

Bachelor of Education (Elementary) & Bachelor of Education (Secondary) STEM Lesson Plan

Lesson Title: Shapes/Patterns From Indigenous Artwork & The Symmetry Found Within Lesson # 1 Date: 02/13/2026
 Name: Breckin Erichuk Subject: Math Grade(s): 4

Rationale:

This lesson integrates mathematics and Indigenous art to help students understand the concept of line symmetry through a meaningful, culturally respectful context. By exploring symmetrical patterns in Indigenous designs, students connect mathematical reasoning to visual and cultural expression. The lesson promotes creativity, critical thinking, and appreciation of Indigenous knowledge systems. It supports the BC Curriculum's goal of developing numeracy, cultural awareness, and cross-curricular learning through inquiry and hands-on exploration.

Core Competencies:

Communication	Thinking	Personal & Social
	<ul style="list-style-type: none"> ● I can analyze patterns and justify why certain lines create symmetry. <p>Why it applies:</p> <ul style="list-style-type: none"> - Students must observe, compare, and reason about balance and design in Indigenous artworks. Students will have the opportunity to see different forms of indigenous artwork and apply what they learned on line symmetry. 	<ul style="list-style-type: none"> ● I can engage respectfully with Indigenous art, understanding its cultural significance.

Big Ideas (Understand)

- Regular changes in patterns can be identified and represented using tools and tables.

Sample Inquiry Questions Found in Big Ideas:

- What regularities can you find in these patterns?
- Where do we see patterns in the world around us?
- How are these polygons similar or different??
- How do the properties of shapes contribute to buildings or designs?

Learning Standards

(DO)	(KNOW)
<p>Learning Standards - Curricular Competencies</p> <p>Students will:</p> <p>Using written and visual texts, students are expected to work individually to be able to:</p> <ul style="list-style-type: none"> ● Visualize and describe mathematical concepts (Identifying Symmetry). 	<p>Learning Standards - Content</p> <p>Students will learn about:</p> <ul style="list-style-type: none"> ● Line symmetry (Identifying and creating symmetrical shapes) ● Attributes and properties of shapes in visual properties

<ul style="list-style-type: none"> ● Use critical thinking to explore and make connections between math and art. ● Explain and justify mathematical ideas using language, pictures, and symbols. 	<p>This directly targets the geometry and measurement content area, where the students will recognize and apply symmetry while connecting math to cultural contexts.</p>
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Instructional Objectives & Assessment

Instructional Objectives (students will be able to...)	Assessment
<ul style="list-style-type: none"> ● Students will be able to identify lines of symmetry in given Indigenous artworks. ● Students will be able to draw or fold to demonstrate symmetry using tools like rulers and mirrors. ● Students will be able explain how symmetry contributes to balance and beauty in visual designs. 	<p>Formative Assessment:</p> <ul style="list-style-type: none"> ● Activity: Create Your Own Symmetrical Indigenous-Inspired Design: Students will identify and draw lines of symmetry on sample artworks. As well as create their own designs to show symmetry. ● Discussion/Exit Ticket: Students reflect on how symmetry appears in their own art. ● Observation: The teacher notes engagement, use of mathematical vocabulary, and problem-solving approaches.

Prerequisite Concepts and Skills:

Students should already be able to:

- Recognize and describe basic 2D shapes (Square, Triangle, Circle).
- Use rulers and folding techniques appropriately.
- Understand basic geometric vocabulary (Side, Shape, Half).
- Follow multi-step directions based on the teacher's instructions.

Indigenous Connections/ First Peoples Principles of Learning:

First Peoples Principle of Learning:

Learning recognizes the role of Indigenous knowledge Systems and artistic expression as connected to place and community.

- This lesson recognizes that Indigenous art forms, such as Coast Salish Spindle Whorls, Metis Bead Work, and Haida Formline Designs, often include symmetrical systems. Students will explore and apply how symmetry in art can express balance, respect, and connection to nature.

Universal Design for Learning (UDL):

Visual: Using Images of Indigenous art (Secwepemc Museum and Heritage Park, Spindle Whorls, Metis Bead Work, Haida Formline Art.

Verbal: Teacher explains symmetry using mathematical vocabulary (“line of symmetry,” “mirror image”).

Kinesthetic: Students fold paper or use mirrors to find symmetrical lines.

Digital: Display examples on a smartboard or projector to zoom in on details found in the artwork.

- This lesson allows students to choose the art design they want to study, and it also has real-world relevance that connects to Indigenous knowledge. There is also an optional collaboration portion of the lessons where students get the choice to work individually or collaboratively.

Differentiate Instruction (DI):

Low floor-High Ceiling Design:

- **Low Floor:** Students will be able to trace or fold paper to find simple vertical symmetry. Use pre-drawn templates or half images to complete the task. The teacher will have less complicated designs ready for students who may struggle with the more detailed designs.
- Teachers will also observe and provide one-on-one modelling or assistance for struggling learners.
- **High Ceiling:** Students will be able to identify multiple lines of symmetry or explore rotational symmetry in circular patterns. The teacher will have more complex designs for students who may want to challenge themselves.
- Teachers can challenge advanced learners to create more complex designs or patterns.

Differentiation by Learning Profile:

- Visual Learners: Analyze photographs, create unique colourful patterns.
- Auditory Learners: Participate in storytelling about Indigenous symbolism and balance.
- Kinesthetic Learners: Folding, cutting, or using mirrors for a better understanding of symmetry.
- Logical Learners: Use grid paper and rulers for precision.

Materials and Resources

- Computer and projector for instructional slides
- Images of Indigenous artwork that are laminated (spindle whorls, beadwork, prints)
- Blank and grid paper
- Rulers and pencils
- Colouring supplies
- Symmetry half templates
- Mirrors (Optional)
- Foldable paper for teacher demonstration

- Use culturally appropriate and locally relevant examples of artwork.

Lesson Activities:

Teacher Activities	Student Activities	Time
<p>Introduction (anticipatory set – “HOOK”):</p> <ul style="list-style-type: none">● Go over classroom expectations to establish how the teacher would like students to behave and work. Ask questions like “What do you do when others are talking?” and “How do you think our work time should look and sound like?” <p>Hook:</p> <ul style="list-style-type: none">● Display images of Indigenous artworks (Spindle whorls, Metis beadwork, and Haida formlines)● Ask Students<ul style="list-style-type: none">- “What patterns or shapes do you notice?”	<ul style="list-style-type: none">● Students listen to the expectations given by the teacher. ● Students may respectfully raise their hands to contribute to the discussion	10 Min

<ul style="list-style-type: none"> - “Do any parts look the same on both sides?” ● On slides, give a brief background on Indigenous artworks like (Spindle whorls, Metis beadwork, Haida formlines) ● Optional: Tell a short story or explanation about the balance of Indigenous worldviews. 	<ul style="list-style-type: none"> ● Students observe the examples while the teacher continues the conversation. ● Students contribute or listen quietly to discussions ● Any questions, students are encouraged to put up their hands while the teacher is giving the lesson portion. 	
<p>Body: Mini Lesson:</p> <ul style="list-style-type: none"> ● Review with students the concept of line symmetry. (A line that divides an image so both halves are mirror images) ● Show an example on the board or on laminated pictures. (Set up ahead of time) ● The teacher will model to the students drawing or using a simple shape (butterfly, leaf), and fold paper or use a ruler to show the symmetry line. <p>Guided Practice:</p> <ul style="list-style-type: none"> ● Handout provided laminated images of Indigenous designs (ensuring beforehand that they are culturally appropriate and with permission to use images when needed). ● Students use dry-erase markers and rulers to draw lines of symmetry on the images. ● Once students begin their practice, discuss how symmetry contributes to the beauty and balance of their designs. ● Ask students <ul style="list-style-type: none"> - “How many lines of symmetry can you find?” - “Is the symmetry horizontal, vertical, or diagonal?” ● (This allows students see symmetry within different forms) <p>Independent/Collaborative Activity: Activity: Create Your Own Symmetrical Indigenous-Inspired Design</p> <ul style="list-style-type: none"> ● The teacher will go over instructions for the activity (Pull up the slide with instructions, so if students forget, they can 	<ul style="list-style-type: none"> ● Students activate prior knowledge on symmetry ● Students pay attention and follow the teacher as they give a lesson and example. ● Student helpers hand out laminated images. ● Students will not touch examples until given instructions and permission from the teacher. ● Students use dry-erase markers and rulers to draw lines of symmetry on the images. ● Students listen to the teacher discuss topics of symmetry. ● Students get the choice of which examples they’d like to try, and different ones. ● Students' examples are given back to the teacher after the practice. 	<p>15 Min</p> <p>20 Min</p>

<p>go back to them without having to ask the teacher a lot of questions to ensure they use their work time)</p> <ul style="list-style-type: none"> ● Students fold a square piece of paper in half ● On one side, they sketch a nature-inspired image (animal, plant, abstract pattern, or challenge themselves with a more complex design). ● Then, they fold or trace to complete the other side symmetrically ● Have students reiterate instructions before letting them start their work. ● Optional (If students finish early, allow them to add more patterns or colour to their symmetrical designs) ● Optional (Have templates with one half of an image that students can use if they struggle with the drawing) ● Have the low-floor, high-ceiling options prepared beforehand. ● Monitor students work by being available for questions and ensuring they are respectful to the topic and each other's work. 	<ul style="list-style-type: none"> ● Students listen to teachers instructions for the activity. ● Students may work with a partner or on their own, but once established, cannot jump from table to table. Must stay with the group or in individual seats. ● Students follow and participate in the activity while discussing what makes their designs symmetrical ● If students decide to use a template or find inspiration for designed they are asked to politely raise their hand, and the teacher will bring over the necessary tools or options for them. 	
<p>Closure: Discussion/Exit Tickets</p> <ul style="list-style-type: none"> ● Discuss with students their findings and explanations for the topics discussed throughout the lesson. ● Ask students... <ul style="list-style-type: none"> - “Where did you find symmetry in your own art?” - “How does symmetry make art feel balanced or complete?” <p>Conclusion/Reflect:</p> <ul style="list-style-type: none"> ● Have a few students show off their creations and give short explanations of why they did what they did. 	<ul style="list-style-type: none"> ● Students may hand in or keep their creations. (Teacher may want some examples for future use) ● Students contribute to the discussion from prompts described by the teacher. ● Students may show off their creations through classwide discussion. ● Students bring the teacher any tools or extra resources 	10 Min

Organizational Strategies:

<ul style="list-style-type: none"> ● Predetermined student helpers will pass out examples to each student when asked by the teacher. ● Students will pick between the examples that interest them ● Students will be asked to complete their creations of symmetry quietly at their desks. ● Students will be asked to share and reflect with the teacher and peers once completed their creations of symmetry and throughout the lesson. ● Guided Practice
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- Inquiry-Based Learning
- Reflection

Proactive, Positive Classroom Learning Environment Strategies:

Teacher will clearly explain classroom expectations throughout the lesson during various activities.

Teacher will ring the bell to capture students' attention

Teacher will move around the room during individual work time to ensure students are on task and grasping the material.

Teacher will provide minimal feedback during the lesson to allow students to think individually and collaboratively with their peers.

Teacher allows students to choose how they want create their symmetrical artwork.

Extensions:

Science: Students investigate how plants and animals display symmetry, for example, butterfly wings, flowers, or snowflakes. They record their findings with labelled diagrams and compare natural symmetry to artistic designs.

Social Studies: Students explore how Indigenous art and symbols (such as family crests, spindle whorls, or totem designs) reflect community, identity, and connection to the land.

Reflections (if necessary, continue on separate sheet):

When designing this lesson, I wanted to do something that students could remember and relate to real life. I remember doing an assignment that was similar to my own elementary school experiences, which were more nature-based. I thought it would be a great idea to incorporate Indigenous artwork and designs into a symmetrical-based lesson, as this is very common in Indigenous artwork and creation. I began researching Indigenous artwork for this assignment and found two fantastic resources (<https://indigenous.mathnetwork.educ.ubc.ca/> and <https://mathcentral.uregina.ca/RR/database/RR.09.01/mcdonald1/>). I thought there were some good ideas in these resources, but I wanted to focus on some local artwork as well, finding three main forms of Indigenous art (Coast Salish Spindle Whorls, Metis Bead Work, and Haida Formline Designs). I also wanted to ensure students could learn about these forms of art through a mini-lesson. It will be important for teachers to prepare before this lesson by finding culturally appropriate forms of art to show the class. As well as preparing yourself to answer any questions that may arise from students during the lesson on these topics. Ultimately, I think this lesson allows students to choose what they learn and create, and to learn about local Indigenous forms of art while applying mathematics to their creations.