

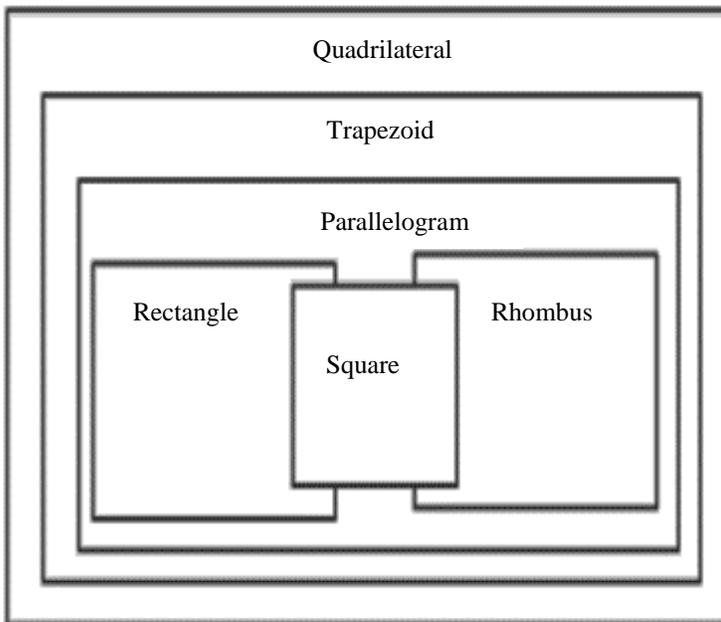
## Unit 7 Focus

Students have had previous experiences classifying shapes using defining attributes, and this unit extends this concept to set a foundation for understanding the properties. Students build on the geometry concepts they developed beginning in Kindergarten and continuing through 4th grade as students described, analyzed, created, and compared properties of shapes. They compared and classified shapes by their sides and angles, and connected these with definitions of shapes. They looked at the presence or absence of parallel and perpendicular lines or the presence or absence of angles of a specified size to classify two-dimensional shapes.

Now, students are continuing to classify two-dimensional shapes in a hierarchy based on properties. Details learned in earlier grades need to be used in the descriptions of the attributes of shapes. The more the students can classify and discriminate shapes, the better they can understand them.



### Example of Hierarchy for Quadrilaterals



- **Quadrilateral** – polygon with exactly four sides.
- **Trapezoid** – quadrilateral with at least one pair of parallel sides.
- **Parallelogram** – quadrilateral with two pairs of parallel sides.
- **Rectangle** – parallelogram with four right angles.
- **Rhombus** – parallelogram with all sides congruent.
- **Square** – parallelogram with four right angles and all sides congruent.

### UNIT 7 GOALS:

- Describe properties of a variety of shapes including but not limited to triangles, quadrilaterals (parallelograms, trapezoids, rectangles, rhombi, squares), pentagons, hexagons, and octagons.
- Identify whether a shape has a specified property.
- Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category.
- Organize a hierarchy of polygons
- Reason about attributes of shapes to determine whether or not they belong in given categories.
- Classify two-dimensional figures based on properties.
- Understand volume can be determined by finding the product of the area of the base times the height  $V = Bh$  and  $V = lwh$ .
- Estimate and determine the volume of cubes and rectangular prisms.
- Compare the volume of different objects with and without formulae.
- Measure solid cubes and rectangular prisms using standard customary and metric measures.
- Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.

### Sample questions that might be posed to students include:

- A parallelogram has 4 sides with both sets of opposite sides parallel. *What types of quadrilaterals are parallelograms?*
- Regular polygons have all of their sides and angles congruent. *Name or draw some regular polygons.*
- All rectangles have 4 right angles. Squares have 4 right angles so they are also rectangles. *True or False?*

Students can use Venn diagrams to compare and contrast the attributes of geometric figures. This will allow a visual recognition that classifications can overlap.

Pose questions such as:

- *Why is a square always a rectangle?"*
- *Why is a rectangle not always a square?*

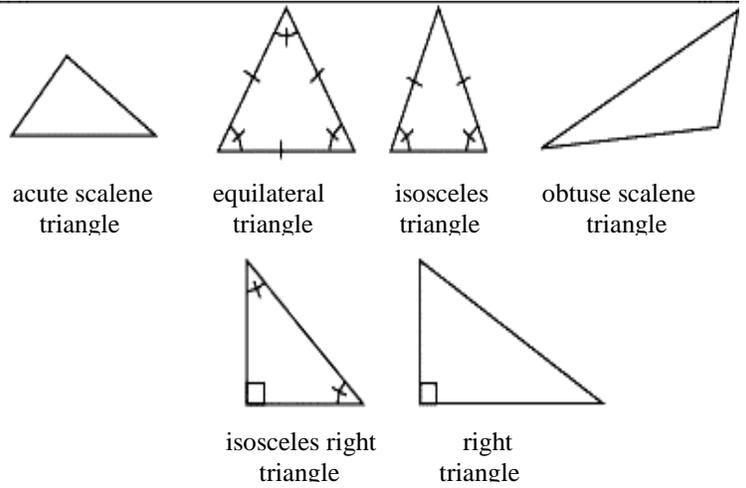
Triangles can be classified by:

**Angles**

- **Right:** The triangle has one angle that measures  $90^\circ$ .
- **Acute:** The triangle has exactly three angles that measure between  $0^\circ$  and  $90^\circ$ .
- **Obtuse:** The triangle has exactly one angle that measures greater than  $90^\circ$  and less than  $180^\circ$ .

**Sides**

- **Equilateral:** All sides of the triangle are the same length.
- **Isosceles:** At least two sides of the triangle are the same length.
- **Scalene:** No sides of the triangle are the same length.



Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.

Figure A.

In Figure A, I found the volume of Prism 1 and the volume of Prism 2 and then combined these measurements to find the total volume for Figure A.

Prism 1:  $2m \times 2m \times 2m = 8m^3$

Prism 2:  $6m \times 2m \times 2m = 24m^3$

Volume of Prism 1 + Volume of Prism 2 =  $32m^3$

The volume of Figure A is  $32m^3$ .

Figure B.

In Figure B, I found the volume of Prism 1 and the volume of Prism 2 and then combined these measurements to find the total volume for Figure A.

Prism 1:  $3in \times 5in \times 2in = 30in^3$

Prism 2:  $6in \times 5in \times 4in = 120in^3$

Volume of Prism 1 + Volume of Prism 2 =  $150in^3$

The volume of Figure B is  $150in^3$ .

Solve word problems involving the volume of rectangular prisms with whole number edge lengths.

Geoffrey wants to grow some tomatoes in four large planters. He wants each planter to have a volume of 320 cubic feet, but he wants them all to be different. Show four different ways Geoffrey can make these planters, and draw diagrams with the planters' measurements on them.

