



These connections are to be used as a resource to integrate and connect related concepts and skills that support and enrich the content standards.

Core Standard

4.3 **Measurement**: Develop an understanding of area and determine the areas of two-dimensional shapes.

Content Standards

- 4.3.1 Recognize area as an attribute of two-dimensional regions.
- 4.3.2 Determine area by finding the total number of same-sized units of area that cover a shape without gaps or overlaps.
- 4.3.3 Recognize a square that is one unit on a side as the standard unit for measuring area.
- 4.3.4 Determine the appropriate units, strategies, and tools to solving problems that involve estimating or measuring area.
- 4.3.5 Connect area measure to the area model used to represent multiplication and use this to justify the formula for area of a rectangle.
- 4.3.6 Find the areas of complex shapes that can be subdivided into rectangles.
- 4.3.7 Solve problems involving perimeters and areas of rectangles and squares.
- 4.3.8 Recognize that rectangles with the same area can have different perimeters and that rectangles with the same perimeter can have different areas.

Connections to the Standard

Key Connections to Prior Math Knowledge:

- Prior to 4th grade students developed an understanding of linear measurement and found the perimeter of two-dimensional shapes. (3.3.7)
- Earlier work included classifying triangles and analyzing quadrilaterals by their sides and angles. (3.3.3)
- In 3rd grade students classified angles as acute, right, or obtuse. Third grade students did so by comparing angle measures as greater than, less than, or equal to 90 degrees. They learned that a “square corner” is called a right angle and established this as a benchmark for estimating the size of other angles. (3.3.1)
- In 3rd grade, students classified polygons by the number of sides, and classified triangles by their side length and angle attributes. Students have already classified polygons as quadrilaterals and have analyzed the results of combining and subdividing quadrilaterals. (3.3.2 and 3.3.4)

Key Connections to Future Math Knowledge

- Fifth grade is the first time students are introduced to the concept of volume. However, the expectation is that students will progress from concrete to abstract problem solving situations that involve volume of rectangular prisms. Another important mathematical issue to consider is using the appropriate unit to describe volume versus perimeter or area. For example, when measuring area the unit should be expressed in square units and when measuring volume, cubic units should be used. It is extremely important that students understand when to use the appropriate unit and why that is so. (5.3.4)
- The work at 4th grade around the concept of area will be expanded to include surface area at 5th grade. (5.3.8 and 5.3.9)
- Students work building rectangles and squares on geoboards will help them focus on base length and height as they explore area formulas of more complex shapes in 5th grade (5.3.2)

Key Connection(s) to Current Grade Level Math Standards:

- Fourth grade is the first time students are introduced to the concept of area. They are expected to generate strategies to determine area of rectangles and squares. Students often confuse the concepts of area and perimeter. With careful scaffolding students will connect area models to understand and justify the formula for area. Pay careful attention to labels or questionings used while providing varied and multiple opportunities to explore dimensions of rectangles and record them in chart form. (4.3.1)
- Students should have many opportunities to solve problems with real-world settings. Intuitive concepts of area are developed when children cover index cards, book covers with color tiles, or design pet enclosures. (4.3.5)
- Students can build polygons on geoboards to explore how they can be divided into rectangular regions. (4.3.6)
- Measuring the areas of surfaces using nonstandard measures such as index cards, hexagons, and pizza the use of standard units. (4.3.4)
- Students should see that each length has a corresponding area unit: inch to square inch, foot to square foot, yard to square yard, centimeter to square centimeter, and meter to square meter. Because this can be an extremely complex concept it is important for students to see that one unit on the perimeter corresponds to one square unit of area. (4.3.3)

Key Connection(s) to Other Content Areas

- Science—Archeology, Engineering constructions
- Art—quilting
- Social Studies—mapping
- Music—Acoustics

Key Connection(s) to Real World:

- Gardening—Mowing a yard, or planting a garden,
- Construction—building a dog fence or run, laying carpet, painting a wall
- Sewing
- Quilting

Vocabulary:

area	two-dimensional	estimating
measurement	perimeter	rectangles
same-sized	gaps	overlaps
subdivided	length	width
dimensions	surface area	region
inch, foot, yard, mile	millimeter, centimeter, decimeter, meter, kilometer	square units of all linear measurement terms

Language of Math:

- When measuring area, the answer should be reflected as a square unit. (insert *examples of answers*)
- Cover a shape
- Words to describe dimension.
- The word *square* to describe units of area.

Common Mistakes and Associated Misconceptions:

- When asked to calculate the area of a rectangle, students add the side measures.
Possible misconception: Students confuse the formulas for perimeter and area.
- When students are given partial measures of dimensions they are unable to determine the missing dimensions.
Possible misconception: Students don't understand the properties of rectangular regions due to limited hands on experience.
- Students assume that different shapes with the same area have the same perimeter.
Possible misconception: Students often have difficulty understanding that rectangles with the same area can have different perimeters and that rectangles with the same perimeter can have different areas.

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