

MNLA Curriculum Unit B, Lesson 1

UNIT TITLE: Using Math to Create Functional Landscapes

LESSON 1: Designing Paver Walkways and Patios Using Geometric Shapes. 30-40 minutes

MINNESOTA ACADEMIC STANDARDS IN SCIENCE:

3.1.3.2.1 -- Understand that everybody can use evidence to learn about the natural world, identify patterns in nature, and develop tools.

MINNESOTA ACADEMIC STANDARDS IN MATH:

3.3.1.1 -- Use geometric attributes to describe and create shapes in various contexts. Identify parallel and perpendicular lines in various contexts, and use them to describe and create geometric shapes, such as right triangles, rectangles, parallelograms and trapezoids.

4.3.1.2 -- Name, describe, classify and sketch polygons. Describe, classify and draw quadrilaterals, including squares, rectangles, trapezoids, rhombuses, parallelograms and kites. Recognize quadrilaterals in various contexts.

4.3.3.1 -- Use translations, reflections and rotations to establish congruency and understand symmetries. Apply translations (slides) to figures.

4.3.3.2 -- Use translations, reflections and rotations to establish congruency and understand symmetries. Apply reflections (flips) to figures by reflecting over vertical or horizontal lines and relate reflections to lines of symmetry.

AUTHORS: Terry Ferriss and Kelly Holt

GRADE LEVEL / SUBJECT: Grade 3 Science and Math; Grade 4 Math

OVERVIEW: Students will learn how to apply mathematical patterns for designing paver walkways and patios.

OBJECTIVES:

As a result of this activity, students will be able to:

1. Name and describe geometric shapes used in construction of walkways and patios.
2. Describe and create patterns from multiple geometric shapes.
3. Define the terms perpendicular, parallel and symmetrical and use the concepts in creating patterns for walkways and patios.

MATERIALS:

- One sheet of 8.5" x 11" plain paper for each student
- Pictorial examples of walkways and/or patios from your own work, printed examples from industry brochures (MNLA Hardscape Brochure for example) or printed examples from online examples on paver supplier web sites.
- Tessellation blocks for each student (provided by the classroom teacher - most third and fourth grade classroom have these) OR download
- Access to a whiteboard, chalkboard, or Smartboard

ACTIVITIES AND PROCEDURES:

1. Introduce yourself as a professional Landscaper or Horticulturist. Briefly describe what you do in your position.
2. Show students examples of walkways and/or patios which show different design patterns with pavers.
3. Ask students "What do you notice about these walkways/patios?" Note: Students should make and share observations of materials used, texture, color, shapes and patterns.
4. Ask student to name the shapes they see in the patterns. Name all of the shapes in the design.
5. Ask students, "Why do you think landscape designers make the walkways/ patios to look like this?" Note: Students should share thoughts and observations about aesthetics, function and design functions.
6. Review with students the names and identification of a square, rectangle, pentagon, triangle and trapezoid.
7. Demonstrate how different shapes fit together to create a pattern.
8. Demonstrate how to trace around the shapes of the tessellation or pattern blocks.
9. Have students create their own pattern for a walkway or patio by tracing around the blocks on the plain 8/5" x 11" paper. Ask students "What shapes easily fit together and which ones don't".
10. (Optional) Encourage students to color the patterns as if 2-3 colors of pavers were being used.
11. Ask students who would like to share their design with the class. Have student volunteers come to the front of the classroom one at a time. Ask them to name the shapes they used and describe their design.
12. Encourage students to show their designs to others at home and observe patterns in walkways and patios throughout the community.
12. (Optional) Send an MNLA Landscape Hardscape booklet home with each student so they can show others at home.

Assessment: Students will be able to:

- Name and describe 5 types of polygons.
- Use translations, reflections and rotations to create geometric patterns.

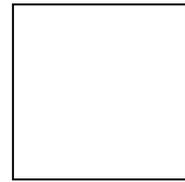
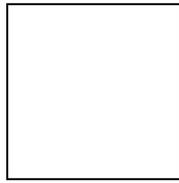
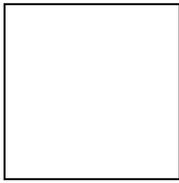
Handouts and Worksheets: Tessellation or Pattern Block Templates

Note: Discuss the lesson with the teacher to determine if students have been introduced to the basic math concepts used in this lesson. The lesson may be more effective if it provides students an opportunity to use already acquired math skills.

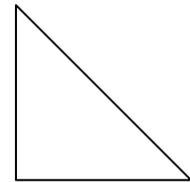
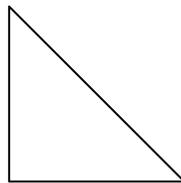
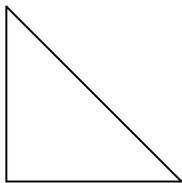
Tessellation or Pattern Block Templates



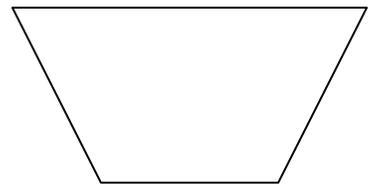
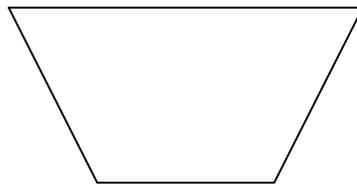
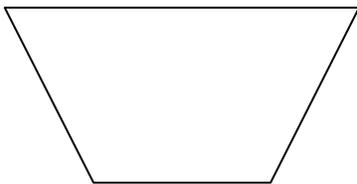
Rectangle



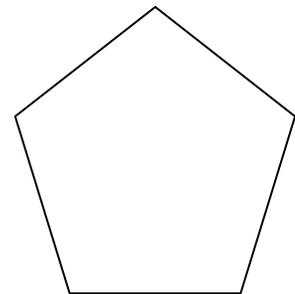
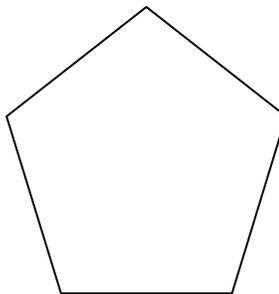
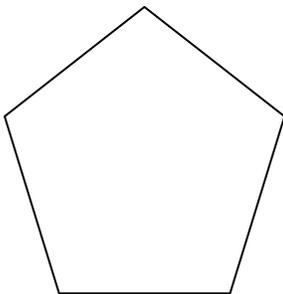
Square



Right Triangle



Trapezoid



Pentagon