



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

5.3 **Geometry, Measurement, and Algebra**: Describe and relate two-dimensional shapes to three-dimensional shapes and analyze their properties, including volume and surface area.

Content Standards

- 5.3.1 Identify and classify triangles by their angles (acute, right, obtuse) and sides (scalene, isosceles, equilateral).
- 5.3.2 Find and justify relationships among the formulas for the areas of triangles and parallelograms.
- 5.3.3 Describe three-dimensional shapes (triangular and rectangular prisms, cube, triangular- and square-based pyramids, cylinder, cone, and sphere) by the number of edges, faces, and/or vertices as well as types of faces.
- 5.3.4 Recognize volume as an attribute of three-dimensional space.
- 5.3.5 Determine volume by finding the total number of same-sized units of volume that fill a three-dimensional shape without gaps or overlaps.
- 5.3.6 Recognize a cube that is one unit on an edge as the standard unit for measuring volume.
- 5.3.7 Determine the appropriate units, and tools for solving problems that involve estimating or measuring volume.
- 5.3.8 Decompose three-dimensional shapes and find surface areas and volumes of triangular and rectangular prisms.
- 5.3.9 Identify and measure necessary attributes of shapes to use area, surface area, and volume formulas to solve problems (e.g., to find which of two gift boxes needs the most wrapping paper or has the greater volume?).

Connections to the Standard

Key Connections to Prior Math Knowledge:

- In 3rd grade, students classified polygons by the number of sides, and classified triangles by their side length and angle attributes. (3.3.2 and 3.3.3)
- Students have already classified polygons as quadrilaterals and have analyzed the results of combining and subdividing quadrilaterals. In 3rd grade, students use these skills to analyze the quadrilaterals squares, rectangles, trapezoids, rhombuses, and parallelograms according to their properties. (3.3.3 and 3.3.4)
- It is important that students see many different examples/models of each type of quadrilateral (squares, rectangles, trapezoids, rhombuses, and parallelograms) so they will learn the unique properties of each. (3.3.6)
- Students should understand the relationship among the various quadrilaterals based on the number of sides, opposite sides, side lengths, and angle measures. By providing a variety of examples, the students are able to classify these quadrilaterals by their properties instead of a memorized picture of one example. (3.3.8)

- It is also important for the students to verbalize correct vocabulary (squares, rectangles, trapezoids, rhombuses, and parallelograms) as they explore these different quadrilaterals. Sorting examples into their group as they name the quadrilateral is a good way for the students to practice this skill. (3.3.3)
- In 3rd Grade students use an appropriate strategy to find the perimeter of polygons. (3.3.7)
- In 4th Grade students recognize area as an attribute of two-dimensional shapes. (4.3.1)

Key Connections to Future Math Knowledge:

- It is important for teachers to lay the foundation for area and volume of three-dimensional shapes for 7th grade standards. (7.3.4, 7.3.5, and 7.3.6)

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

- In 5th grade, students should describe the front, top, and side views of a three-dimensional object built with cubes. (5.3.3)
- Students should be able to decompose a net for a given three-dimensional shape and construct and/or state the three-dimensional shape when given its two-dimensional representation (net). (5.3.8)
- Fifth grade is the first time students are introduced to the measurement tool protractor. (5.3.7)
- Building on the key concepts for area and perimeter covered in 3rd and 4th grade, students will determine volume of three-dimensional shapes. (5.3.4 and 5.3.5)

Key Connection(s) to Other Content Areas

- Science—using different containers to measure materials
- Social Studies—mapping (topographical maps)
- Art—drawing and design, for example incorporating or using isometric dot paper in guiding the students to draw three-dimensional objects

Key Connection(s) to Real World:

- Construction—Architecture
- Technology—CAD (computer drawing)
- Home—bathtub, sink, storage container

Vocabulary:

angles	acute	right
obtuse	scalene	isosceles
equilateral	sides	formulas
area	three-dimensional shapes	volume
cube	estimating	measurement
triangular prism	Rectangular prism	cube
triangular pyramid	edges	faces
vertices	surface area	attribute
square based pyramid	cylinder	cone
sphere	decompose	

Language of Math:

- Nets/representation
- Decompose

Common Mistakes and Associated Misconceptions:

- Students confuse edges, faces, and vertices as well as types of faces.
Possible misconception: They don't understand the types of faces and how they apply to different three-dimensional shapes.
- Students often lose track of the original shape when converting it to a three-dimensional shape.
Possible misconception: They all convert the same way not taking into consideration the structural differences.

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