4th Grade Math: Composite Figures

Lesson Objective:

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

- Identify composite figures.
- Break down composite figures into simpler shapes.
- Calculate the area and perimeter of composite figures by adding the areas of the simpler shapes.

1. Introduction to Composite Figures

What is a Composite Figure?

- A **composite figure** is a shape that is made up of two or more simple geometric shapes (like rectangles, squares, triangles, and circles).
- We can find the **area** and **perimeter** of a composite figure by breaking it down into smaller shapes and calculating each shape separately.

Example:

- Imagine a house made of a rectangle (for the body) and a triangle (for the roof). This is a composite figure because it is made of two simpler shapes.

2. Breaking Down Composite Figures

To solve problems with composite figures, follow these steps:

1. **Identify** the simpler shapes that make up the composite figure.
2. **Calculate the area** of each simple shape.
3. **Add the areas** of the shapes to get the total area of the composite figure.

Example 1:

A shape is made up of a rectangle and a triangle on top.

- **Rectangle dimensions:** Length = 8 cm, Width = 4 cm
- **Triangle dimensions:** Base = 8 cm, Height = 3 cm

Step 1: Break the figure into a rectangle and a triangle.

- **Step 2:** Calculate the area of the rectangle:

$$\text{Area of Rectangle} = \text{Length} \times \text{Width} = 8 \times 4 = 32 \text{ cm}^2$$

- **Step 3:** Calculate the area of the triangle:

$$\text{Area of Triangle} = \frac{1}{2} \times \text{Base} \times \text{Height} = \frac{1}{2} \times 8 \times 3 = 12 \text{ cm}^2$$

- **Step 4:** Add the two areas together:

$$\text{Total Area} = 32 + 12 = 44 \text{ cm}^2$$

3. Calculating the Perimeter of Composite Figures

To calculate the **perimeter** of a composite figure:

1. **Identify** the outside edges of the figure.
2. **Add the lengths** of all the outside edges to find the total perimeter.

Example 2:

A composite figure is made of two rectangles.

- **Rectangle 1 dimensions:** Length = 6 meters, Width = 3 meters
- **Rectangle 2 dimensions:** Length = 4 meters, Width = 2 meters

Step 1: Add the outside edges of both rectangles.

- **Perimeter of Rectangle 1:**

$$2 \times (6 + 3) = 2 \times 9 = 18 \text{ meters}$$

- **Perimeter of Rectangle 2:**

$$2 \times (4 + 2) = 2 \times 6 = 12 \text{ meters}$$

Step 2: The composite perimeter includes all outer edges, so you combine the non-overlapping edges. Pay attention to the layout of the shapes!

4. Practice Problems

Problem 1:

A composite figure consists of a rectangle and a square.

- **Rectangle dimensions:** Length = 10 cm, Width = 5 cm
- **Square dimensions:** Side length = 3 cm

Find the total **area** of the composite figure.

Problem 2:

A playground is shaped like an L, made up of two rectangles.

- **Rectangle 1 dimensions:** Length = 12 feet, Width = 8 feet
- **Rectangle 2 dimensions:** Length = 6 feet, Width = 4 feet

Find the **perimeter** of the playground.

5. Real-World Application

Example:

You are designing a garden that has two parts:

- One part is a rectangular flower bed that is 8 meters long and 6 meters wide.
- Another part is a triangular vegetable bed that has a base of 8 meters and a height of 4 meters.

Step 1: Break down the garden into a rectangle and a triangle.

Step 2: Calculate the area of the rectangle:

$$\text{Area of Rectangle} = 8 \times 6 = 48 \text{ square meters}$$

Step 3: Calculate the area of the triangle:

$$\text{Area of Triangle} = \frac{1}{2} \times 8 \times 4 = 16 \text{ square meters}$$

Step 4: Add the areas together:

$$\text{Total Area} = 48 + 16 = 64 \text{ square meters}$$

The total area of the garden is 64 square meters.

6. Extension Activity

Create Your Own Composite Figure:

- Draw a composite figure by combining two or more shapes (like rectangles, triangles, or squares).
- Calculate the area and perimeter of your shape.
- Share your drawing with a classmate and compare your calculations.

7. Review and Wrap-Up

Key Takeaways:

- A **composite figure** is made up of simpler shapes.
- You can find the area and perimeter of a composite figure by breaking it into smaller shapes, calculating their areas and perimeters, and then combining the results.

Exit Question: A composite figure is made up of a rectangle and a triangle. If the rectangle has an area of 24 square centimeters and the triangle has an area of 10 square centimeters, what is the total area of the figure?