

Essentials of Math 1: Practical Geometry and Statistics

DATA, PROBABILITY, AND STATISTICAL REASONING

1 Summarize, represent, and interpret data on two categorical and quantitative variables. [GS.DPSR.1](#)

- 1 Represent data for two quantitative variables on a scatter plot and describe how the variables are related. [GS.DPSR.1.1](#)
- 2 Use two representative points from the data to find an approximate line of fit and compare it to the line of best fit. [GS.DPSR.1.2](#)
- 3 Conduct an investigation for a statistical question, interpret statistical significance in the context of a situation, and answer investigative questions appropriately. [GS.DPSR.1.3](#)

2 Analyze and interpret models for two quantitative variables [GS.DPSR.2](#)

- 1 Distinguish between correlation and causation. [GS.DPSR.2.1](#)

3 Solve problems involving the probability of compound events in real-world situations. [GS.DPSR.3](#)

- 1 Describe categories of events as subsets of a sample space using unions, intersections, or complements of other events. [GS.DPSR.3.1](#)
- 2 Apply the Addition Rule to find the probability of both mutually exclusive and not mutually exclusive events and interpret the answers in context. [GS.DPSR.3.2](#)
- 3 Apply the Multiplication Rule to determine the probability of independent events and interpret the answers in context. [GS.DPSR.3.3](#)

MEASUREMENT, GEOMETRY, AND SPATIAL REASONING

1 Compute area and volume of figures by determining how the figure might be obtained from simpler figures by dissection and recombination. [GS.MGSR.1](#)

- 1 Apply area and volume formulas of two and three-dimensional figures to solve real-world situations. [GS.MGSR.1.1](#)
- 2 Identify the shape of a two-dimensional cross-section of a three-dimensional figure. [GS.MGSR.1.2](#)
- 3 Use cross-sections of three-dimensional figures to model and solve mathematical and real-world situations. [GS.MGSR.1.3](#)

2 Apply rigid geometric transformations to figures, describing their attributes and symmetries. [GS.MGSR.2](#)

- 1 Describe the results of transformations on a given figure using geometric terminology from the definitions of the transformations. [GS.MGSR.2.1](#)
 - 2 Describe and apply a sequence of transformations that maps a preimage onto its image. [GS.MGSR.2.2](#)
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3 Determine that two figures are congruent by demonstrating that a rigid motion or a sequence of rigid motions maps one figure onto the other. [GS.MGSR.3](#)

- 1 Identify types of symmetry of polygons, including line, point, rotational, and self congruence, and use symmetry to analyze mathematical situations. [GS.MGSR.3.1](#)
 - 2 Demonstrate that triangles and quadrilaterals are congruent by a combination of translations, rotations, and reflections. Use dynamic geometry software to demonstrate congruence. [GS.MGSR.3.2](#)
 - 3 Recognize the criteria for showing triangles are congruent using a sequence of rigid motions that map one triangle to another and justify that the two triangles are congruent by applying the Side-Side-Side, Side-Angle-Side, Angle-Side-Angle, Angle-Angle-Side, and Hypotenuse-Leg congruence conditions. [GS.MGSR.3.3](#)
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4 Determine that two figures are similar by demonstrating a similarity transformation or a sequence of similarity transformations that maps one figure onto the other. [GS.MGSR.4](#)

- 1 Demonstrate experimentally the properties of dilations given by a center and a scale factor. [GS.MGSR.4.1](#)
 - 2 Justify experimentally that a dilation of a line segment is longer or shorter, given the ratio. [GS.MGSR.4.2](#)
 - 3 Recognize that the criteria for showing triangles are similar using a similarity transformation that maps one figure to the other and justify the two triangles are similar by applying the Angle-Angle, Side-Side-Side, and Side-Angle-Side similarity conditions. [GS.MGSR.4.3](#)
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5 Demonstrate whether a conjecture or theorem is true or false using a variety of algebraic and geometric explanations. [GS.MGSR.5](#)

- 1 Justify and apply the attributes of angle relationships/lines in mathematical and real-world situations. [GS.MGSR.5.1](#)
 - 2 Apply the attributes of triangles in mathematical and real-world situations. [GS.MGSR.5.2](#)
 - 3 Apply the attributes of quadrilaterals, including diagonals, sides, and angles, to prove that a given quadrilateral is a parallelogram in mathematical and real-world situations. [GS.MGSR.5.3](#)
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6 Discover and apply relationships in similar right triangles. [GS.MGSR.6](#)

- 1 Discover and apply the converse of the Pythagorean Theorem. [GS.MGSR.6.1](#)
- 2 Discover and apply the constant ratios of the sides in 30-60-90 and 45-45-90 right triangles. [GS.MGSR.6.2](#)

- 3 Define the trigonometric ratios using the properties of similar right triangles. [GS.MGSR.6.3](#)
- 4 Determine the sine, cosine, and tangent of an acute angle in a right triangle in the context of mathematical and real-world situations. [GS.MGSR.6.4](#)
- 5 Apply trigonometric ratios (sine, cosine, tangent) and the Pythagorean Theorem to solve right triangle problems in real-life situations. [GS.MGSR.6.5](#)

7 Investigate and apply relationships among segments and angles in circles. [GS.MGSR.7](#)

- 1 Use angle and segment relationships in circles to solve mathematical and real world situations. [GS.MGSR.7.1](#)
- 2 Investigate and apply relationships in circles, inscribed angles, radii, secants, and chords; among inscribed angles, central angles, and circumscribed angles; and between radii and tangents to circles. [GS.MGSR.7.2](#)

NUMERICAL REASONING

1 Represent all points on the number line as irrational and rational numbers in the real number system. [GS.NR.1](#)

- 1 Rewrite numerical expressions of irrational and rational numbers involving radicals, including addition, subtraction, multiplication, and division, to recognize geometric patterns. [GS.NR.1.1](#)

PATTERNS, ALGEBRA, AND FUNCTIONAL REASONING

1 Analyze the structure of an equation or inequality to determine an efficient strategy to find a solution, if one exists, then justify the solution. [GS.PAFR.1](#)

- 1 Discover and apply the formulas for the length of an arc and the area of a sector in a circle to develop mathematical models and solve mathematical and real world situations. [GS.PAFR.1.1](#)
- 2 Analyze and apply the derivations of the formulas for the circumference of a circle, area of a circle, and volume of a cylinder, pyramid, and cone to model real phenomena and solve mathematical and real-world situations. [GS.PAFR.1.2](#)

2 Interpret the structure of expressions, equations, and inequalities to analyze and make predictions in different contexts. [GS.PAFR.2](#)

- 1 Apply surface area and volume formulas for prisms, cylinders, pyramids, cones, spheres, and/or compositions of figures to solve problems and justify results. [GS.PAFR.2.1](#)
- 2 Analyze slopes of lines to determine whether lines are parallel, perpendicular, or neither. Address the occurrence of coincidental lines. [GS.PAFR.2.2](#)
- 3 Determine the equation of a line passing through a given point that is parallel or perpendicular to a given line. [GS.PAFR.2.3](#)

3 Determine the exact or approximate solutions of equations and inequalities using graphs on the coordinate plane. [GS.PAFR.3](#)

- 1 Use coordinates to prove simple geometric theorems algebraically. [GS.PAFR.3.1](#)

- 2 Determine distance and midpoint of segments in a coordinate plane to find areas of triangles and quadrilaterals, when given coordinates. [GS.PAFR.3.2](#)