

Mandala Magic



- Grade Level: 4-6, 7-8
- Duration: 60 minutes
- Subject: Mathematics
- Interdisciplinary Connection: The Arts
- Platform: Scratch

This lesson introduces students to creating geometric mandalas by designing unique symbols and using block-based coding in Scratch. Its educational value lies in applying mathematical concepts like symmetry and repetition through coding, while also fostering mindfulness, creativity, and self-expression.

Curricular Connections

Ontario

Coding. Grade 4:

C3. Solve problems and create computational representations of mathematical situations using coding concepts and skills.

C3.1 Solve problems and create computational representations of mathematical situations by writing and executing code, including code that involves sequential, concurrent, repeating, and nested events.

Quebec

Dimensions of the Digital Competency Framework

#2: Developing And Mobilizing Technological Skills

#3: Harnessing The Potential Of Digital Resources For Learning

#5: Collaborating Via Digital Technology

Objectives

Learning Goals

Students will be able to...

- Employ the pen extension and learn how to create stamps.
- Utilize the "repeat" block to explore the geometrical concept of a circle having 360 degrees.
- Explore the function feature to create reusable code blocks

Success Criteria

I can...

- Use the pen extension in Scratch to stamp symbols for my mandala.

- Use a "repeat" block and turn blocks to arrange my stamped symbols in a full circle.
 - Create and use a "function" block to make my code more efficient.
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Material

Required Materials

- Computer with internet access

Optional Materials

- Scratch Teacher Account
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Lesson

Activity	Description
Prior Knowledge	Students should have a basic understanding of the Scratch interface, including how to find and arrange code blocks. Familiarity with sprites and basic sequencing of commands is beneficial.

Minds On	5 minutes <ol style="list-style-type: none">1. Warm-Up Questions: Start a discussion with questions like: "What are mandalas? Where have you seen them? What feelings or ideas do they bring to mind?"2. Connect to Mental Health: Explain the workshop's central idea is Mental Health. Discuss how creating mandalas can be a calming and meditative process that promotes mindfulness and self-care.3. Introduce the Project: Show students the completed Scratch project so they can see what they will be creating. Briefly discuss the patterns and symmetry they observe.
Model	5 minutes <ol style="list-style-type: none">1. Introduce Starter Code & Pen Extension: Guide students to the starter project. Demonstrate how to add the Pen extension and explain its key blocks, like stamp, pen down, pen up, and erase all.2. Code the Basic Pattern: Model how to use the stamp block in combination with a turn block inside a repeat loop. Explain the math: a full circle is 360 degrees, so to repeat a shape 10 times, each turn must be 36 degrees ($360 / 10 = 36$).3. Demonstrate Functions: Explain that a "function" (My Blocks) allows you to create a reusable block of code. Model how to create a simple function for drawing the mandala to make the code more organized and efficient.

<p>Practice</p>	<p>30 minutes</p> <ol style="list-style-type: none"> 1. Create a Custom Symbol: Instruct students to design their own unique symbol in the paint editor. Encourage them to choose symbols that represent something meaningful to them, such as inner growth, math, or science. 2. Code the Mandala: Students will apply the modeled concepts to their own project. They will use the repeat loop with stamp and turn blocks to create a full circle with their symbol. Circulate to provide support, reminding students to check their math for the turn degrees. 3. Implement a Function: Guide students to create and call their own function to generate their mandala pattern efficiently. 4. Add a Signature (Broadcast): Students will create a second sprite and use the broadcast block to make their signature appear after the mandala is drawn.
<p>Consolidation</p>	<p>10 minutes</p> <ol style="list-style-type: none"> 1. Gallery Walk/Share: Have students share their completed mandalas with a partner or in small groups. 2. Reflection Questions: Lead a brief discussion with questions like: <ol style="list-style-type: none"> a. "What was challenging about making your code work?" b. "How did using a 'repeat' block help you create your pattern?" c. "How did creating your mandala make you feel?"
<p>Modifications & Accommodations</p>	<ul style="list-style-type: none"> ● Pre-Made Symbol Templates Provide simple, pre-designed symbols (stars, hearts, basic shapes) that students can choose from instead of creating their own. This allows them to focus on the coding concepts rather than design. ● Visual Math Reference Card Create a quick reference showing the turn degrees for different repetitions: <ul style="list-style-type: none"> ■ 4 repeats = 90° 6 repeats = 60° 10 repeats = 36° 12 repeats = 30°

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| | <ul style="list-style-type: none">• Make Functions Optional
Allow students to complete the mandala using just the repeat loop with stamp and turn blocks. Add the custom function as an extension once they've mastered the basic pattern. |
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Assessment

Formative

- Observations: Observe students during the Practice phase, noting their ability to apply concepts like repetition, stamping, and functions.
- Self-Check Exit Ticket: Provide a brief self-assessment survey for students to reflect on their learning:
 1. I can use the pen and stamp blocks to create a pattern. (Getting there / I got it!)
 2. I can use a repeat loop to make a circular design. (Getting there / I got it!)
 3. I feel confident creating a function to organize my code. (Getting there / I got it!)

Extension

Cross Curricular Connections

Visual Arts: Explore the history and cultural significance of mandalas. Students can design more complex symbols based on artistic principles.

Extend Your Thinking

- "Jazz it up": Encourage early finishers to experiment with changing the color, size, or other effects inside the loop to create more dynamic mandalas.
- Nested Loops: Challenge advanced students to use nested repeat blocks to create patterns within patterns for a more intricate design