Lesson 2.1: Polygons: Drawing a Square

Objectives

In this lesson, students will:

- Explain what polygons are and give examples
- Draw a square using sequential programming and a loop
- Describe the concept of sequence and loop

Agenda

1. Introduction to Polygons	10 mins
2. Draw a Square in Scratch	15 mins
3. Loops	15 mins
4. Wrap Up and Reflections	10 mins

Preparation

- ❑ Projector to demonstrate coding exercises
- ❑ Be prepared to discuss simple polygons

Resources & Links

- ❑ None

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1. Introduction to Polygons

To help with the understanding of how to draw polygons, you can start by having students physically act out the drawing process.

- Tell students we are going to draw shapes. Start with a square. Ask a volunteer if they know how to draw a square and have them draw it on the board. Do the same with a triangle
- Next, instruct students to imagine a square is drawn on the floor. Ask a volunteer to give the teacher or another student the step by step instructions of where to walk so that they trace out the drawing with their feet. Be sure to do exactly as told and not what was intended, which is why it helps if the teacher follows the instructions first. Optionally, repeat the same for a triangle.
- It may become evident that a review of angles and using degrees to measure them can help with the instructions needed for drawing squares.

Ask students if they know what the previously drawn shapes are called. Have a discussion about regular polygons (all sides have the same length). What are they? Give more examples (pentagons, octagons, …).

Here are some examples of regular polygons:

Tell students that they are going to write a program in Scratch that draws a simple polygon.

2. Draw a Square in Scratch

Demonstrate how to draw a square in Scratch (student's computers are closed).

1. Open a new project

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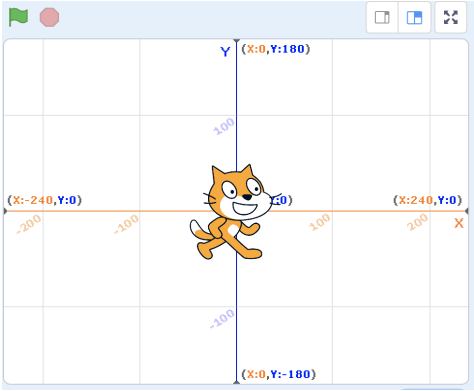
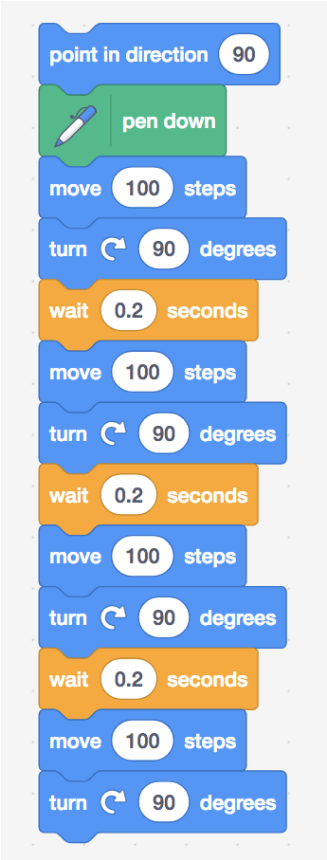
2. Add the “xy-grid” backdrop (found at the bottom of the All category when adding a new backdrop)
3. Point out where the drawing will start (Cartesian coordinate (0, 0)).



4. Point in direction <90>. (We will draw our square to the right of the starting point.)
5. Put the pen down to draw.
6. Move 100 steps.
7. Turn 90 degrees (counterclockwise or clockwise).
8. Duplicate (right click on the block) the move and turn commands to produce four pairs.
9. Run the program to see the square. (click on the top block)
10. Notice how fast the square appears.
11. Use the wait statement to slow the drawing down (wait 0.2 secs)



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Students Turn:

Instruct students to create a new project and draw a square in Scratch. Ask them to add a When (green) flag clicked event to run it as a program.

3. Sequence and Loops

Instruct students on the concept of a sequence, one operation follows the next to complete a task: Move and turn until a square is drawn.

Prompt students if they notice some instructions keep repeating. Call on students to point out the repeating sequence.

Direct attention to the *Control* category in Scratch and if there is a block that we could use instead. Some students may have already used a loop and are familiar with it. Recode the script using the *repeat* block as shown to the right.

Explain to students that these repeating commands are called loops. A loop repeats the same instructions multiple times.

Students Turn:

Instruct students to draw the square using the repeat loop. If time allows, students can explore drawing different sizes and color squares.

4. Wrap Up and Reflections

Remind students to save their project and sign out of Scratch

Reflection Points:

- What did you like about today's activity?
- What are real-world examples of loops?
- Why are loops useful in programming? (**Answer**: program is shorter, code is easier to read, if you need to change one command, you only have to do it once)

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