

3.7

Exploring Functions: Quest & Plan

(Use->Modify->Create)

Students will be able to:

1. Create and use a function multiple times in a program.
2. Modify, delete, and add coding blocks in an existing project.
3. Plan a new project using if, then, else conditions with operators and functions.
4. Complete a debugging challenge related to if, then, else conditions and functions.

Learning Activity Summary

1. Review Functions (5 minutes)
2. Quest: (20 minutes)
-  Optional Turn & Talk: (5 minutes)
3. Plan (20 mins)

Student Materials

- Student Workbook
- Computer with Internet

Teacher Preparation

- [A3:U3.7 Teacher Slide Deck](#) Projected
- [TIPP&SEE: Draw a shape](#) Scratch project (Quest)
- [My Ball Bar Chart](#) Scratch project (Plan)
- Video: Create Functions Learning video
- Create studio called Ball Bar Chart

3.7 Lesson Presentation

ENGAGE EXPLORE

(Use->Modify->Create)

REVIEW: Functions

UNIT 3.7
Functions Review

What is a function?
a sequence of steps that can be used multiple times in a program

Why do computer programmers use functions?
it makes code: more efficient, run faster, use less energy, better organized, can be use multiple times

How do you decide on a name for a function?
use one or two words that describe what the function does

What do you click on in Scratch to create a function?
My Blocks, then Make a block



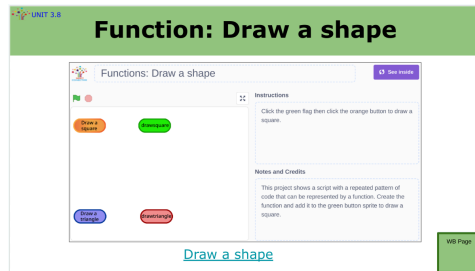
What is a function? [*a sequence of steps that can be used multiple times in a program*]

Why do computer programmers use functions? [*it makes the code more efficient, runs faster, uses less energy, better organized, can use multiple times*]

How do you decide on a name for a function? [*one or two words that describe what the function does*]

What do you click on in Scratch to create a function? [*My Blocks, then Make a block*]

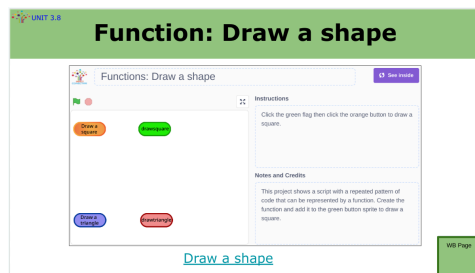
QUEST



Now it is time to work on the “Quest”, where you get to modify the Scratch project you used in the TIPP&SEE and Explore.

You will be using the **same** projects that you used for the Explore task, so **you do NOT** need to RoaR & hiSS again. You will login to your Scratch account and open the project that you remixed in the last class (it should be called Draw a shape).

First you are going to create a function to draw one side of a triangle, then you will use your function to draw a triangle! If you finish early, use your functions to create a unique drawing!

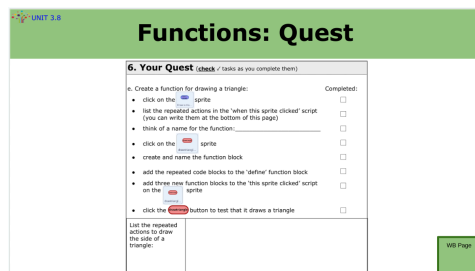


Let’s see how the program draws a triangle. [*Display the [Draw a shape](#) project and run the program: click the green flag and then click the blue Draw a triangle button*]

In your Quest, you will create a new function on the red “drawtriangle” sprite to draw one side of a triangle. Then you will use this function to draw a triangle! You will follow the same steps you followed for creating the function to draw one side of a square. This will be a different function from the function you created for the square.

Let’s look at the scripts for the Draw a triangle button [*click See inside, then click on the blue Draw a triangle sprite in the sprites pane*]

There are fewer blocks in the ‘when this sprite clicked’ script compared to the square. Why do you think there are fewer blocks? [*triangles only have 3 sides and squares have 4 sides so there is less code to draw 3 sides rather than 4 sides*]



You will follow the same process as you did to create the function for the square:

- examine the code on the Draw a triangle sprite and list the repeated steps (you can write the repeated steps in the space below the instructions in your workbook)
- think of a name for the function for drawing a side of the triangle
- click on the red drawtriangle sprite in the sprites pane
- click on My Blocks and create the function block

- add the repeated code blocks to the define function block to define the function
- add function blocks to the 'when this sprite clicked' script to draw a triangle
- click the red drawtriangle button to test!
- you can review this video: if you don't remember how to create a function

UNIT 3.8 Functions: Quest

7. If You Finish Early:

- ★ Add a **when this sprite clicked** block in between each of the function blocks in the 'when this sprite clicked' script and click **test**
- ★ Add a **drawtriangle** block after each **when this sprite clicked** block and change 10 to 30 then click **test**

WB Page



If you finish this early, you can follow the instructions in the "If you finish early" section to create a fun design using the triangle function!

[Remember, the Quest is designed to be challenging. Encourage the students' productive struggle!]

TURN & TALK

UNIT 3.8 TURN AND TALK

Have students discuss any challenges that they had with creating and using functions in the Quest.

Have students volunteer to display their fun designs if they were able to complete the "If you finish early" tasks.

Once students have completed the Quest, have them discuss any challenges that they had with creating and using functions in the Quest.

Have students volunteer to display their fun designs if they were able to complete the "If you finish early" tasks.

PLAN

UNIT 3.8 Plan: My Ball Bar Chart



[My Ball Bar Chart](#)

WB Page



Time to plan for your Create project! In the Create project you will be working on a graph project that is partially completed. You will be responsible for completing the rest of the graph by adding code, functions, and if, then, else conditions.

UNIT 3.8 Plan: My Ball Bar Chart

Let's collect data for our Bar Chart

This graph can accept 3 categories of data.

1. Choose the data to collect: for example, shirt color, favorite class, favorite ice cream flavor, or another data topic of your choice
2. Identify the 3 categories for the data: for example, 3 shirt colors, 3 classes, 3 ice cream flavors
3. Record and count the data:

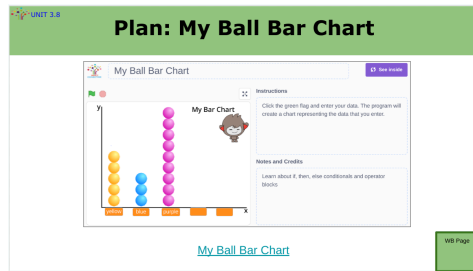
Category	Count

4. Enter the data into the program on the next slide

WB Page

The program you will be working with creates a bar chart based on data that you enter. So first let's collect some data. *[the bar chart will accept up to 3 categories of data; suggested data: list and count 3 colors of shirts the students are wearing, list and count 3 favorite classes at school; list and count 3 favorite ice cream flavors, the chart can display up to a count of 10 in each category. Each student votes*

once in a category - so vote for their one favorite class or ice cream flavor]

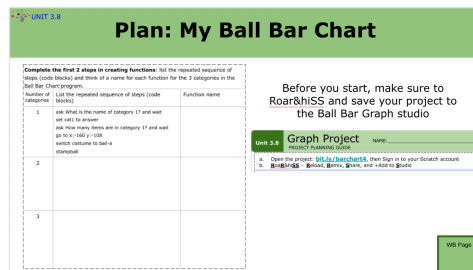


Now that we have the data, we can run the program [My Ball Bar Chart](#) and enter our data. [click the green flag and answer the questions, enter 3 for the number of categories, as you enter the data for the first 3 categories, the category name and stacked balls will appear; categories 4 and 5 will not appear as these are the parts that the students will be coding]

The program graphed our 3 sets of data. Each ball represents one person in our category count.

Let's look at the code to see where to start. [click See inside] You will only be changing the code on the Ball sprite. The Ball sprite has if, then, else conditions, variables, operators, one function, and a lot of repeated code [scroll up and down slowly so the students can examine the code]

Optional: If students ask about the Nano sprite and you want to review the code: click on the Nano sprite to review the code. The Nano sprite's only job is to ask the question of how many categories, and then make sure that the number of categories entered is greater than or equal to 1 or less than or equal to 5. Once the Nano sprite confirms the number of categories, it passes the number categories to the Ball sprite using a broadcast block.



Today you will be working on the Plan, but before you start the planning process, you will need to RoaR & hiSS to make sure that you create your own copy of the Scratch program so your changes will be saved.

Open your workbooks to the Graph Project Planning Guide on page XX. At the top of the page it reminds you to do the RoaR & hiSS (reload, remix, share, add to studio). Please add your projects to the Ball Bar Graph studio I have created.

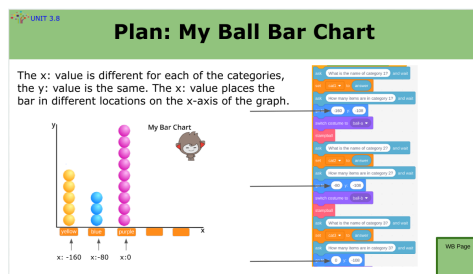
[click to display on the slide] You will be looking at the conditions on the Ball sprite for the first 3 categories: number of categories = 1, number of categories = 2, and number of categories = 3. You will list the repeated code blocks that you identify for categories 2 and 3, (category 1 is given to you in your workbook), you will think of names for

these 3 functions. If you have time, you will create the functions in the Scratch Ball Bar Graph program.

Let's read through the steps for the first category [*have a student volunteer to read through and then have the student explain what each of the steps do*]

What would be a good function name for this sequence of steps? [*category1, firstbar*]

You will fill in the sequence of steps for the 2nd and 3rd category, like it is done for the first category, then think of a function name for these categories (the names should be different). Be aware, similar to the Dancing Sprite program that we looked at, each condition includes the sequence of steps for the previous category, so be careful only to list the steps for the specific category.



Be very careful when looking at the code blocks. Each category number has a different **x value** in the 'go to x: y:' code block. The x value identifies the location of the bar on the x-axis.

If you finish early, you can create the functions for the 3 categories in your remixed Scratch program. Just create the function blocks, do not add the sequence of steps to the define block. You will have time to do this in the next class if you do not do it today.