

4th Grade Math: Identifying Tessellations

Lesson Objective:

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

- Understand the concept of tessellations.
- Identify and create tessellations using regular and irregular shapes.
- Explore real-world examples of tessellations in art and nature.

1. Introduction to Tessellations

What is a Tessellation?

- A **tessellation** is a pattern made up of one or more shapes that fit together without any gaps or overlaps to cover a plane completely.
- Tessellations can use shapes that are regular (all sides and angles are the same) or irregular.

Key Concepts:

- **Regular Tessellation:** Uses only one type of regular polygon (e.g., equilateral triangles, squares, hexagons).
- **Irregular Tessellation:** Uses more complex shapes or combinations of shapes.

2. Identifying Tessellations

Regular Tessellations

1. **Shapes Used in Regular Tessellations:**
 - **Equilateral Triangle:** Each triangle fits perfectly with its neighbors.
 - **Square:** Each square fits perfectly with its neighbors.
 - **Regular Hexagon:** Each hexagon fits perfectly with its neighbors.
2. **Activity: Finding Regular Tessellations**
 - **Materials:** Printed patterns or images of tessellations.
 - **Instructions:**
 - Examine the patterns to identify if they use one type of regular polygon.
 - Discuss how the shapes fit together without gaps or overlaps.
 - Identify the regular tessellations from a selection of patterns.

Irregular Tessellations

1. **Shapes Used in Irregular Tessellations:**
 - Can include combinations of different shapes, like triangles, squares, and hexagons, or more complex shapes.
2. **Activity: Finding Irregular Tessellations**

- **Materials:** Printed patterns or images of tessellations.
- **Instructions:**
 - Look for patterns where different shapes fit together to cover the plane without gaps or overlaps.
 - Identify and discuss how the different shapes are arranged.

3. Creating Tessellations

Regular Tessellation Creation

1. **Activity: Making a Tessellation with Squares**
 - **Materials:** Graph paper, colored pencils, and rulers.
 - **Instructions:**
 - Draw a grid of squares on the graph paper.
 - Color each square in a pattern that repeats to form a tessellation.
 - Ensure that the squares fit together perfectly.
2. **Activity: Making a Tessellation with Equilateral Triangles**
 - **Materials:** Graph paper, colored pencils, and rulers.
 - **Instructions:**
 - Draw a grid of equilateral triangles on the graph paper.
 - Color each triangle to create a repeating tessellation pattern.

Irregular Tessellation Creation

1. **Activity: Designing an Irregular Tessellation**
 - **Materials:** Plain paper, scissors, and colored pencils.
 - **Instructions:**
 - Cut out a shape from the paper that will tessellate (fit together without gaps) with copies of itself.
 - Use the cut-out shape to trace and create a tessellation on the paper.
 - Color the tessellation pattern.

4. Real-World Applications of Tessellations

Art and Design:

- Tessellations are often used in art and design to create visually interesting patterns. Famous examples include the work of M.C. Escher.

Nature:

- Tessellations can be seen in nature, such as the patterns on honeycombs, turtle shells, and some animal skins.

Architecture:

- Tessellations are used in architecture and tiling to create decorative and functional patterns.

5. Group Activity: Tessellation Exploration

Objective:

- Explore and create tessellations as a group activity.

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 either regular or irregular shapes.
4. Groups share their tessellations with the class and explain the process and patterns used.

6. Practice Problems

1. **Problem 1:** Draw a tessellation using squares. Color the tessellation to show how the squares fit together without gaps or overlaps.
2. **Problem 2:** Identify if the following patterns are tessellations. Explain why or why not.

[Insert images of different patterns]

3. **Problem 3:** Create a tessellation with a shape of your choice. Show how the shape fits together to cover a plane completely.

7. Review and Wrap-Up

Key Points to Remember:

- A **tessellation** is a pattern of shapes that covers a plane with no gaps or overlaps.
- **Regular Tessellations** use one type of regular polygon.
- **Irregular Tessellations** use combinations of different shapes.
- Tessellations are found in art, nature, and architecture.

Exit Question: Can you give an example of where you might see tessellations in real life and describe how the shapes fit together?