

## Geometry standards: Book K

### Create, explore, and describe shapes

**G.GS.00.01** Relate familiar three-dimensional objects inside and outside the classroom to their geometric name, e.g., ball/sphere, box/cube, soup can/cylinder, ice cream cone/cone, refrigerator/prism.

**G.GS.00.02** Identify, sort, and classify objects by attribute and identify objects that do not belong in a particular group.

### Explore geometric patterns

**G.GS.00.03** Create, describe, and extend simple geometric patterns.

## Geometry standards: Book 1

### **Create and describe shapes**

**G.GS.01.01** Create common two-dimensional and three-dimensional shapes, and describe their physical and geometric attributes, such as color and shape.

**G.LO.01.02** Describe relative position of objects on a plane and in space, using words such as above, below, behind, in front of.

### **Create and describe patterns involving geometric objects**

**G.SR.01.03** Create and describe patterns, such as repeating patterns and growing patterns using number, shape, and size.

**G.SR.01.04** Distinguish between repeating and growing patterns.

**G.SR.01.05** Predict the next element in a simple repeating pattern.

**G.SR.01.06** Describe ways to get to the next element in simple repeating patterns.

## Geometry standards: Book 2

### Identify and describe shapes

**G.GS.02.01** Identify, describe, and compare familiar two-dimensional and three-dimensional shapes, such as triangles, rectangles, squares, circles, semi-circles, spheres, and rectangular prisms.

**G.GS.02.02** Explore and predict the results of putting together and taking apart two-dimensional and three-dimensional shapes.

**G.GS.02.04** Distinguish between curves and straight lines and between curved surfaces and flat surfaces.

**G.SR.02.05** Classify familiar plane and solid objects, e.g., square, rectangle, rhombus, cube, pyramid, prism, cone, cylinder, and sphere, by common attributes such as shape, size, color, roundness, or number of corners and explain which attributes are being used for classification.

**G.TR.02.06** Recognize that shapes that have been slid, turned, or flipped are the same shape, e.g., a square rotated  $45^\circ$  is still a square.

### Use coordinate systems

**G.LO.02.07** Find and name locations using simple coordinate systems such as maps and first quadrant grids.

## Geometry standards: Book 3

### **Recognize the basic elements of geometric objects**

**G.GS.03.01** Identify points, line segments, lines, and distance.

**G.GS.03.02** Identify perpendicular lines and parallel lines in familiar shapes and in the classroom.

**G.GS.03.03** Identify parallel faces of rectangular prisms in familiar shapes and in the classroom.

### **Name and explore properties of shapes**

**G.GS.03.04** Identify, describe, compare, and classify two-dimensional shapes, e.g., parallelogram, trapezoid, circle, rectangle, square, and rhombus, based on their component parts (angles, sides, vertices, line segment) and on the number of sides and vertices.

**G.SR.03.05** Compose and decompose triangles and rectangles to form other familiar two-dimensional shapes, e.g., form a rectangle using two congruent right triangles, or decompose a parallelogram into a rectangle and two right triangles.

### **Explore and name three-dimensional solids**

**G.GS.03.06** Identify, describe, build, and classify familiar three-dimensional solids, e.g., cube, rectangular prism, sphere, pyramid, cone, based on their component parts (faces, surfaces, bases, edges, vertices).

**G.SR.03.07** Represent front, top, and side views of solids built with cubes.

## Geometry standards: Book 4

### Understand perpendicular, parallel, and intersecting lines

**G.GS.04.01** Identify and draw perpendicular, parallel, and intersecting lines using a ruler and a tool or object with a square ( $90^\circ$ ) corner.

### Identify basic geometric shapes and their components, and solve problems

**G.GS.04.02** Identify basic geometric shapes including isosceles, equilateral, and right triangles, and use their properties to solve problems.

**G.SR.04.03** Identify and count the faces, edges, and vertices of basic three-dimensional geometric solids including cubes, rectangular prisms, and pyramids; describe the shape of their faces.

### Recognize symmetry and transformations

**G.TR.04.04** Recognize plane figures that have line symmetry.

**G.TR.04.05** Recognize rigid motion transformations (flips, slides, turns) of a two-dimensional object.

## Geometry standards: Book 5

### Know the meaning of angles, and solve problems

**G.TR.05.01** Associate an angle with a certain amount of turning; know that angles are measured in degrees; understand that  $90^\circ$ ,  $180^\circ$ ,  $270^\circ$ , and  $360^\circ$  are associated respectively, with  $\frac{1}{4}$ ,  $\frac{1}{2}$ , and  $\frac{3}{4}$ , and full turns.

**G.GS.05.02** Measure angles with a protractor and classify them as acute, right, obtuse, or straight.

**G.GS.05.03** Identify and name angles on a straight line and vertical angles.

**G.GS.05.04** Find unknown angles in problems involving angles on a straight line, angles surrounding a point, and vertical angles.

**G.GS.05.05** Know that angles on a straight line add up to  $180^\circ$  and angles surrounding a point add up to  $360^\circ$ ; justify informally by "surrounding" a point with angles.

**G.GS.05.06** Understand why the sum of the interior angles of a triangle is  $180^\circ$  and the sum of the interior angles of a quadrilateral is  $360^\circ$ , and use these properties to solve problems.

### Solve problems about geometric shapes

**G.GS.05.07** Find unknown angles and sides using the properties of: triangles, including right, isosceles, and equilateral triangles; parallelograms, including rectangles and rhombuses; and trapezoids.

## Geometry standards: Book 6

### Understand and apply basic properties

**G.GS.06.01** Understand and apply basic properties of lines, angles, and triangles, including:

- triangle inequality
- relationships of vertical angles, complementary angles, supplementary angles
- congruence of corresponding and alternate interior angles when parallel lines are cut by a transversal, and that such congruencies imply parallel lines
- locate interior and exterior angles of any triangle, and use the property that an exterior angle of a triangle is equal to the sum of the remote (opposite) interior angles
- know that the sum of the exterior angles of a convex polygon is  $360^\circ$ .

### Understand the concept of congruence and basic transformations

**G.GS.06.02** Understand that for polygons, congruence means corresponding sides and angles have equal measures.

**G.TR.06.03** Understand the basic rigid motions in the plane (reflections, rotations, translations), relate these to congruence, and apply them to solve problems.

**G.TR.06.04** Understand and use simple compositions of basic rigid transformations, e.g., a translation followed by a reflection.

### Construct geometric shapes

**G.SR.06.05** Use paper folding to perform basic geometric constructions of perpendicular lines, midpoints of line segments and angle bisectors; justify informally.

## Geometry standards: Book 7

### Draw and construct geometric objects

**G.SR.07.01** Use a ruler and other tools to draw squares, rectangles, triangles, and parallelograms with specified dimensions.

**G.SR.07.02** Use compass and straightedge to perform basic geometric constructions: the perpendicular bisector of a segment, an equilateral triangle, and the bisector of an angle; understand informal justifications.

### Understand the concept of similar polygons, and solve related problems

**G.TR.07.03** Understand that in similar polygons, corresponding angles are congruent and the ratios of corresponding sides are equal; understand the concepts of similar figures and scale factor.

**G.TR.07.04** Solve problems about similar figures and scale drawings.

**G.TR.07.05** Show that two triangles are similar using the criteria: corresponding angles are congruent (AAA similarity); the ratios of two pairs of corresponding sides are equal and the included angles are congruent (SAS similarity); ratios of all pairs of corresponding sides are equal (SSS similarity); use these criteria to solve problems and to justify arguments.

**G.TR.07.06** Understand and use the fact that when two triangles are similar with scale factor of  $r$ , their areas are related by a factor of  $r^2$ .



## Geometry standards: Book 8

### Understand and use the Pythagorean Theorem

**G.GS.08.01** Understand at least one proof of the Pythagorean Theorem; use the Pythagorean Theorem and its converse to solve applied problems including perimeter, area, and volume problems.

**G.LO.08.02** Find the distance between two points on the coordinate plane using the distance formula; recognize that the distance formula is an application of the Pythagorean Theorem.

### Solve problems about geometric figures

**G.SR.08.03** Understand the definition of a circle; know and use the formulas for circumference and area of a circle to solve problems.

**G.SR.08.04** Find area and perimeter of complex figures by sub-dividing them into basic shapes (quadrilaterals, triangles, circles).

**G.SR.08.05** Solve applied problems involving areas of triangles, quadrilaterals, and circles.

### Understand concepts of volume and surface area, and apply formulas

**G.SR.08.06** Know the volume formulas for generalized cylinders ((area of base) x height), generalized cones and pyramids ( $\frac{1}{3}$  (area of base) x height), and spheres ( $\frac{4}{3} \pi (\text{radius})^3$ ) and apply them to solve problems.

**G.SR.08.07** Understand the concept of surface area, and find the surface area of prisms, cones, spheres, pyramids, and cylinders.

### Visualize solids

**G.SR.08.08** Sketch a variety of two-dimensional representations of three-dimensional solids including orthogonal views (top, front, and side), picture views (projective or isometric), and nets; use such two-dimensional representations to help solve problems.

**Understand and apply concepts of transformation and symmetry**

**G.TR.08.09** Understand the definition of a dilation from a point in the plane, and relate it to the definition of similar polygons.

**G.TR.08.10** Understand and use reflective and rotational symmetries of two-dimensional shapes and relate them to transformations to solve problems.