Lesson #2.2: Making Digital Art

Overview:

In this lesson, students will build their own art-inspired Scratch project. After learning how to draw regular polygons, they will continue experimenting with Motion, Looks, and Pen blocks to program a sprite to generate artwork on the screen.

Student Agency:

The overall purpose of this activity is for students to create a digital work of art. They are free to express themselves as they choose by experimenting with Motion, Looks, and Pen blocks. While using the Pen blocks along with Motion blocks students can try drawing all sorts of objects. They can draw geometric shapes, letters, or make totally random pictures. The idea is for students to learn through play (or experimenting). No two projects will be exactly the same. This project will challenge students to think mathematically and artistically, so students with those interests may thrive with this activity as it offers an extension to learning that takes place in their math and art classes. Encourage students to find these connections as they work through their projects.

Pathway: Coding/Computational Thinking

Duration: 40-80 minutes. This lesson can be completed in a class period as an introduction, but can also be extended to allow more time for students to make a finished product.

Essential Question: How can you utilize Scratch to express yourself artistically?

Objectives:

- Students will be able to express their creativity by completing an arts-themed project
- Students will be able to gain more fluency with Motion, Looks, and Pen blocks
- Students will be able to determine the internal angles of regular polygons based off the number of sides
- Students will be able to apply geometric principles to creating a digital art project

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Competencies & Practices	**Student Artifacts/Evidence**
Collaboration	Students share ideas and discoveries with others as they create “Digital Arts” projects.
Automation	Students write a program for the computer to draw a picture.
Incremental and Iterative	Students build up their program through experimentation and iterating.

Teacher Preparation:

Create a class studio where students can share their “Digital Art” Scratch projects. Review the Drawing Polygons with Pen Blocks tutorial video. Search the Scratch website or create examples of projects to share with students.

Materials for Students:

- Scratch Website: http://scratch.mit.edu
- Drawing Polygons with Pen Blocks tutorial video.
- “Digital Art” Studio - to be created by the teacher.

Students Prior Knowledge:

Students should have an understanding of how to click and drag blocks to build up a program. A familiarity with geometric shapes and an understanding of angles will help in determining the variables to set for the polygons or shapes they will be programming,

Concepts:

Experimenting and Iterating
Automation
Algorithms and Procedures
Event

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Sequence
Loop

 **Habits of Mind:**
Taking responsible risks
Applying past knowledge to new situations

 **Lesson Sequence:**

1. **Anticipatory Set (<5 minutes):** Lead a discussion to review geometric shapes, in particular regular polygons. Talk about number of sides and angles. Draw upon students' past knowledge from geometry lessons in math class.

2. **Engaging Activities:**
    a. **Introduce the Pen blocks (5 Minutes):** Have students open Scratch and create a new project and name it Polygons. Tell them that we are going to use blocks in the **Pen** category to program the computer to draw various polygons. **Pen** is found under **Extensions**. Walk students through the process of creating a square, Follow the step by step instructions in Drawing Polygons with Pen Blocks tutorial video.
    b. **Draw Polygons (15 Minutes):** Challenge students to create additional polygons.
        i. Can you write a program so when you press the 5 key, the sprite draws a pentagon with sides with lengths of 100? Use the comment feature to label your program.
        ii. Can you write a program so when you press the 6 key, the sprite draws a hexagon with sides with lengths of 100? Use the comment feature to label your program.
        iii. Write two additional programs to draw more polygons. Don't forget to label the programs.

    c. **Create a Digital Art Project (20-40 minutes):** Instruct students to create a new project called "Digital Art." Encourage them to try drawing geometric shapes, real objects, letters, or go completely random. Have

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them experiment with other **Motion, Looks,** and **Pen blocks** to achieve their desired design. Challenge them to use **repeat** blocks to make **loops**.

Teacher Tip: Time to time, while students are creating their projects, you may want to give brief demonstrations on things they can try. Demonstrate what happens when they use **Pen Up and Pen Down.** Show students the **Stamp** block.

Questions to Ask Students:

- When might you use **Pen Up and Pen Down**?
- Describe what happens when you use the **Stamp** block. How do you get rid of the stamped image?

d. Sharing student work (10 minutes): Have students add their projects to the Digital Art studio. If special instructions are required, remind students how to put directions in the **Instructions** field on the project page. Ask them to leave comments under their projects asking one another how they programmed their projects. Optionally, try a gallery walk: have students put their projects in presentation mode. Then invite them to walk around and explore each other's projects.

3. Wrap Up (5 minutes): Have students reflect on their learning in a design journal or in the Notes and Credits section of their project by responding to the reflections prompts. These questions are designed to have the students think about the practice of experimenting and iterating by thinking about the steps they took to build up their project.

a. How did you incorporate math into your project? Where did this idea come from?
b. What was challenging about this activity?
c. What was surprising about this activity?

Assessment Questions	**Yes**	**No**
Do the students' projects show an understanding of Pen blocks?		
Are students able to determine angles of regular polygons based upon is number of sides?		
Are students able to explain the steps they took to create their project?		

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Activities for Relearning:

The purpose of this activity is to introduce students to **Motion, Looks,** and **Pen** blocks. Encourage students to use experiment with multiple blocks and change variables to demonstrate that they understand how each of the blocks work. Offer opportunities in future projects for students to include sounds.

Activities for Enrichment:

Challenge students to try making various art projects using Scratch. Encourage those with artistic talents to include various elements of art (line, shape, space, value, form, texture, and color). Work with the school's art teachers to create other cross-curricular activities.

Resources for Teachers:

- Creative Computing Curriculum Guide
- Drawing Polygons with Pen Blocks