

# 4th Grade Math: Tessellating Shapes in Different Ways

## Lesson Objective:

By the end of this lesson, students will be able to:

- Understand the concept of tessellation.
- Create tessellations using different shapes and patterns.
- Explore how shapes can be arranged in multiple ways to form tessellations.

## 1. Introduction to Tessellations

### What is a Tessellation?

- A **tessellation** is a pattern created by repeating a shape or set of shapes in a way that covers a surface completely without any gaps or overlaps.
- Tessellations can be made with regular shapes (same size and angles) or irregular shapes (different sizes and angles).

### Types of Tessellations:

- **Regular Tessellations:** Use only one type of regular polygon (e.g., squares, equilateral triangles).
- **Irregular Tessellations:** Use combinations of shapes or irregular polygons.

## 2. Understanding Tessellation Patterns

### Examples of Tessellations:

- **Regular Tessellations:** Patterns made from repeating squares, hexagons, or equilateral triangles.
- **Irregular Tessellations:** Patterns made from various shapes fitting together in unique ways.

## 3. Tessellating Shapes in Different Ways

### Activity 1: Tessellating with Regular Shapes

1. **Materials:** Graph paper, colored pencils, rulers.
2. **Instructions:**
  - **Squares:**
    1. Draw a grid of squares on the graph paper.
    2. Color each square to create a repeating tessellation pattern.
    3. Observe how squares fit together perfectly without gaps or overlaps.
  - **Equilateral Triangles:**
    1. Draw a grid of equilateral triangles on the graph paper.

2. Color each triangle to form a tessellation pattern.
3. Discuss how triangles fit together to cover the plane completely.

### **Activity 2: Tessellating with Irregular Shapes**

1. **Materials:** Plain paper, scissors, colored pencils, glue.
2. **Instructions:**
  - **Creating an Irregular Shape:**
    1. Draw and cut out an irregular shape from the plain paper.
    2. Use the shape to create a tessellation by tracing and gluing the shape repeatedly on another piece of paper.
    3. Color the tessellation pattern.
  - **Combining Shapes:**
    1. Draw several different shapes on paper (e.g., triangles, hexagons, and trapezoids).
    2. Arrange these shapes to form a tessellation pattern.
    3. Color the shapes and discuss how they fit together to cover the plane without gaps.

### **Activity 3: Tessellating with a Design**

1. **Materials:** Plain paper, colored pencils, and rulers.
2. **Instructions:**
  - **Designing a Tessellation:**
    1. Create a simple design that includes a combination of regular and irregular shapes.
    2. Draw the design on graph paper.
    3. Color the tessellation and discuss how the shapes fit together.

## **4. Real-World Examples of Tessellations**

### **Art:**

- Tessellations are used in art to create visually appealing patterns. Look at artworks by M.C. Escher for inspiration.

### **Nature:**

- Tessellations can be found in nature, such as honeycombs and patterns on animal skins.

### **Architecture:**

- Tessellations are used in floor designs and decorative patterns in buildings.

## **5. Group Activity: Tessellation Exploration**

**Objective:**

- Explore and create tessellations using different shapes.

**Instructions:**

1. Divide the class into small groups.
2. Provide each group with materials to create tessellations (paper, scissors, rulers, colored pencils).
3. Each group creates their own tessellation pattern using various shapes.
4. Groups share their tessellations with the class and explain their design process.

**5. Group Activity: Tessellation Exploration****Objective:**

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**7. Review and Wrap-Up****Key Points to Remember:**

- Tessellations are patterns that cover a plane without gaps or overlaps.
- **Regular Tessellations** use one type of regular polygon.
- **Irregular Tessellations** use a variety of shapes.
- Tessellations are used in art, nature, and architecture.

**Exit Question:** Can you describe a new way to tessellate a shape or pattern you have learned about today?