Lesson 4.3: Build a Neighborhood

Objectives

In this lesson, students will:

- Learn to create composite objects using building blocks that they created using procedures (blocks)
- Programmatically practice using the x/y coordinate plane to place objects in exact locations

Agenda

1. Blocks with parameters	10 mins
2. Student Activity: Create a Procedure with Parameters	10 mins
3. Student Activity: Build a Neighborhood	25 mins
4. Wrap Up and Reflections	5 mins

Preparation

- ❑ Projector and speakers for video
- ❑ Print student activity worksheet (one per student or student pair)

Resources & Links

- ❑ Building a neighborhood - demo project (solution): https://scratch.mit.edu/projects/288845721

1. Blocks with Parameters

Engage students in an interactive demonstration and discussion:

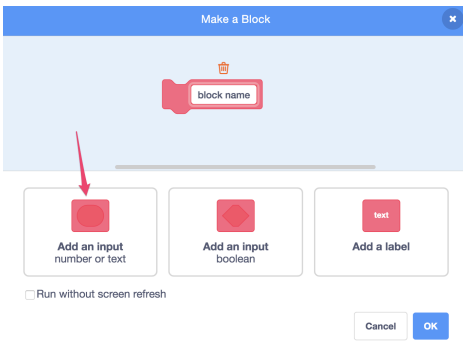
When you created your building blocks, did you create a block for a square and a rectangle? Did you create more than one rectangle of different sizes? If we need rectangles of different sizes, we would need to create a bunch of rectangles. Does that seem efficient? Everytime we want a different size, we would have to create a new block. That's a lot of blocks!

What about a square? If you draw a rectangle where all sides have the same length, what do you get? (a square)

What if we could just have one block that can draw a rectangle or square of any size? That would be so much better. Does anyone know how to do that?
Answer: The answer we are after is one block with 2 input parameters, one for each side.

We can draw a rectangle of any size inside our block if we can tell the block what length and height to use. We do that by adding inputs to our block. Inputs to our blocks are called Input Parameters.

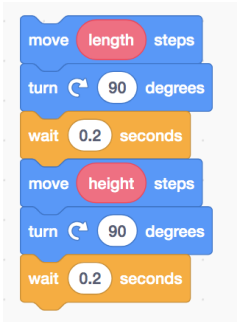
Demo creating a new block pointing out the input option.



Add 2 input parameters, after you give the block a name. Click on the Add an input (number), give the input the name ***length*** and repeat for ***height***.

We have a new block with 2 inputs parameters:

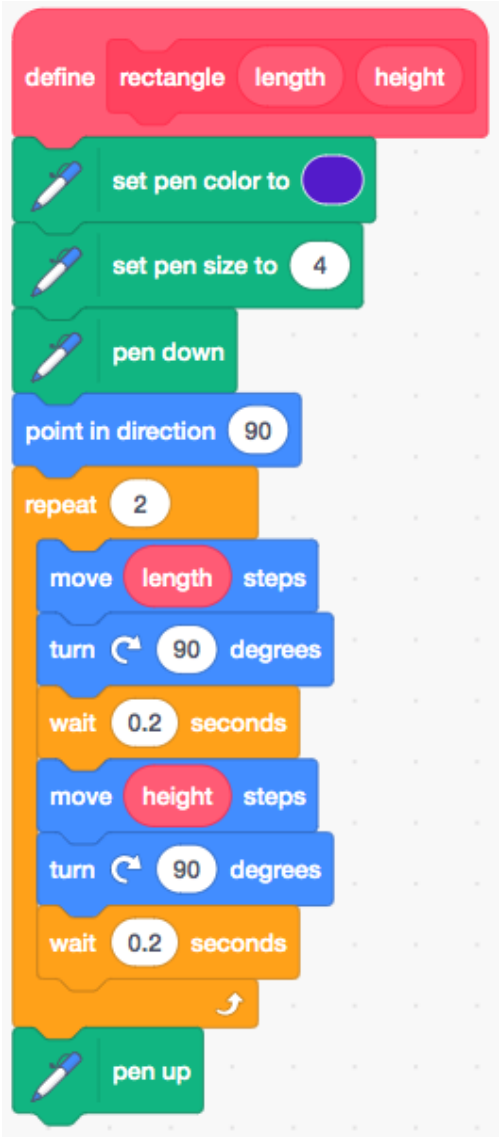
Now we have to change the code inside our block. Instead of moving 50 steps, we use the value inside of ***length*** and ***height***.



The wait helps us see the drawing happen. How many times do we repeat this code ?

This code only draws 2 sides. SInce we need 4, we can repeat this code 2 times to draw a complete rectangle.

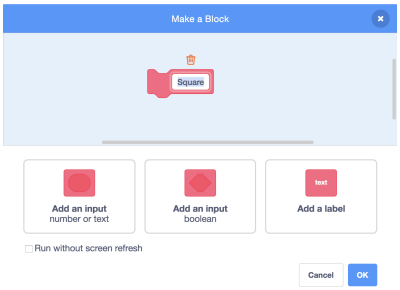
Display the code to show the complete block under the cat sprite called “rectangle of any size” in the demo project.



If you have an existing block that already draws a rectangle or square of a certain size, you can edit the block to add parameters to your blocks.

Note: Demo the following using the edit sprite in the solution project.

Right click on the block header and click on edit. The new block window opens:



Then click on Add an input, number or text. Do this for each parameter you want to add.

You can also change the name of the block and add a label that describes what each parameter represents.

Now we have a block that can draw any size square or rectangle. Instead of repeating code every time we want to draw a rectangle or square, we simply call our block. In computer science this type of block is called a Procedure.

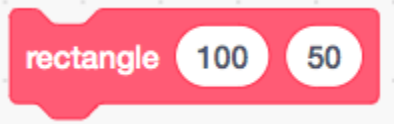
Procedures are small sections of code that are used to perform a particular task. They are used to avoid repetition and to break down the program into smaller parts which makes it easier to understand. And the ***length*** and ***height*** variables in our block are called input ____(prompt students for the answer) Answer: **parameters**.

2. Student Activity: Create a Procedure with Parameters

In this activity students will replace their square and rectangle blocks with a single block with the 2 input parameters to draw any size rectangle or square.

Instructions to give to students:

1. In your building blocks project, edit your rectangle block to add 2 input parameters named ***length*** and ***height*** to draw any size rectangle or square. Add a label as well to describe what the length and height parameters represent. You can delete the square block as you will no longer need it.
2. Change the code in your block to draw a rectangle using the values from the input parameters as demoed during class instruction.
3. Add code when the green flag is clicked to explore calling your new procedure to draw different size rectangles and squares.



Review the procedure solution with students if necessary.

3. Student Activity: Build a Neighborhood

In this activity students are ready to build their neighborhood using the building blocks they have created.

To place the building blocks on the stage to create composite objects such as a house or a building, they will need to use the x / y coordinate extensively. Review it briefly with students if necessary.

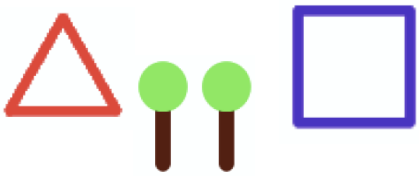
Explain the activity to students. Distribute the activity worksheet. If students worked in pairs for the building blocks project, they should work with their same partner.

4. Wrap Up and Reflections

Reflection Points:

- What did you learn today?
- What is a procedure?
- What is a parameter?
- What advantages are there to using procedures?

Student Activity: Build a Neighborhood

What to do:	Using/Details:
Time to plan your neighborhood using your building blocks. Take a few minutes to plan what you will be creating. Draw some ideas on paper or in your journal.	
Open your Building Blocks Scratch project and build your neighborhood using your building blocks. You can also create a building with details such as doors and windows. When placing your shapes on the stage, you will need to position them using the x / y coordinate plane. Here is a list of blocks that could be useful.	
Extended Activity - Create Trees with Flowers	
If you want to create trees and flowers of different sizes, you would apply the same principle of adding parameters as we did with the rectangle block. You can also create a Dot block that takes an input parameter. The parameter determines the size of the dot.