

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

**Lesson Title:** Mathematics – Using Area to Build an Art Mosaic **Date:** Fri April 25, 2025  
**Lesson #** 7  
*Building a Math Art Mosaic Using the Area Calculations of Rectangles & Squares*  
**Name:** Squares **Subject:** Mathematics **Grade(s):** 4/5

**Rationale:**

This lesson is important because it introduces students to finding the area of rectangles & squares and applying that knowledge to designing a mathematical mosaic with the total area calculated. This knowledge is taken forwards into the students’ futures to build upon and is related to real-world scenarios in which this skill is needed to develop special reasoning, problem-solving skills, and real-world applications.

**Core Competencies:**

Communication	Thinking	Personal & Social
<ul style="list-style-type: none"> <li>• <b>Collaborating - Working Collectively:</b> Students combine their efforts with those of others to effectively accomplish learning and tasks. As members of a group, they appreciate interdependence and cooperation, commit to needed roles and responsibilities, and are conscientious about contributing. They also negotiate respectfully and follow through on plans, strategies, and actions as they share resources, time, and spaces for collaborative projects.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Critical thinking &amp; Reflective Thinking - Questioning &amp; Investigating:</b> Students learn to engage in inquiry when they identify and investigate questions, challenges, key issues, or problematic situations in their studies, lives, and communities and in the media. They develop and refine questions; create and carry out plans; gather, interpret, and synthesize information and evidence; and reflect to draw reasoned conclusions. Critical thinking activities may focus on one part of the process, such as questioning, and reach a simple conclusion, while others may involve more complex inquiry requiring extensive thought and reflection.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Positive personal and cultural identity – Identifying personal strengths and abilities:</b> Students acknowledge their strengths and abilities, and they intentionally consider these as assets, helping them in all aspects of their lives. Students understand that they are unique and are a part of larger, and often multiple, communities. They explain how they are using their strengths and abilities in their families, their relationships, and their communities.</li> <li>• <b>Personal awareness and responsibility - Self-advocating:</b> Students who are personally aware and responsible have a sense of self-worth and a growing confidence in a variety of situations. They value themselves, their ideas, and their accomplishments. They are able to express their needs and seek help when needed, find purpose and motivation,</li> </ul>

		<p>act on decisions, and advocate for themselves.</p> <ul style="list-style-type: none"> <li>• <b>Social Awareness &amp; Responsibility - Building Relationships:</b> Students build and maintain diverse, positive peer and intergenerational relationships. They are aware and respectful of others' needs and feelings and share their own in appropriate ways. They adjust their words and actions to care for their relationships.</li> </ul>
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**Big Ideas (Understand)**

<ul style="list-style-type: none"> <li>• Closed shapes have area and perimeter that can be described, measured, and compared.</li> <li>• Polygons are closed shapes with similar attributes that can be described, measured, and compared.</li> </ul>
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**Learning Standards**

(DO)	(KNOW)
Learning Standards - Curricular Competencies	Learning Standards - Content
<ul style="list-style-type: none"> <li>• Explain and justify mathematical ideas and decisions</li> <li>• Develop and use multiple strategies to engage in problem solving</li> <li>• Develop, demonstrate, and apply mathematical understanding through play, inquiry, and problem solving</li> <li>• Use reasoning to explore and make connections</li> <li>• Use mathematical vocabulary and language to contribute to mathematical discussions</li> <li>• Communicate mathematical thinking in many ways</li> <li>• Represent mathematical ideas in concrete, pictorial, and symbolic forms</li> <li>• Reflect on mathematical thinking</li> </ul> <p>ELA:</p> <p><b>Create &amp; Communicate:</b></p> <ul style="list-style-type: none"> <li>• Use writing and design processes to plan, develop, and create texts for a variety of purposes and audiences</li> </ul> <p><b>Comprehend &amp; Connect:</b></p>	<ul style="list-style-type: none"> <li>• Area measurement of squares and rectangles</li> <li>• Relationships between area and perimeter</li> <li>• Perimeter of regular and irregular shapes</li> <li>• Regular and irregular polygons</li> </ul>

<ul style="list-style-type: none"> <li>• Access information and ideas from a variety of sources and from prior knowledge to build understanding</li> </ul> <p><b>Science:</b></p> <p><b>Planning &amp; Conducting:</b></p> <ul style="list-style-type: none"> <li>• With support, plan appropriate investigations to answer their questions or solve problems they have identified</li> <li>• Choose appropriate data to collect to answer their questions</li> </ul> <p><b>Evaluating:</b></p> <ul style="list-style-type: none"> <li>• Identify possible sources of error</li> </ul> <p><b>Applying &amp; Innovating:</b></p> <ul style="list-style-type: none"> <li>• Transfer and apply learning to new situations</li> </ul> <p><b>Art Education:</b></p> <p><b>Reasoning &amp; Reflecting:</b></p> <ul style="list-style-type: none"> <li>• Connect knowledge and skills from other areas of learning in planning, creating, interpreting, and analyzing works for art</li> </ul> <p><b>Communicating &amp; Documenting:</b></p> <ul style="list-style-type: none"> <li>• Express, feelings, ideas, and experiences through the arts</li> <li>• Experience, document and present creative works in a variety of ways</li> <li>• Adapt learned skills, understandings, and processes for use in new contexts and for different purposes and audiences</li> </ul>	
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**Instructional Objectives & Assessment**

Instructional Objectives (students will be able to...)	Assessment
<ul style="list-style-type: none"> <li>• Understand and calculate the area of squares, rectangles, &amp; triangles</li> <li>• Apply area calculations in the creation of a mosaic art piece</li> <li>• Enhance spatial reasoning &amp; creativity through geometric design</li> </ul>	<ul style="list-style-type: none"> <li>• Observation of students during the planning and calculation phases to ensure they accurately determine the area of each shape</li> <li>• Provide immediate feedback and support to students who may struggle with area calculations or design planning</li> <li>• Evaluate the completed mosaics based on the accuracy of area calculations, creativity in design, and overall presentation</li> <li>• Participation in the gallery walk &amp; support for their classmates</li> </ul>

**Prerequisite Concepts and Skills:**

<ul style="list-style-type: none"> <li>• Counting &amp; measuring with simple tools &amp; graph paper</li> <li>• Knowledge of calculating the area of rectangles &amp; squares</li> </ul>
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- Addition & simple multiplication with a calculator
- Recording data on paper or a digital device
- Ability to use standard units for measurement

### Indigenous Connections/ First Peoples Principles of Learning:

**Learning is holistic, reflexive, reflective, experiential, and relational (focused on connectedness, on reciprocal relationships, and a sense of place):** Students will be measuring and counting, which can be a trial-and-error endeavor. This allows students the opportunity to reflect and predict using their reasoning skills and natural problem-solving abilities.

**Learning involves patience and time:** Patience and time are intertwined with learning new things, and that's exemplified in mathematics. Giving students appropriate time to learn and expand their thinking is important for retaining information in a calm and supportive fashion.

**Learning involves recognizing the consequences of one's actions:** Mathematics is an objective course that teaches students this Indigenous principle — if they perform a certain action, like adding two digits, there is a direct consequence, and calculations will affect it positively or negatively in terms of accuracy.

### Universal Design for Learning (UDL):

- Use multiple means of representation for what area is — written, verbal, and pictures
- Allow all students to use a calculator to find the area of rectangles & squares using  $\text{Area} = \text{Length} * \text{Width}$
- Use grid paper that is large enough to be easily seen so students are not struggling to count the squares
- Use real-world structures to explain how to calculate the perimeter and area (i.e. playgrounds, fields, the classroom, etc.)

### Differentiate Instruction (DI):

- Ensure directions are clear & worksheets are appropriate for the students' needs & abilities
- Consult specific individual education plans to appropriately serve student learning requirements
- Using a hands-on approach with an activity to build a mathematical art piece that utilizes the area calculations of squares & rectangles
- Allow time to complete the mosaic
- Utilize partners for the mosaic activity so they can help each other to complete it if needed

### Materials and Resources

- Kahoot! set up
- Graph paper
- Laptop for presentation
- Projector
- Whiteboard
- Whiteboard markers & eraser
- Scissors
- Rulers
- Pencils & erasers
- Coloured cardstock or construction paper for mosaic base

- Glue sticks
- Coloured pencils
- Examples of mosaics for inspiration in presentation slides
- Practice worksheets for the area of rectangles & squares for presentation:  
<https://www.k5learning.com/free-math-worksheets/third-grade-3/geometry/area-rectangular-grid>  
<https://www.mathworksheets4kids.com/perimeter-grids.php>
- Chart for mosaic information recording

### Lesson Activities:

Teacher Activities	Student Activities	Time
<p><b>Introduction &amp; Hook:</b></p> <ul style="list-style-type: none"> <li>• Put students into pairs for Chromebooks by picking them or using elbow partners (not the students picking their own partners)</li> <li>• Begin by doing a 6 question Kahoot! with a review of perimeter &amp; area</li> <li>• Explain that they will be doing a main activity today and it'll be a mosaic of coloured paper shapes that they are going to glue onto paper to create an art mosaic of mathematical areas</li> </ul>	<ul style="list-style-type: none"> <li>• Students will do Kahoot!</li> </ul>	<p>10 minutes</p>
<p><b>Body:</b></p> <p><b>Review of Area Concepts:</b></p> <ul style="list-style-type: none"> <li>• Review the concept of finding the area of rectangles &amp; squares by the formula <b><i>Area = Length x Width</i></b> and as we've been doing it on graph paper by counting the units in the shape</li> <li>• Provide a few practice problems where students will calculate the area of given rectangles &amp; squares to ensure understanding</li> </ul> <p><b>Planning the Mosaic Design:</b></p> <ul style="list-style-type: none"> <li>• Handout graph paper &amp; instruct students to sketch a simple mosaic design composed of squares &amp; rectangles. <ul style="list-style-type: none"> <li>○ Emphasize that the shapes should align with the grid lines to simplify area calculations</li> </ul> </li> <li>• Encourage students to colour their shapes to make an esthetically pleasing arrangement of their mosaic</li> </ul>	<ul style="list-style-type: none"> <li>• Students will do review sheets of needed</li> <li>• Students will work on designing their mosaics by making squares &amp; rectangles on graph paper that they will cut out &amp; transfer onto their construction paper for their final project</li> <li>• Students will colour their individual shapes</li> </ul>	<p>10 minutes</p> <p>35 minutes</p>

<p><b>Calculating the Area of Their Mosaic:</b></p> <ul style="list-style-type: none"> <li>Once designs are sketched &amp; the students are happy with them, have them calculate the area of each individual shape in their mosaic by counting the number of squares within each shape or using multiplication</li> <li>Ask students to record their area calculations for each shape onto the sheet provided</li> <li>Get students to calculate the total area of their design by adding all their areas together on the chart provided</li> </ul> <p><b>Creating the Mosaic:</b></p> <ul style="list-style-type: none"> <li>Provide students with coloured construction paper for them to cut out the shapes corresponding to their designs on their graph paper</li> <li>Instruct students to glue their shapes onto the construction paper into a design replicating what they designed on their graph paper</li> </ul>	<ul style="list-style-type: none"> <li>Students will calculate the areas of each of their shapes and record them in the chart provided</li> <li>Students will add all of the areas together to find the total area of their mosaic and record that on their chart</li> <li>Students will cut out their shapes (squares and rectangles) from the graph paper and glue it onto their construction paper</li> </ul>	
<p><b>Closure:</b></p> <ul style="list-style-type: none"> <li>Ask students to clean up their area and put their mosaics to the side for the glue to dry</li> </ul>	<ul style="list-style-type: none"> <li>Students will clean up their areas and place their mosaic projects to the side to dry</li> </ul>	5 minutes

**Organizational Strategies:**

<ul style="list-style-type: none"> <li>Students will be fresh in the morning so sitting &amp; listening should be easier for them</li> <li>When students want to add to the class discussion or ask questions, they will raise their hand and wait to be called on by the teacher</li> <li>Worksheets &amp; art materials will not be distributed until after the instruction when they need them</li> <li>Students that are talking without raising their hand will be asked to raise their hand if they want to contribute</li> <li>Students that are talking after reminders will be separated</li> <li>The teacher will remain silent until the class chatter stops &amp;/or use strategies to gain attention and hold it (counting down, touch your nose, etc.)</li> </ul>
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**Proactive, Positive Classroom Learning Environment Strategies:**

<ul style="list-style-type: none"> <li>There will be area practice together for students</li> <li>The teacher will make behaviour expectations clear – sit quietly and listen attentively without distracting other students, only speak if the teacher calls on you – by stating them before and during the lesson</li> <li>The teacher will verbally acknowledge and thank students who are on task and will verbally address the students who continue to distract others</li> </ul>
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- The teacher will, if necessary, separate students who continue to distract each other
- Hands-on activity that involves making art so that students are learning while having fun
- Kahoot! as a hook will engage the students in the math lesson following

**Extensions:**

The area of triangles or other shapes could be added to enhance the calculations and level of learning required in building the mosaics, rather than just using rectangles & squares.

The teacher could provide shapes that are already done for the students to take that part of the activity away if there is a time constraint or if the activity needs to be simplified or save time.

**Reflections (if necessary, continue on separate sheet):**

I ended up separating this lesson into two. We did the drawing on graph paper for lesson 1 and then the actual colouring and mosaic in the second lesson. It did go over well, and the kids LOVE Kahoot! This class is a challenge in that it takes 50-75% of the time getting their attention & holding it so I can actually teach. I used a presentation with Minecraft as a background to instruct for this.