| Graph points on the coordinate plane to solve real-world and mathematical problems in quadrant one (Standards 5.G.1–2). |
|---|

**Standard 5.G.1** Compose and understand the coordinate plane.
**a.** Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the zero on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates.
**b.** Using quadrant one on the coordinate plane, understand that the first number in a coordinate pair indicates how far to travel from the origin in the direction of the horizontal axis, and the second number indicates how far to travel in the direction of the vertical axis, with the convention that the names of the two axes and the coordinates correspond (*x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate).

### Concepts and Skills to Master

- Compose the coordinate plane
- Describe the coordinate plane using mathematically correct language, including the terms *x*-axis, *y*-axis, origin
- Understand that the origin represents 0 on the *x*-axis and 0 on the *y*-axis
- Understand that an ordered pair describes a location with respect to the origin
- Understand that ordered pairs are written as (*x*, *y*), with *x* being the distance from the origin in the horizontal direction and y being the distance from the origin in the vertical direction
- Name points using ordered pairs of whole numbers
- Locate points given an ordered pair of whole numbers

Teacher Note: Students at this grade level are required to work in Quadrant I only.

| Related Standards: Current Grade Level | Related Standards: Future Grade Levels |
|---|---|
| **5.G.2** Represent real-world and mathematical problems by graphing points in the first quadrant of the coordinate plane<br>**5.OA.3** Form ordered pairs consisting of corresponding terms from two numerical patterns and graph the ordered pairs on a coordinate plane | **6.NS.6** Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates<br>**6.NS.7** Understand ordering and absolute value of rational numbers<br>**6.NS.8** Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane |

### Critical Background Knowledge from Previous Grade Levels

- Draw perpendicular and parallel lines (4.G.1)
- Represent fractions on a number line diagram (3.NF.2)
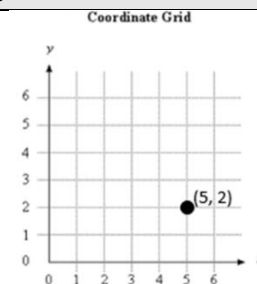- Represent whole numbers on a number line diagram (2.MD.6)
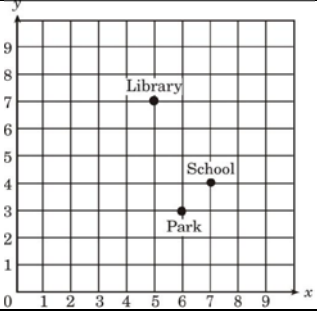
| Academic Vocabulary | Suggested Models |
|---|---|
| perpendicular, right angle, intersect, vertical, horizontal, axis, *x*-axis, *y*-axis, coordinate plane/grid, origin, *x*-coordinate, *y*-coordinate, ordered pair, intervals, coordinates, Quadrant I | |

### Suggested Strategies

- Locate points on horizontal and vertical number lines
- Tape axes on a tiled area and have students stand in the correct location given an ordered pair
- Play coordinate grid Battleship (adaptation from regular Battleship)



5.G.1

| Graph points on the coordinate plane to solve real-world and mathematical problems in quadrant one (Standards 5.G.1–2) |
|---|

**Standard 5.G.2** Represent real-world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

## Concepts and Skills to Master

- Understand that ordered pairs are written as (x, y), with x being the distance from the origin in the horizontal direction and y being the distance from the origin in the vertical direction
- Name points using ordered pairs of whole numbers
- Locate points given an ordered pair of whole numbers
- Identify real-world situations that could be represented on a coordinate plane
- Interpret the value of the x- and y-coordinates within a given situation

Teacher Note: Students at this grade level are required to work in Quadrant I only.

| Related Standards: Current Course | Related Standards: Future Courses |
|---|---|
| **5.G.1** Compose and understand the coordinate plane<br>**5.OA.3** Form ordered pairs consisting of corresponding terms from two numerical patterns and graph the ordered pairs on a coordinate plane | **6.NS.6** Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates<br>**6.NS.7** Understand ordering and absolute value of rational numbers<br>**6.NS.8** Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane<br>**6.EE.9** Analyze the relationship between the dependent and independent variables using graphs and tables<br>**7.RP.3d** Explain what a point (x, y) on a graph means |

## Critical Background Knowledge from Previous Grade Levels

- Compose and understand the coordinate plane (5.G.1)
- Draw perpendicular and parallel lines (4.G.1)
- Represent fractions on a number line diagram (3.NF.2)
- Represent whole numbers on a number line diagram (2.MD.6)
- Partition rectangles into rows and columns of equal sized squares (2.G.2)

## Academic Vocabulary

perpendicular, intersect, vertical, horizontal, *x*-axis, *y*-axis, coordinate plane/grid, origin, *x*-coordinate, *y*-coordinate, ordered pair, Quadrant I, coordinates

| Suggested Models | Suggested Strategies |
|---|---|
|  | - Create a treasure map on a coordinate grid. Give clues and locations using ordered pairs to find a treasure<br>- Tape axes on a tiled area and have students stand in the correct location given an ordered pair<br>- Play coordinate grid Battleship (adaptation from regular Battleship)<br>- Use maps with identified locations. State the coordinates of various buildings or points of interest<br>- Identify the coordinates of missing points in geometric figures, such as squares, rectangles, and parallelograms.<br>- Present students with graphs that have labeled axes (outside temperature and number of ice cream treats sold) and given a point, ask them to determine what the value of the x- or the y-coordinate represents |

Image Source: http://www.dpi.state.nc.us/docs/curriculum/mathematics/scos/5.pdf

| Classify two-dimensional figures into categories based on their properties. (Standards 5.G.3–4). |

**Standard 5.G.3** Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. *For example, all rectangles have four right angles and all squares are rectangles, so all squares have four right angles.*

| Concepts and Skills to Master |

- Identify, compare, contrast, and describe the attributes of two-dimensional figures
- Recognize shapes that belong to the larger category; Identify examples and non-examples of two-dimensional figures
- Understand that the larger category includes other subcategories.  For example, conclude that all rectangles are parallelograms, because they are all quadrilaterals with two pairs of opposite, parallel, equal-length sides

Teacher Note:  Note that in the U.S., that the term "trapezoid" may have two different meanings. Research identifies these as inclusive and exclusive definitions. The inclusive definition states: A trapezoid is a quadrilateral with at least one pair of parallel sides. The exclusive definition states: A trapezoid is a quadrilateral with exactly one pair of parallel sides. Both definitions are accepted in the United States. Utah has adopted the inclusive definition. **A trapezoid is a quadrilateral with at least one pair of parallel sides.** The inclusive definition is the most accepted definition worldwide and is the definition used by the Utah State Board of Education for standard and assessment purposes. The notion of congruence ("same size and same shape") may be part of classroom conversation but the concepts of congruence and similarity do not appear until middle school.

| Related Standards: Current Grade Level | Related Standards: Future Grade Levels |
|---|---|
| **5.G.4** Classify two-dimensional figures in a hierarchy based on properties. | **6.G.1** Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing and decomposing into rectangles, triangles and/or other shapes. |
| | **7.G.2** Draw geometric shapes with given conditions. |

| Critical Background Knowledge from Previous Grade Levels |

- Understand that shapes in different categories may share attributes, and that the shared attributes can define a larger category. Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories. (4.G.1)
- Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size.  Recognize right triangles as a category, and identify right triangles. (4.G.2)
- Recognize angles as geometric figures that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement. (4.MD.5)
- Understand that shapes in different categories may share attributes, and that the shared attributes can define a larger category. Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories. (3.G.1)
- Recognize and draw shapes having specified attributes, such as a given number of sides of angles. Identify and describe quadrilaterals, squares, rectangles, and trapezoids (2.G.1)

| Academic Vocabulary |

polygon, angle, line, parallel, perpendicular, triangle, quadrilateral, pentagon, trapezoid, hexagon, parallelogram, rectangle, rhombus, square, acute angle, right angle, obtuse angle, two-dimensional, subset, subcategories, properties, line segment

| Suggested Models | Suggested Strategies |
|---|---|
| Here is an example when a parallelogram is a rectangle:<br><br><br>Here is an example when a parallelogram is *not* a rectangle: | • Decide whether each of these statements is always, sometimes, or never true.  If it is sometimes true, draw and describe a figure for which the statement is true and another figure for which the statement is not true. (See suggested model.)<br>- A rhombus is a square<br>- A triangle is a parallelogram<br>- A square is a parallelogram<br>- A square is a rhombus<br>- A parallelogram is a rectangle<br>- A trapezoid is a quadrilateral<br>• Lead discussions having students reason about the attributes of shapes |

Image Source: https://www.illustrativemathematics.org/content-standards/5/G/B/3/tasks/1941

5.G.3

| Classify two-dimensional figures into categories based on their properties. (Standards 5.G.3–4) |
|---|

**Standard 5.G.4** Classify two-dimensional figures in a hierarchy based on properties.

## Concepts and Skills to Master

- Reason about the attributes of two-dimensional shapes by examining
- Classify two-dimensional figures in a hierarchy based on properties
- Relate certain categories of shapes as categories of other categories

Teacher Note: Note that in the U.S., that the term "trapezoid" may have two different meanings. Research identifies these as inclusive and exclusive definitions. The inclusive definition states: A trapezoid is a quadrilateral with at least one pair of parallel sides. The exclusive definition states: A trapezoid is a quadrilateral with exactly one pair of parallel sides. Both definitions are accepted in the United States. Utah has adopted the inclusive definition. **A trapezoid is a quadrilateral with at least one pair of parallel sides.** The inclusive definition is the most accepted definition worldwide and is the definition used by the Utah State Board of Education for standard and assessment purposes.

| Related Standards: Current Grade Level | Related Standards: Future Grade Levels |
|---|---|
| **5.G.3** Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category | **6.G.1** Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing and decomposing into rectangles, triangles and/or other shapes.<br>**7.G.2** Draw geometric shapes with given conditions. |

## Critical Background Knowledge from Previous Grade Levels

- Understand that shapes in different categories may share attributes, and that the shared attributes can define a larger category. Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories. (4.G.1)
- Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles. (4.G.2)
- Recognize angles as geometric figures that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement. (4.MD.5)
- Understand that shapes in different categories may share attributes, and that the shared attributes can define a larger category. Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories. (3.G.1)
- Recognize and draw shapes having specified attributes, such as a given number of sides of angles. Identify and describe quadrilaterals, squares, rectangles, and trapezoids (2.G.1)

## Academic Vocabulary

polygon, angle ($\angle$), line, parallel ($\parallel$), perpendicular ($\perp$), triangle, quadrilateral, pentagon, hexagon, parallelogram, rectangle, rhombus, square, acute angle, right angle ($\llcorner$), obtuse angle, trapezoid, two-dimensional, subcategory, category

5.G.4

| Suggested Models | Suggested Strategies |
|---|---|
| 

Venn diagram showing classification of quadrilaterals
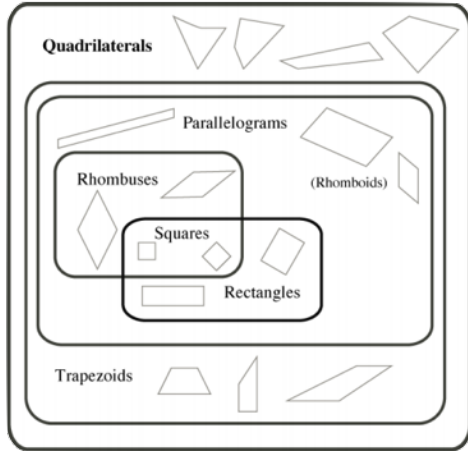
Note that rhomboids are parallelograms that are not rhombuses or rectangles. This example uses the inclusive definition of trapezoid (see p. [pageref "T(E)")]).

quadrilateral – a four-sided polygon.
parallelogram – a quadrilateral with two pairs of parallel and congruent sides.
rectangle – a quadrilateral with two pairs of congruent, parallel sides and four right angles.
rhombus – a parallelogram with all four sides equal in length.
square – a parallelogram with four congruent sides and four right angles.
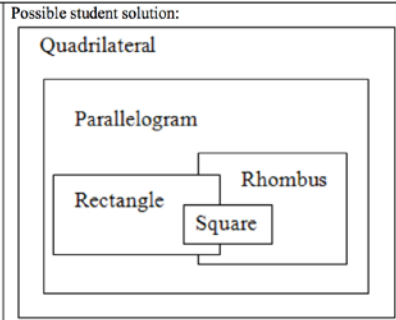
Possible student solution: | • Sort given shapes using a graphic organizer such as a bull's-eye graph or Venn diagram or reference chart
• Use graphic organizers, diagrams, reference charts
• Sequence shapes and their properties into a hierarchy
• Lead discussions having students reason about the attributes of shapes
• Create a property lists for a given two-dimensional figure (for example quadrilaterals) Assign students to work with one type of quadrilateral.  List as many properties as they can that apply to their shape.  Compare and contrast the given shapes and their properties
• Make a property list using headings such as sides, angles, symmetries etc. Students can add shapes to the given property categories |

Image Sources: http://commoncoretools.me/wp-content/uploads/2014/12/ccss_progression_gk6_2014_12_27.pdf; http://www.dpi.state.nc.us/docs/curriculum/mathematics/scos/5.pdf

5.G.4