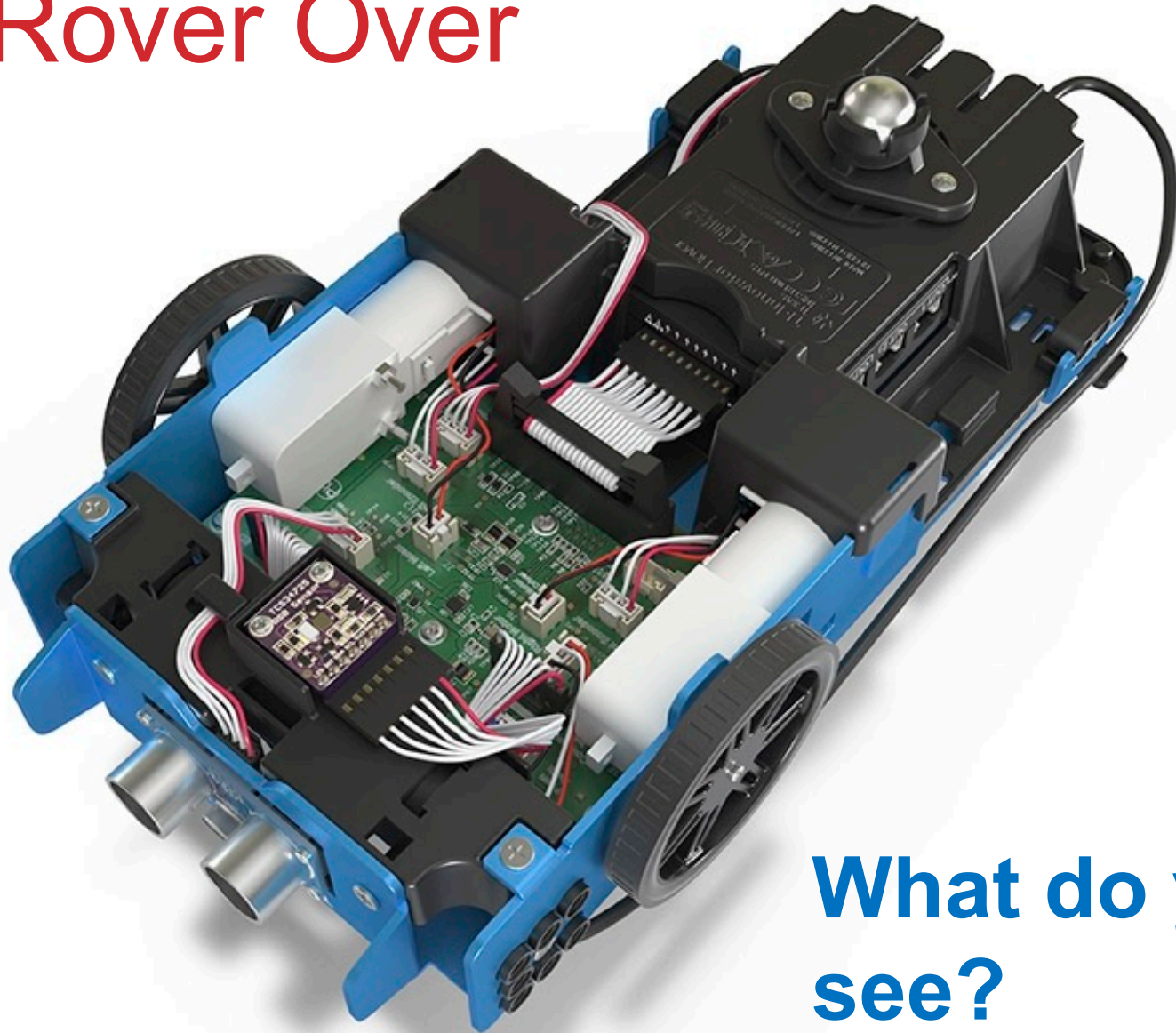
TI-Innovator™ Hub



Rover from the top



Turn Rover Over



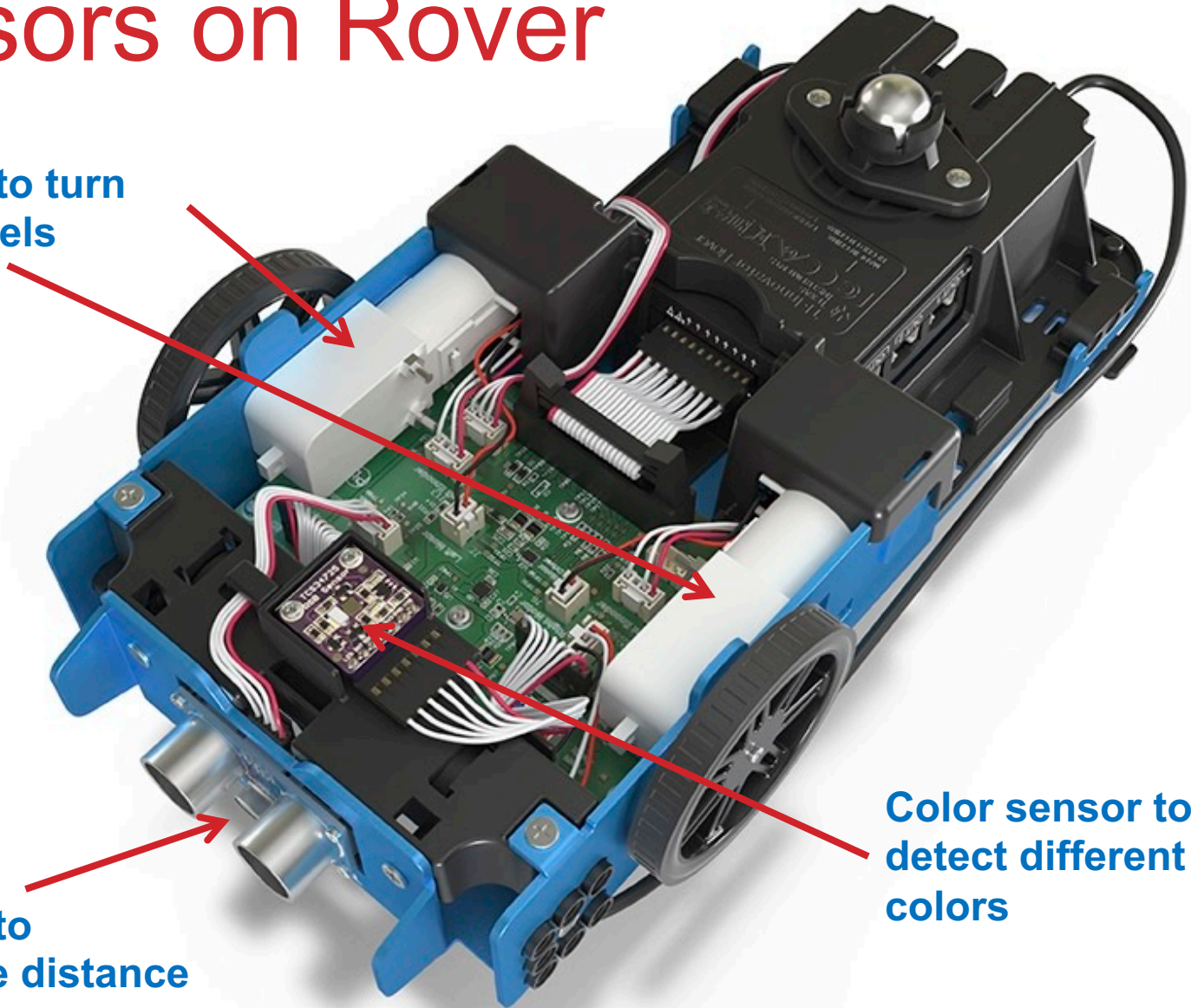
**What do you
see?**

Sensors on Rover

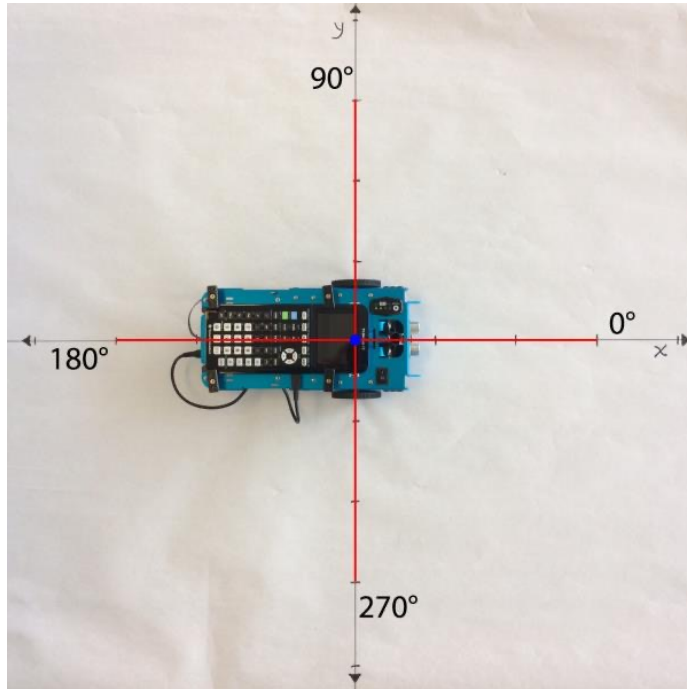
Motors to turn
the wheels

Ranger to
measure distance

Color sensor to
detect different
colors



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



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

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



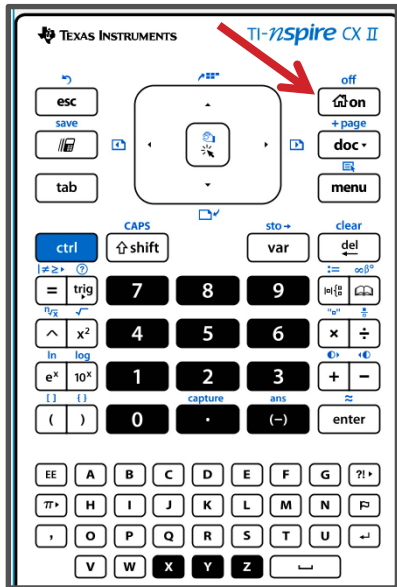
Unit-to-unit cable

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



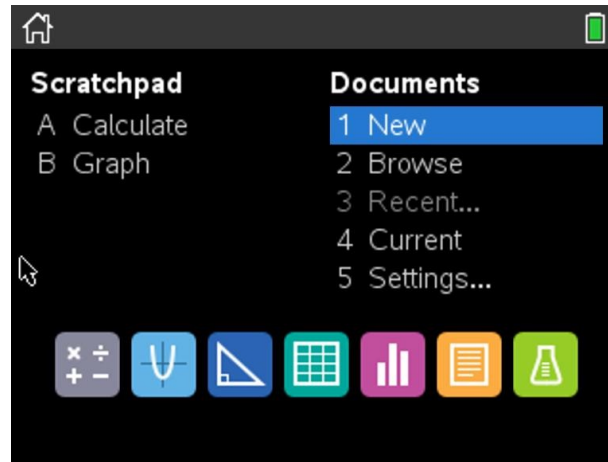
Creating a new TI-Nspire document

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.

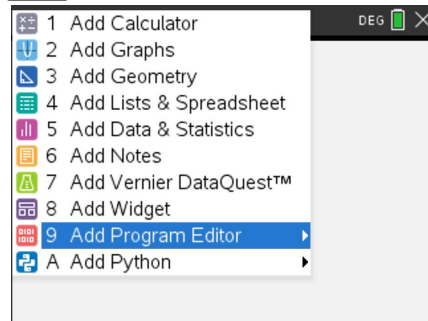
Creating a Rover Program

1



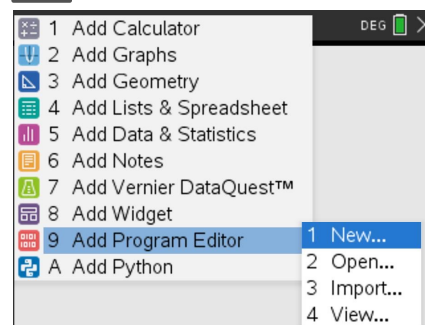
Press **[menu]** to bring up a menu of applications to add to the page.

2



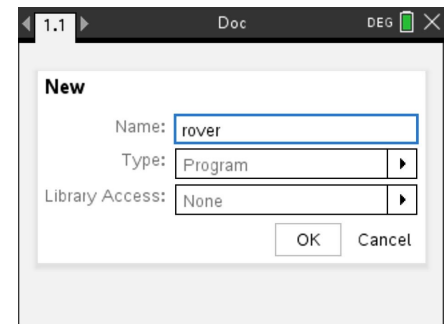
Press **down arrow** repeatedly then press **[enter]** or press **[9]** to select Add Program Editor.

3



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

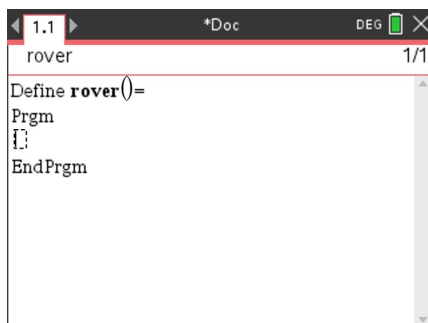
4



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

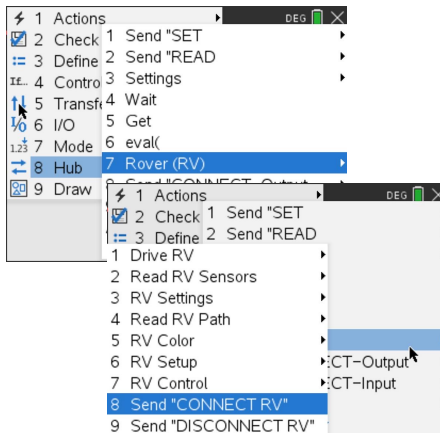
Note: You can also add a new page to the document by pressing **[ctrl] [doc] +page**.

5



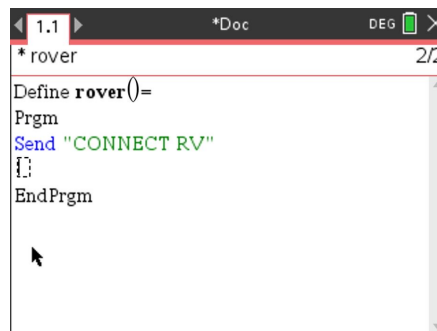
You begin on a blank program line.

6



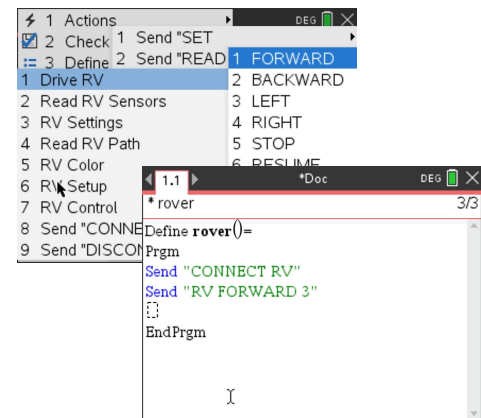
Press **[menu]** then **[8] Hub [7] Rover (RV) [8] Send "Connect RV"**

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.

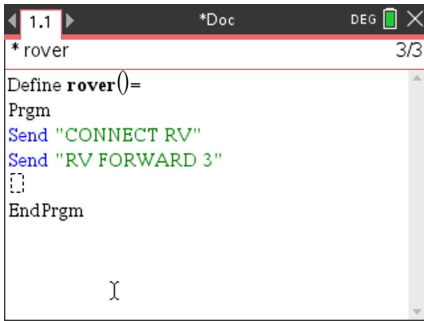
8



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.

Running a Rover Program

1



```
Define rover()=
Prgm
Send "CONNECT RV"
Send "RV FORWARD 3"
[]
EndPrgm
```

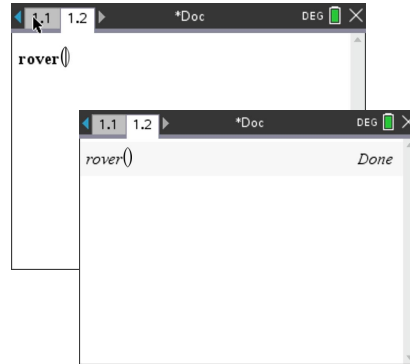
Press **[ctrl] [R]** to paste the program name ready to run in a Calculator app on the next page.

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

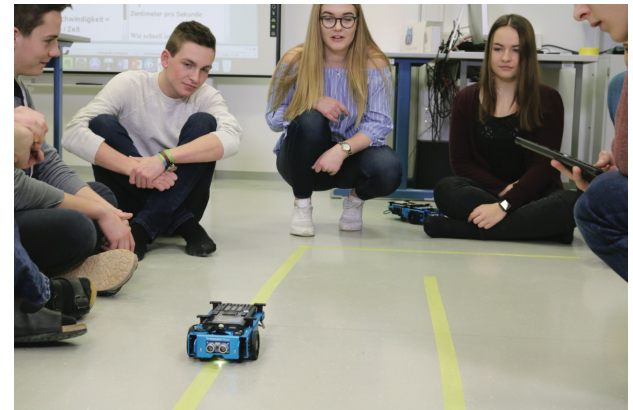
- Rover is connected to the calculator
- Rover is switched on
- Rover is on a flat surface ready to roll

2



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

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



Editing a Rover Program

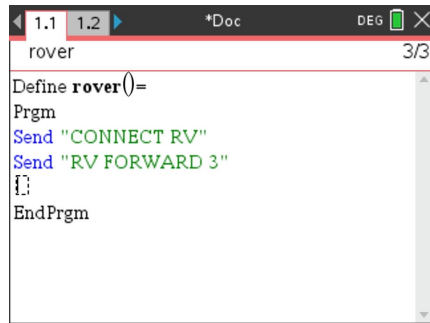
1



```
rover() Done
```

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

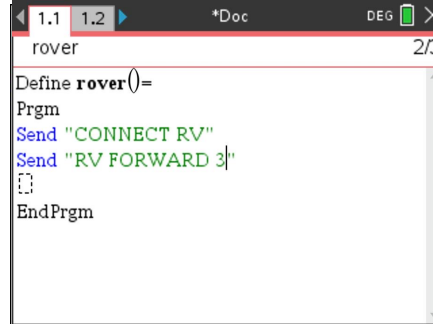
2



```
rover 3/3
Define rover()=
Prgm
Send "CONNECT RV"
Send "RV FORWARD 3"
[]
EndPrgm
```

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

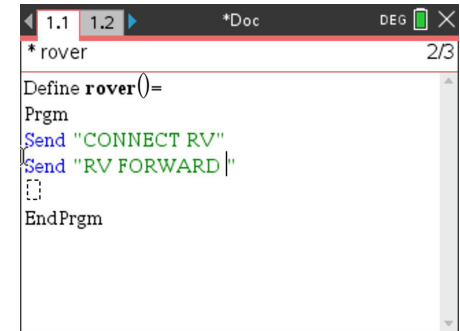
3



```
rover 2/3
Define rover()=
Prgm
Send "CONNECT RV"
Send "RV FORWARD 3"
[]
EndPrgm
```

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

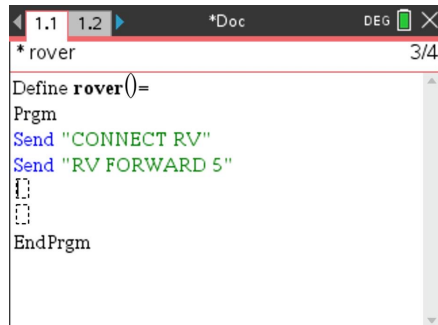
4



```
*rover 2/3
Define rover()=
Prgm
Send "CONNECT RV"
Send "RV FORWARD 3"
[]
EndPrgm
```

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

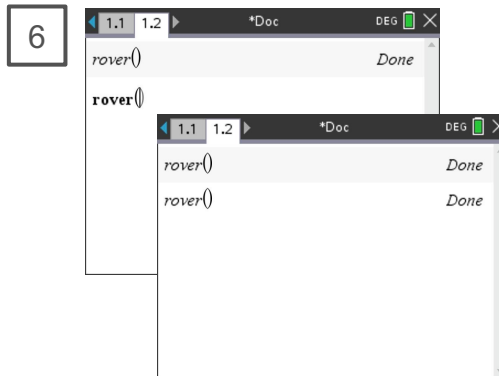
5



```
*rover 3/4
Define rover()=
Prgm
Send "CONNECT RV"
Send "RV FORWARD 5"
[]
EndPrgm
```

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

6

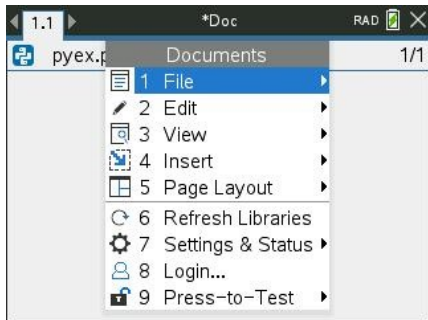


```
rover() Done
rover()
rover() Done
```

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

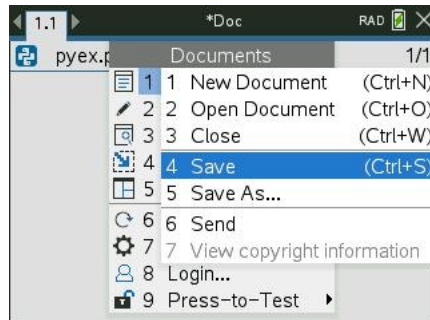
Saving a TI-Nspire document file

1



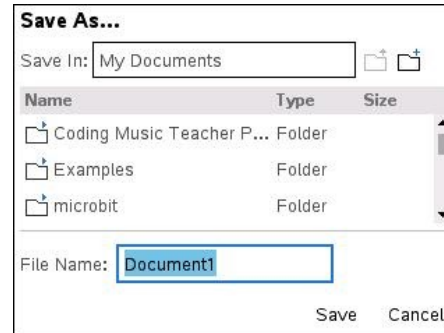
Press **[doc]** then select 1 File from the menu by pressing **[enter]** or **[1]**.

2



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

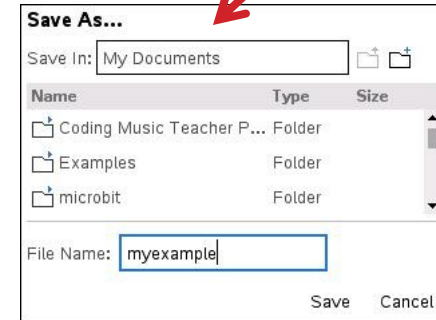
3



Type in your file name using alpha and numeric characters.

Note: The name must begin with an alpha character.

4



Folder where file will be saved.

Press **[enter]** to save the file to the folder indicated above.

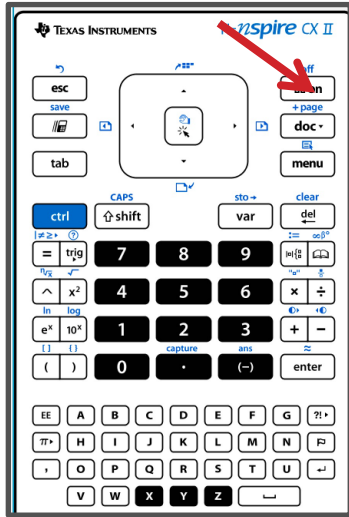
To change the folder press the **[UP]** arrow key and then use **arrows** and **[enter]** to select a folder before pressing **[enter]** to save the file.

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

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

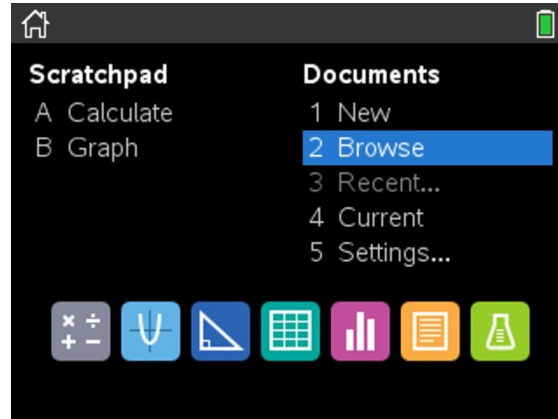
Opening an existing TI-Nspire document file

1



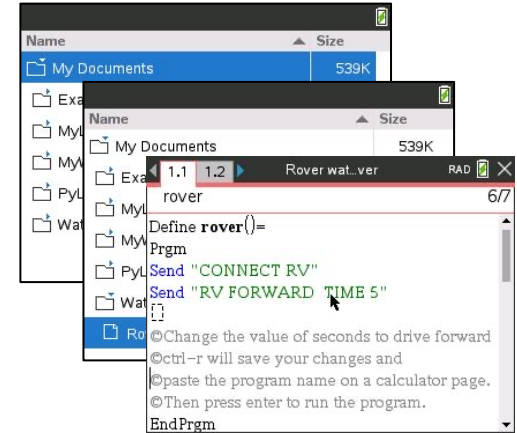
Press the **[home/on]** key to display the home screen.

2



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

3

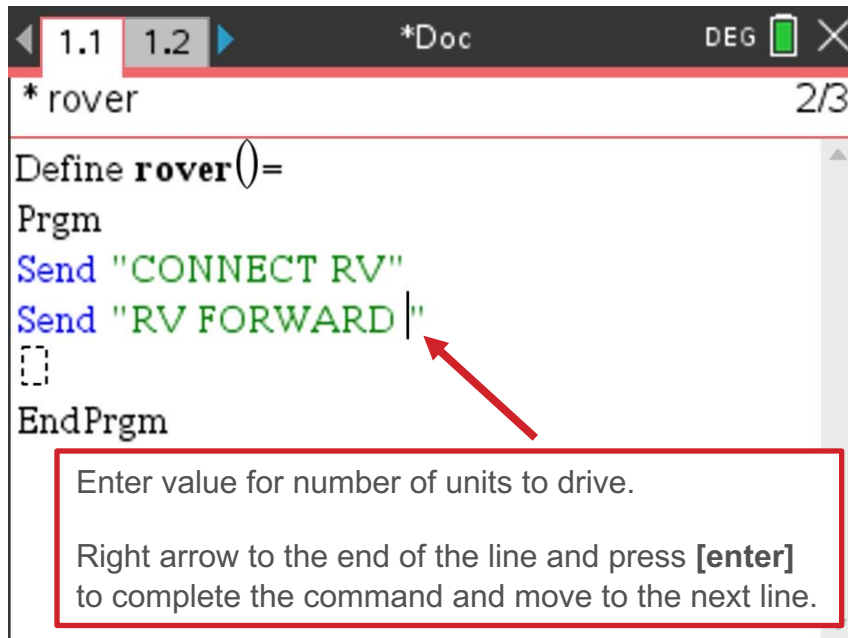


Use **arrow keys** and **[enter]** to select a folder and a file.

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

MAKE IT MOVE!

New Program:



```
* rover 2/3
Define rover()=
Prgm
Send "CONNECT RV"
Send "RV FORWARD |"
EndPrgm
```

Enter value for number of units to drive.

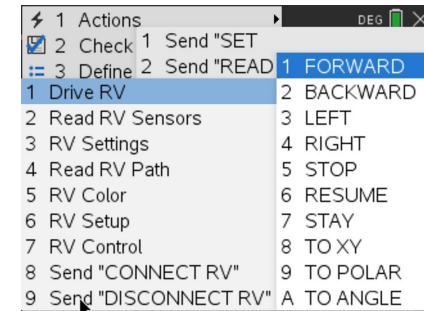
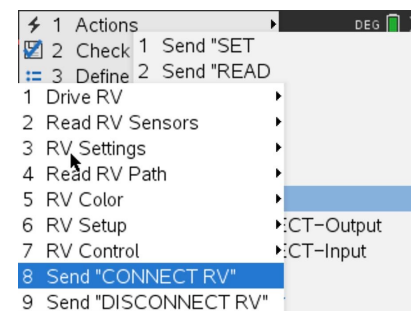
Right arrow to the end of the line and press **[enter]** to complete the command and move to the next line.

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.



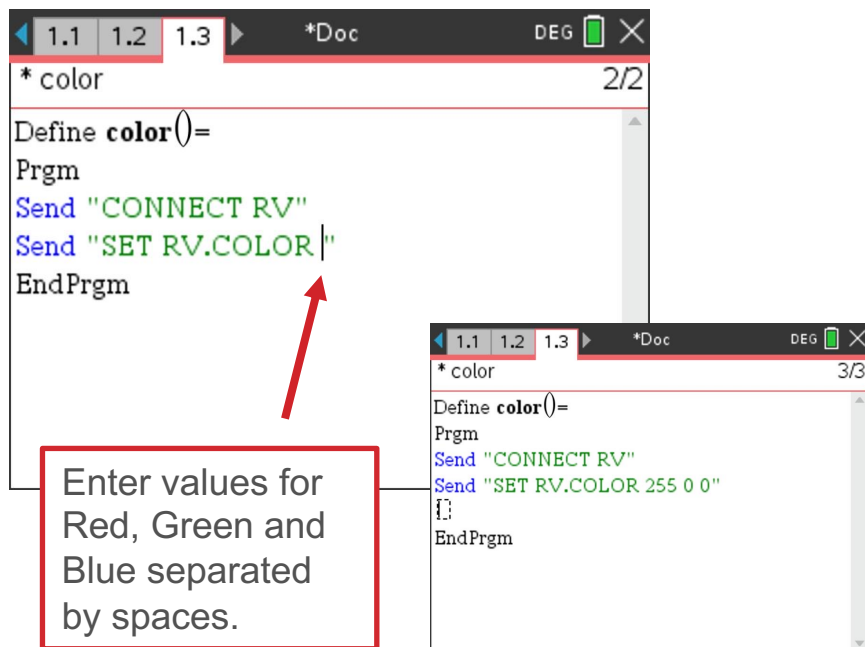
Press **[menu]** key to see TI-Basic Program Editor options.

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.

Set the color

New Program:



```
* color 2/2
Define color()=
Prgm
Send "CONNECT RV"
Send "SET RV.COLOR |"
EndPrgm
```

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

```
* color 3/3
Define color()=
Prgm
Send "CONNECT RV"
Send "SET RV.COLOR 255 0 0"
EndPrgm
```

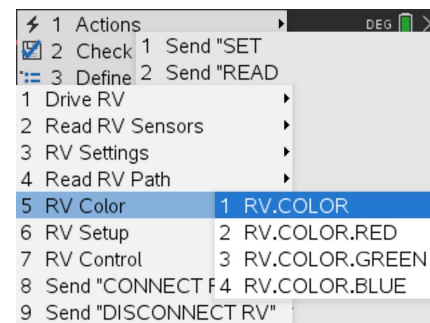
Task: Set the color output of the RGB LED.

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.



Explore angles

New Program:

```
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.

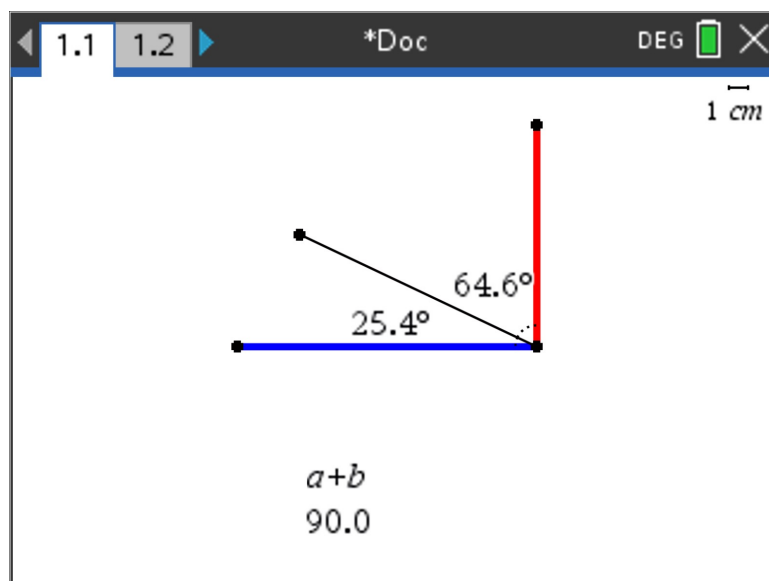
The program above is a framework for driving a square.

Enter values for distance and turn angle.

Quick Math Reminders

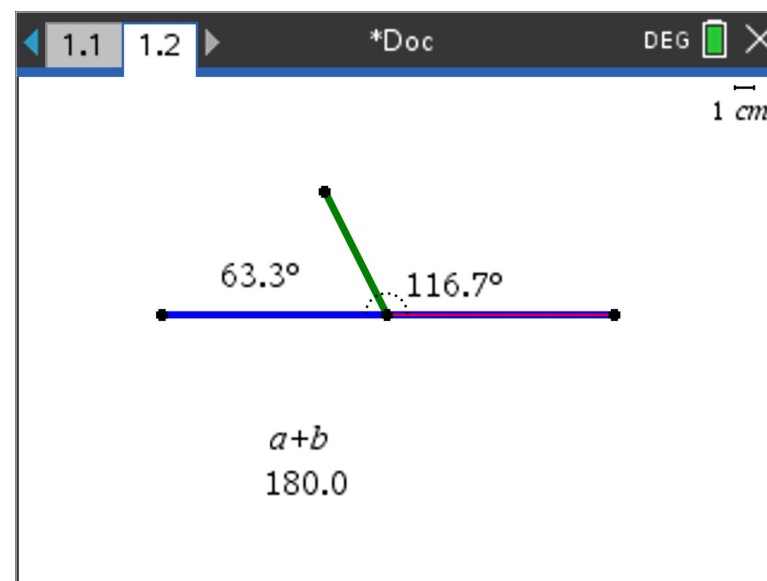
» Complementary Angles:

» Sum to 90 degrees



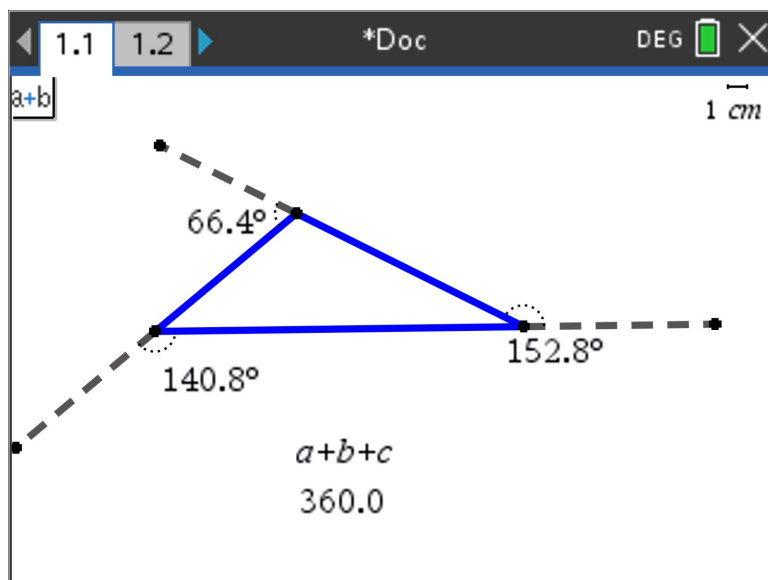
» Supplementary Angles:

» Sum to 180 degrees

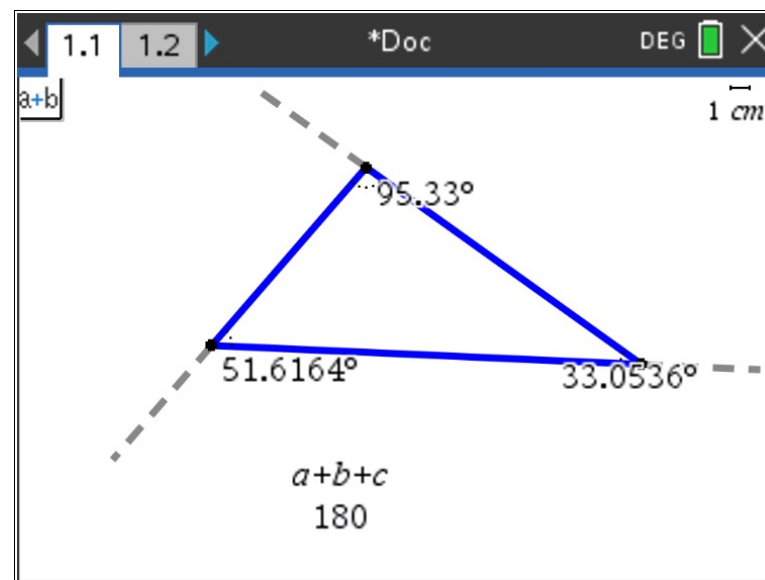


Quick Math Reminders

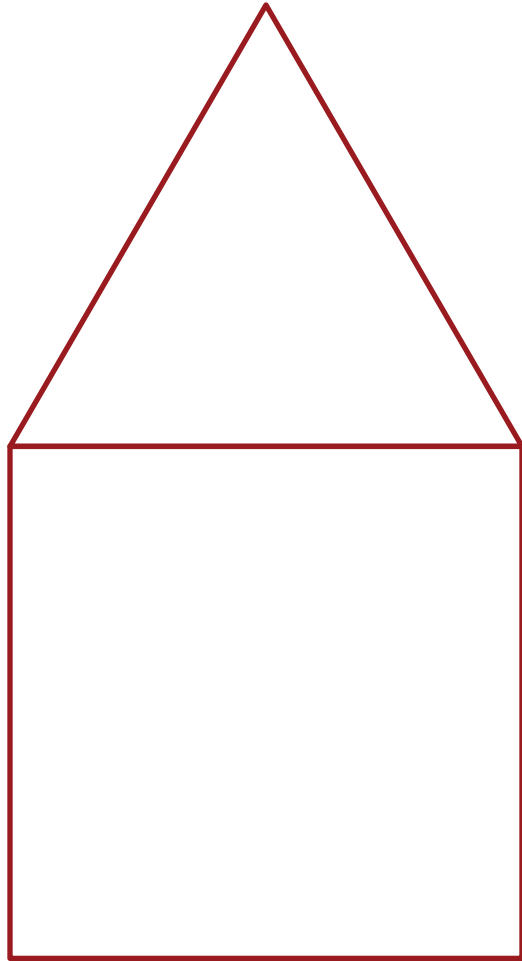
» Exterior angles:



» 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.

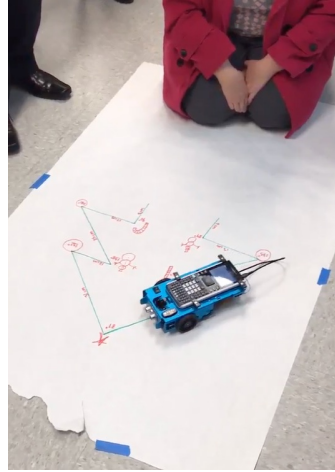
When you are ready put the pen in and trace your path



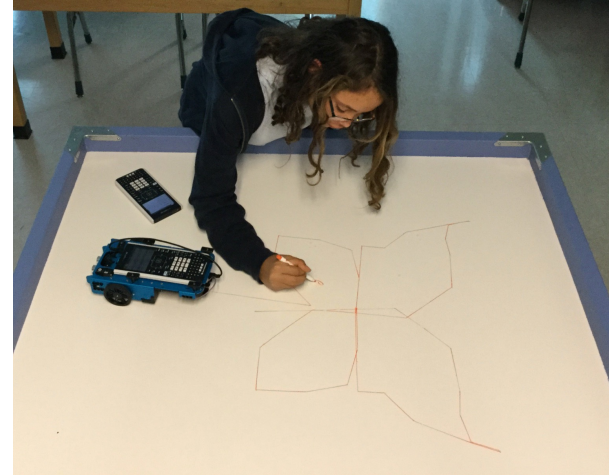
Where can you go next with TI-Rover?



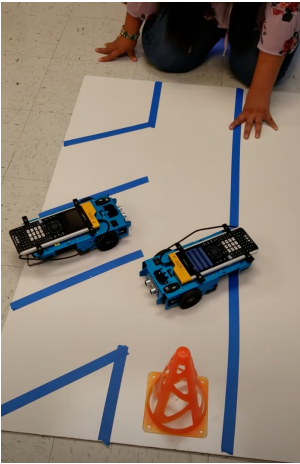
Drive an obstacle course



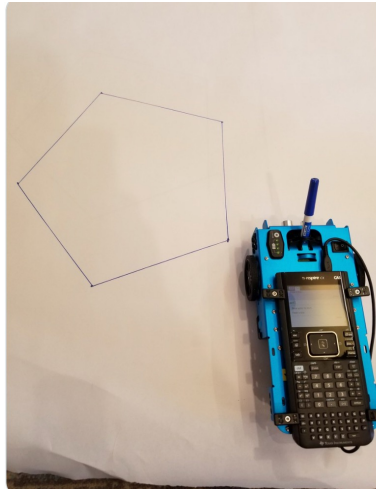
Drive a design



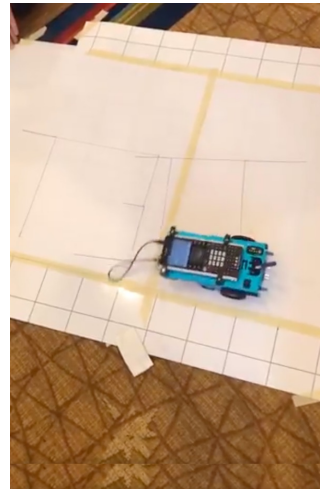
Draw artwork



Park your Rover



Use a For loop
to draw polygons



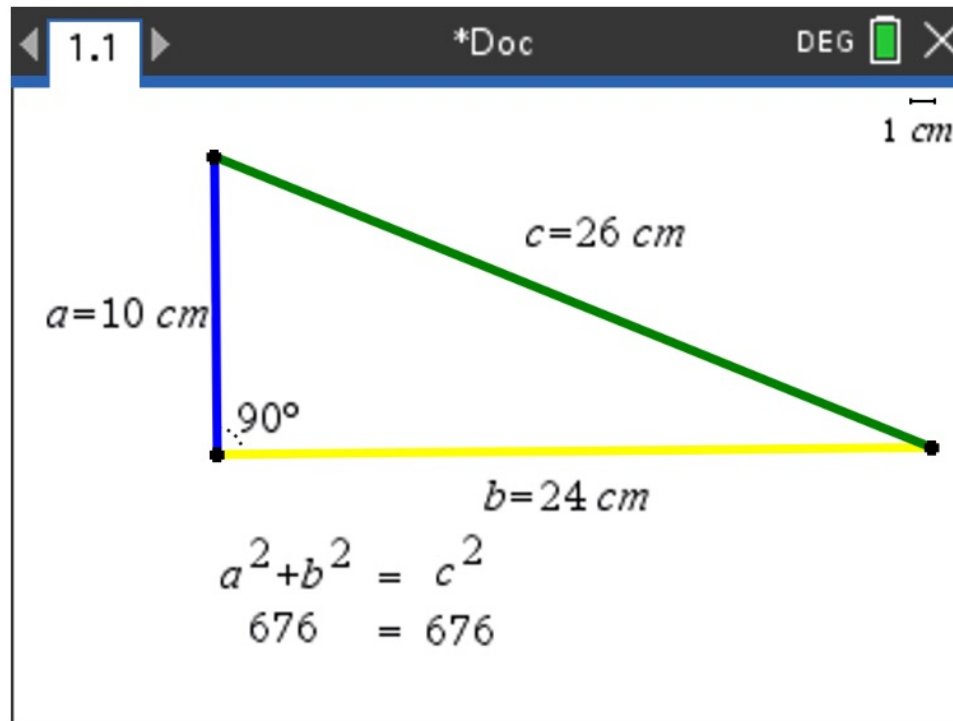
Write your name



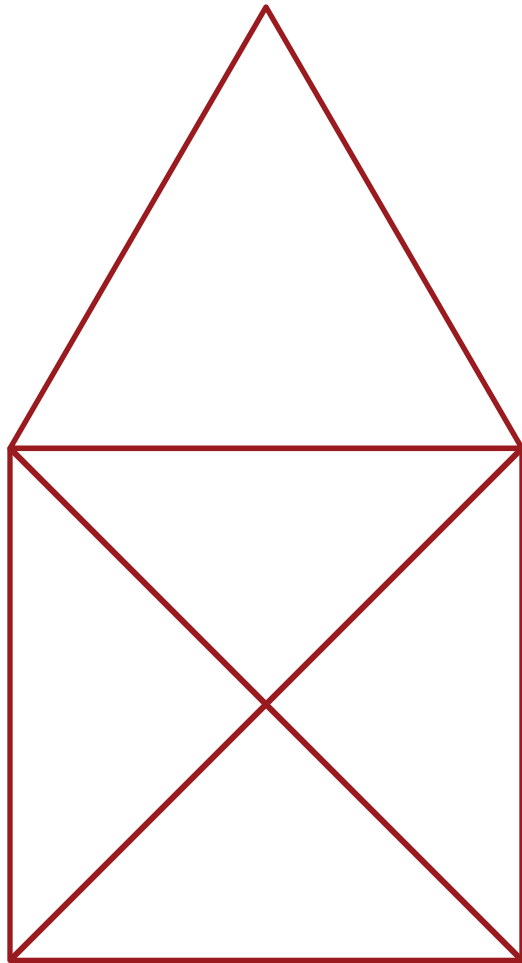
Navigate a map

Quick Math Reminders

» Pythagorean Theorem



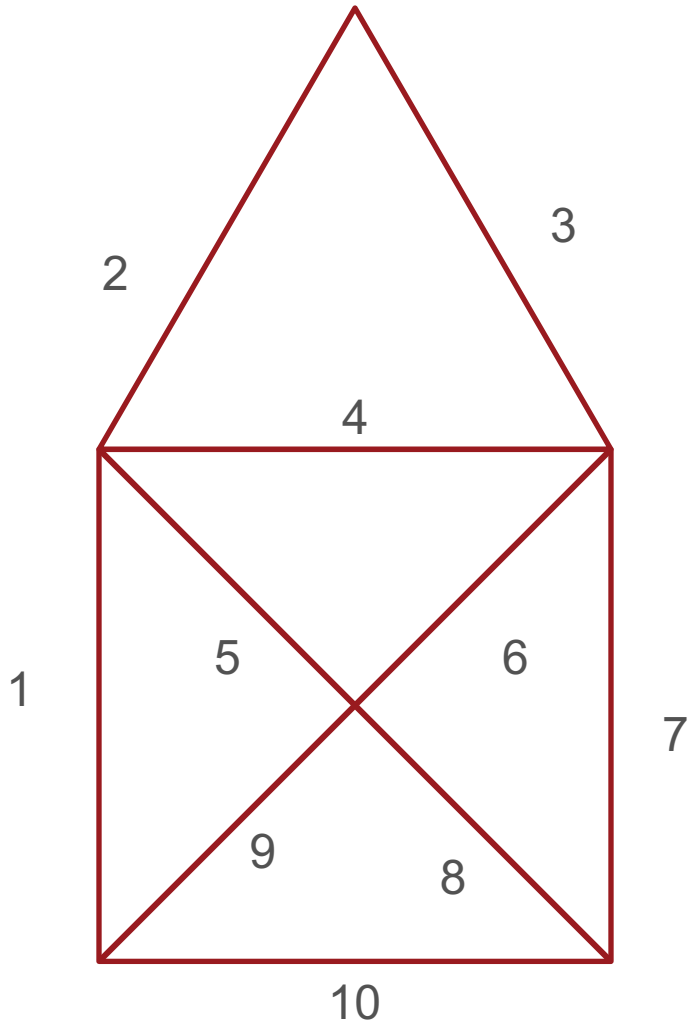
Logic Challenge 2



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.