Wyoming Mathematics

# Grade 8

Adopted 2021

## Standards for Mathematical Practice

1. **Make sense of problems and persevere in solving them.** MP.1
2. **Reason abstractly and quantitatively.** MP.2
3. **Construct viable arguments and critique the reasoning of others.** MP.3
4. **Model with mathematics.** MP.4
5. **Use appropriate tools strategically.** MP.5
6. **Attend to precision.** MP.6
7. **Look for and make use of structure.** MP.7
8. **Look for and express regularity in repeated reasoning.** MP.8

## Geometry

G. **Understand congruence and similarity using physical models, transparencies, or geometry software.** 8.G.G

1. Verify experimentally the properties of rotations, reflections, and translations. 8.G.G.1

   A. Lines are taken to lines, and line segments to line segments of the same length. 8.G.G.1.A

   B. Angles are taken to angles of the same measure. 8.G.G.1.B

   C. Parallel lines are taken to parallel lines. 8.G.G.1.C

Ad. Verify experimentally the properties of rotations, reflections, and translations. 8.G.G.1.AD

   A. Write a sequence of transformations that takes a line to a line, and line segment to a line segment of the same length. 8.G.G.1.AD.A

   B. Write a sequence of transformations that takes an angle to an angle of the same measure. 8.G.G.1.AD.B

   C. Write a sequence of transformations that takes parallel lines to parallel lines. 8.G.G.1.AD.C

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P. Verify experimentally the properties of rotations, reflections, and translations. 8.G.G.1.P

A. Demonstrate that lines are taken to lines, and line segments to line segments of the same length. 8.G.G.1.P.A

B. Demonstrate that angles are taken to angles of the same measure. 8.G.G.1.P.B

C. Demonstrate that parallel lines are taken to parallel lines. 8.G.G.1.P.C

Ba. Verify experimentally the properties of rotations, reflections, and translations. 8.G.G.1.BA

A. Select the transformation that shows lines are taken to lines, and line segments to line segments of the same length. 8.G.G.1.BA.A

B. Select the transformation that shows angles are taken to angles of the same measure. 8.G.G.1.BA.B

C. Select the transformation that shows parallel lines are taken to parallel lines. 8.G.G.1.BA.C

BeB. May be able to verify experimentally the properties of rotations, reflections, and translations. 8.G.G.1.BEB

A. Select the translation that shows lines are taken to lines, and line segments to line segments of the same length. 8.G.G.1.BEB.A

B. Select the translation that shows angles are taken to angles of the same measure. 8.G.G.1.BEB.B

C. Select the translation that shows parallel lines are taken to parallel lines. 8.G.G.1.BEB.C

2. Recognize through visual comparison that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them. 8.G.G.2

Ad. Recognize through visual comparison that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of three or more transformations (rotations, reflections, and translations); given two congruent figures, describe a sequence of three or more transformations that exhibits the congruence between them. 8.G.G.2.AD

P. Recognize through visual comparison that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of at most two transformations (rotations, reflections, and translations); given two congruent figures, describe a sequence of at most two transformations that exhibits the congruence between them. 8.G.G.2.P

Ba. Recognize through visual comparison that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of at most two transformations (reflections and translations); given two congruent figures, describe a sequence of at most two transformations that exhibits the congruence between them. 8.G.G.2.BA

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BeB. May be able to recognize through visual comparison that a two-dimensional figure is congruent to another if the second can be obtained from the first by a transformation (reflection or translation); given two congruent figures, describe a transformation that exhibits the congruence between them. 8.G.G.2.BEB

3. Describe the effect of dilations, translations, rotations and reflections on two-dimensional figures using coordinates. 8.G.G.3

Ad. Describe and justify the sequence of dilations, translations, rotations, and reflections performed on the pre-image to determine the image on a coordinate plane. 8.G.G.3.AD

P. Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. 8.G.G.3.P

Ba. Describe the effect of dilations, translations, and reflections on two-dimensional figures using coordinates. 8.G.G.3.BA

BeB. May be able to describe the effect of translations and reflections on two-dimensional figures using coordinates. 8.G.G.3.BEB

4. Recognize through visual comparison that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them. 8.G.G.4

Ad. Describe and justify a sequence of rotations, reflections, translations, and dilations that maintains similarity between the pre-image and determined image. 8.G.G.4.AD

P. Recognize through visual comparison that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them. 8.G.G.4.P

Ba. Recognize through visual comparison that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them. 8.G.G.4.BA

BeB. May be able to recognize through visual comparison that a two-dimensional figure is similar to another if the second can be obtained from a dilation. 8.G.G.4.BEB

5. Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. 8.G.G.5

Ad. Use informal arguments to establish that two triangles are similar using the angle-angle criterion for similarity of triangles. 8.G.G.5.AD

P. Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. 8.G.G.5.P

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Ba. Use informal arguments to establish facts about the angles created when parallel lines are cut by a transversal and the angle-angle criterion for similarity of triangles. 8.G.G.5.BA

BeB. May be able to use informal arguments to establish facts about the angles created when parallel lines are cut by a transversal. 8.G.G.5.BEB

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**H. Understand and apply the Pythagorean Theorem.** 8.G.H

6. Use models or diagrams to explain the Pythagorean Theorem and its converse. 8.G.H.6

Ad. Model a proof of the Pythagorean Theorem and its converse using a pictorial representation. 8.G.H.6.AD

P. Use models or diagrams to explain the Pythagorean Theorem and its converse. 8.G.H.6.P

Ba. Identify the Pythagorean Theorem and its converse. 8.G.H.6.BA

BeB. May be able to identify the Pythagorean Theorem. 8.G.H.6.BEB

7. Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems. 8.G.H.7

Ad. Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in multi-step real-world and mathematical problems. 8.G.H.7.AD

P. Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems. 8.G.H.7.P

Ba. Apply the Pythagorean Theorem in mathematical problems by setting up the equation $a^2 + b^2 = c^2$ and solving for either leg. 8.G.H.7.BA

BeB. May be able to apply the Pythagorean Theorem in mathematical problems by setting up the equation $a^2 + b^2 = c^2$ and only solving for the hypotenuse. 8.G.H.7.BEB

8. Apply the Pythagorean Theorem to find the distance between two points in a coordinate system. 8.G.H.8

Ad. Apply the distance formula to calculate the distance between two points in a coordinate system. 8.G.H.8.AD

P. Apply the Pythagorean Theorem to find the distance between two points in a coordinate system. 8.G.H.8.P

Ba. Apply the Pythagorean Theorem to find the distance between two points plotted on a coordinate plane. 8.G.H.8.BA

BeB. May be able to apply the Pythagorean Theorem to find the distance between two points given the right triangle drawn on a coordinate plane. 8.G.H.8.BEB

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**I. Solve real-world and mathematical problems involving volume of cylinders, cones and spheres.** 8.G.I

9. Given the formulas, solve real-world and mathematical problems involving volume and surface area of cylinders. 8.G.I.9

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Ad. Given the formulas:<ul><li>Solve for a component part (radius or height) given the volume of a cylinder. OR</li><li>Determine the volume of a cone or sphere. AND</li><li>Determine the volume of a composite figure containing two or more cones, cylinders, or spheres.</li></ul> 8.G.I.9.AD

P. Given the formulas, solve real-world and mathematical problems involving volume and surface area of cylinders. Assessment Boundary: Specify calculations should be performed with the pi button. Limit the place value to up to the thousandths place or written in terms of pi. 8.G.I.9.P

Ba. Given the formulas, solve mathematical problems involving volume and surface area of cylinders. 8.G.I.9.BA

BeB. May be able to, given the formulas, solve mathematical problems involving volume of cylinders. 8.G.I.9.BEB

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**The Number System**

A. **Know that there are numbers that are not rational, and approximate them by rational numbers.** 8.NS.A

1. Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number. Explore the real number system and its appropriate usage in real-world situations. 8.NS.A.1

   A. Make comparisons between rational and irrational numbers. 8.NS.A.1.A

   B. Understand that all real numbers have a decimal expansion. 8.NS.A.1.B

   C. Model the hierarchy of the real number system, including natural, whole, integer, rational, and irrational numbers. 8.NS.A.1.C

   D. Convert repeating decimals to fractions. 8.NS.A.1.D

Ad. Compare and contrast properties of rational and irrational numbers. 8.NS.A.1.AD

P. Know that numbers that are not rational are called irrational. Show that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number. Explore the real number system and its appropriate usage in real-world situations. 8.NS.A.1.P

   A. Make comparisons between rational and irrational numbers. 8.NS.A.1.P.A

   B. Show that real numbers (excluding irrational numbers) have a decimal expansion. 8.NS.A.1.P.B

   C. Model the hierarchy of the real number system, including natural, whole, integer, rational, and irrational numbers. 8.NS.A.1.P.C

   D. Convert repeating decimals to fractions. 8.NS.A.1.P.D

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Ba. Know that numbers that are not rational are called irrational. Show that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number. Explore the real number system and its appropriate usage in real-world situations. 8.NS.A.1.BA

A. Make comparisons between rational and irrational numbers. 8.NS.A.1.BA.A

B. Show that real numbers (excluding irrational numbers) have a decimal expansion. 8.NS.A.1.BA.B

C. Model the hierarchy of the real number system, including natural, whole, integer, rational, and irrational numbers. 8.NS.A.1.BA.C

BeB. May be able to know that numbers that are not rational are called irrational. Show that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number. Explore the real number system and its appropriate usage in real-world situations. Make comparisons between rational and irrational numbers. 8.NS.A.1.BEB

2. Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions. 8.NS.A.2

Ad. Using estimation strategies, order a set of irrational numbers and explain your reasoning. 8.NS.A.2.AD

P. Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions. 8.NS.A.2.P

Ba. Use rational approximations to locate irrational numbers on a number line and estimate the value of expressions. 8.NS.A.2.BA

BeB. May be able to use rational approximations to locate irrational numbers on a number line. 8.NS.A.2.BEB

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**Expressions and Equations**

**B. Work with radicals and integer exponents.** 8.EE.B

1. Understand and apply the Laws of Exponents (i.e. Product Rule, Quotient Rule, Power to a Power, Product to a Power, Quotient to a Power, Zero Power Property, negative exponents) to generate equivalent numerical expressions limited to integer exponents. 8.EE.B.1

Ad. Apply all of the following Laws of exponents to generate equivalent algebraic expressions limited to integer exponents.<ul><li>Product Rule.</li><li>Quotient Rule.</li><li>Power to a Power.</li><li>Product to a Power.</li><li>Quotient to a Power</li><li>Zero Power Property.</li><li>Negative Exponents.</li></ul> 8.EE.B.1.AD

P. Apply all of the following Laws of Exponents to generate equivalent numerical expressions limited to integer exponents.<ul><li>Product Rule.</li><li>Quotient Rule.</li><li>Power to a Power.</li><li>Product to a Power.</li><li>Quotient to a Power.</li><li>Zero Power Property.</li><li>Negative Exponents.</li></ul> 8.EE.B.1.P

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Ba. Apply all of the following Laws of Exponents to generate equivalent numerical expressions limited to integer exponents.<ul><li>Product Rule.</li><li>Quotient Rule.</li><li>Power to a Power.</li><li>Zero Power Property.</li></ul> 8.EE.B.1.BA

BeB. May be able to apply all of the following Laws of Exponents to generate equivalent numerical expressions limited to integer exponents.<ul><li>Product Rule.</li><li>Quotient Rule.</li></ul> 8.EE.B.1.BEB

2. Investigate concepts of square and cube roots. 8.EE.B.2

   A. Use radical notation, if applicable, to represent the exact solutions to equations of the form $x^2 = p$ and $x^3 = q$ where p is a positive rational number and q is any rational number. 8.EE.B.2.A

   B. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. 8.EE.B.2.B

   C. Recognize that square roots of non-perfect squares and the cube roots of non-perfect cubes are irrational. 8.EE.B.2.C

Ad. Investigate concepts of square and cube roots. Use radical notation, if applicable, to represent the exact solutions to equations of the form $x^2 + a = p$ and $x^3 + a = q$ where a, p, and q are positive rational numbers such that p - a and q - a are greater than or equal to zero. 8.EE.B.2.AD

P. Investigate concepts of square and cube roots. 8.EE.B.2.P

   A. Use radical notation, if applicable, to represent the exact solutions to equations of the form $x^2 = p$ and $x^3 = q$ where p is a positive rational number and q is any rational number. 8.EE.B.2.P.A

   B. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. 8.EE.B.2.P.B

   C. Recognize that square roots of non-perfect squares and the cube roots of non-perfect cubes are irrational. 8.EE.B.2.P.C

Ba. Investigate concepts of square and cube roots. 8.EE.B.2.BA

   A. Use radical notation, if applicable, to represent the exact solutions to equations of the form $x^2 = p$ and $x^3 = q$ where p is a positive rational number and q is any rational number. 8.EE.B.2.BA.A

   B. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. 8.EE.B.2.BA.B

BeB. May be able to evaluate square roots of small perfect squares and cube roots of small perfect cubes. 8.EE.B.2.BEB

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3. Explore the relationship between quantities in decimal and scientific notation. 8.EE.B.3

   A. Express very large and very small quantities, p, in scientific notation in the form a · 10<sup>b</sup> = p where 1 ≤ a < 10 and b is an integer. 8.EE.B.3.A

   B. Translate between decimal notation and scientific notation. 8.EE.B.3.B

   C. Estimate and compare the relative size of two quantities in scientific notation. 8.EE.B.3.C

Ad. Compare the relative size of two quantities written in decimal and scientific notation in a real-world context. 8.EE.B.3.AD

P. Explore the relationship between quantities in decimal and scientific notation. 8.EE.B.3.P

   A. Express very large and very small quantities, p, in scientific notation in the form and a · 10<sup>b</sup> = p where 1 ≤ a < 10 and b is an integer. 8.EE.B.3.P.A

   B. Translate between decimal notation and scientific notation. 8.EE.B.3.P.B

   C. Estimate and compare the relative size of two quantities in scientific notation. 8.EE.B.3.P.C

Ba. Explore the relationship between quantities in decimal and scientific notation. 8.EE.B.3.BA

   A. Express very large and very small quantities, p, in scientific notation in the form a · 10<sup>b</sup> = p where 1 ≤ a < 10 and b is an integer. 8.EE.B.3.BA.A

   B. Translate between decimal notation and scientific notation. 8.EE.B.3.BA.B

BeB. May be able to express very large and very small quantities, p, in scientific notation in the form a · 10<sup>b</sup> = p where 1 ≤ a < 10 and b is an integer. 8.EE.B.3.BEB

4. Apply the concepts of decimal and scientific notation to real-world and mathematical problems. 8.EE.B.4

   A. Select appropriate units of measure when representing answers in scientific notation. 8.EE.B.4.A

   B. Interpret scientific notation that has been generated by a variety of technologies. 8.EE.B.4.B

Ad. Select appropriate units of measure when multiplying and dividing numbers written in scientific notation in real-world and mathematical problems. 8.EE.B.4.AD

P. Apply the concepts of decimal and scientific notation to real-world and mathematical problems. 8.EE.B.4.P

   A. Select appropriate units of measure when representing answers in scientific notation. 8.EE.B.4.P.A

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   B. Interpret scientific notation that has been generated by a variety of technologies. 8.EE.B.4.P.B

Ba. Select appropriate units of measure when representing answers in decimal and scientific notation in real-world and mathematical problems. 8.EE.B.4.BA

BeB. May be able to select appropriate units of measure when representing answers in scientific notation in real-world and mathematical problems. 8.EE.B.4.BEB

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**C. Understand the connections between proportional relationships, lines, and linear equations.** 8.EE.C

5. Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. 8.EE.C.5

Ad. Create a table, graph, and equation of a proportional relationship given a written description. 8.EE.C.5.AD

P. Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. 8.EE.C.5.P

Ba. Graph proportional relationships, interpreting the unit rate as the slope of the graph. 8.EE.C.5.BA

BeB. The Below Basic student may be able to graph proportional relationships from a table of values. 8.EE.C.5.BEB

6. Explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y = mx for a line through the origin and the equation y = mx + b for a line intercepting the vertical axis at (0, b). 8.EE.C.6

Ad. Derive the equation y = mx + b for a line intercepting the vertical axis at (0,b) from a written description. 8.EE.C.6.AD

P. Explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y = mx for a line through the origin and the equation y = mx + b for a line intercepting the vertical axis at (0, b). 8.EE.C.6.P

Ba. Explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y = mx for a line through the origin. 8.EE.C.6.BA

6BeB. May be able to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane. 8.EE.C.6BEB

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**D. Analyze and solve linear equations and pairs of simultaneous linear equations.** 8.EE.D

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7. Extend concepts of linear equations and inequalities in one variable to more complex multi-step equations and inequalities in real-world and mathematical situations. 8.EE.D.7

   A. Solve linear equations and inequalities with rational number coefficients that include the use of the Distributive Property, combining like terms, and variable terms on both sides. 8.EE.D.7.A

   B. Recognize the three types of solutions to linear equations: one solution, infinitely many solutions, or no solutions. 8.EE.D.7.B

   C. Generate linear equations with the three types of solutions. 8.EE.D.7.C

   D. Justify why linear equations have a specific type of solution. 8.EE.D.7.D

Ad. Create and solve a multi-step equation or inequality in a real-world context given a written description. 8.EE.D.7.AD

P. Extend concepts of linear equations and inequalities in one variable to more complex multi-step equations and inequalities in real-world and mathematical situations. 8.EE.D.7.P

   A. Solve linear equations and inequalities with rational number coefficients that include the use of the Distributive Property, combining like terms, and variable terms on both sides. 8.EE.D.7.P.A

   B. Recognize the three types of solutions to linear equations: one solution, infinitely many solutions, or no solutions. 8.EE.D.7.P.B

   C. Generate linear equations with the three types of solutions. 8.EE.D.7.P.C

   D. Justify why linear equations have a specific type of solution. 8.EE.D.7.P.D

Ba. Extend concepts of linear equations and inequalities in one variable to more complex multi-step equations and inequalities in real-world and mathematical situations. 8.EE.D.7.BA

   A. Solve linear equations and inequalities with rational number coefficients that include the use of the Distributive Property, combining like terms, and variable terms on both sides. 8.EE.D.7.BA.A

   B. Recognize the three types of solutions to linear equations: one solution, infinitely many solutions, or no solutions. 8.EE.D.7.BA.B

BeB. May be able to solve linear equations and inequalities with rational number coefficients that include the use of the Distributive Property, combining like terms, and variable terms on one side. 8.EE.D.7.BEB

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8. Analyze and solve pairs of simultaneous linear equations. 8.EE.D.8

   A. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously. 8.EE.D.8.A

   B. Solve systems of two linear equations in two variables with integer solutions by graphing the equations. 8.EE.D.8.B

   C. Solve simple real-world and mathematical problems leading to two linear equations in two variables given y = mx + b form with integer solutions. 8.EE.D.8.C

Ad. Create and solve systems of two linear equations from a real-world context that requires simplification to write in the form y = mx + b. 8.EE.D.8.AD

P. Analyze and solve a system of linear equations. 8.EE.D.8.P

   A. Show that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously, including systems with one, infinitely many, and no solutions. 8.EE.D.8.P.A

   B. Solve systems of two linear equations in two variables with integer solutions by graphing the equations. 8.EE.D.8.P.B

   C. Solve simple real-world and mathematical problems leading to two linear equations in two variables given y = mx + b form with integer solutions. 8.EE.D.8.P.C

Ba. Analyze and solve a system of linear equations. 8.EE.D.8.BA

   A. Show that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously, including systems with one, infinitely many, and no solutions. 8.EE.D.8.BA.A

   B. Solve systems of two linear equations in two variables with integer solutions by graphing the equations. 8.EE.D.8.BA.B

BeB. May be able to given a graph, identify the solution to a system of two linear equations, including systems with one, infinitely many, and no solutions. 8.EE.D.8.BEB

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**Statistics and Probability**

**J. Investigate patterns of association in bivariate data.** 8.SP.J

1. Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe the association by form (linear/nonlinear), direction (positive/negative), strength (correlation), and unusual features. 8.SP.J.1

Ad. In addition to Proficient, the Advanced student is able to interpret and compare scatter plots for bivariate measurement data by comparing their association by form (linear/nonlinear), direction (positive/negative), strength (correlation), and unusual features. 8.SP.J.1.AD

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P. Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe the association by form (linear/nonlinear), direction (positive/negative), strength (correlation), and unusual features. 8.SP.J.1.P

Ba. Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe the linear association by direction (positive/negative) and strength (correlation). 8.SP.J.1.BA

BeB. May be able to interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe the linear association by direction (positive/negative) and strength (correlation). 8.SP.J.1.BEB

2. Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line. 8.SP.J.2

Ad. Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model by plotting the residuals. 8.SP.J.2.AD

P. Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line. 8.SP.J.2.P

Ba. Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line. 8.SP.J.2.BA

BeB. May be able to know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, identify a line of best fit. 8.SP.J.2.BEB

3. Use an equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. 8.SP.J.3

Ad. Draw a line of best fit and create its equation in the context of the bivariate measurement data when given a scatter plot. 8.SP.J.3.AD

P. Interpret the slope and y-intercept in the context of the bivariate measurement data when given a scatter plot with a line of best fit and an equation. 8.SP.J.3.P

Ba. Interpret the slope in the context of the bivariate measurement data when given a scatter plot with a line of best fit and an equation. 8.SP.J.3.BA

BeB. May be able to match an equation of a line of best fit to bivariate measurement data when given scatter plot with a line of best fit. 8.SP.J.3.BEB

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4. Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. 8.SP.J.4

   A. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. 8.SP.J.4.A

   B. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. 8.SP.J.4.B

Ad. In addition to Proficient, the Advanced student is able to understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table and justifying conclusions about the frequencies and relative frequencies of data in a two-way table. 8.SP.J.4.AD

P. The Proficient student is able to understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. 8.SP.J.4.P

   A. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. 8.SP.J.4.P.A

   B. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. 8.SP.J.4.P.B

Ba. The Basic student is able to understand that patterns of association can also be seen in bivariate categorical data by constructing and interpreting a two-way table summarizing data on two categorical variables collected from the same subjects. 8.SP.J.4.BA

BeB. The Below Basic student may be able to understand that patterns of association can also be seen in bivariate categorical data by completing a two-way table summarizing data on two categorical variables collected from the same subjects. 8.SP.J.4.BEB

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**Functions**

**E. Define, evaluate, and compare functions.** 8.F.E

1. Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. 8.F.E.1

Ad. In addition to Proficient, the Advanced student is able to compare relations in different forms to determine if they represent a function. (Function notation is not required in Grade 8.) 8.F.E.1.AD

P. The Proficient student is able to determine if a relation represented by a graph, a table, a mapping diagram, and a set of ordered pairs is a function. (Function notation is not required in Grade 8.) 8.F.E.1.P

Ba. The Basic student is able to determine that a relation represented by a table or a set of ordered pairs is a function by demonstrating each input has exactly one output. (Function notation is not required in Grade 8.) 8.F.E.1.BA

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BeB. The Below Basic student may be able to recognize the input and output values of a relation in a table or a set of ordered pairs. (Function notation is not required in Grade 8.) 8.F.E.1.BEB

2. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). 8.F.E.2

Ad. In addition to Proficient, the Advanced student is able to compare properties (intercepts, domain, and range) of one linear function and one non-linear function each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). 8.F.E.2.AD

P. The Proficient student is able to compare properties (intercepts, domain, and range) of two linear functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). 8.F.E.2.P

Ba. The Basic student is able to compare properties (intercepts, domain, and range) of two linear functions each represented graphically or numerically in tables. 8.F.E.2.BA

BeB. The Below Basic student may be able to compare the domains of two linear functions each represented graphically or numerically in tables. 8.F.E.2.BEB

3. Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. 8.F.E.3

Ad. In addition to Proficient, the Advanced student is able to identify linear and non-linear functions represented by verbal or written descriptions. 8.F.E.3.AD

P. The Proficient student is able to recognize the equation y = mx + b as defining a linear function, whose graph is a straight line; write examples of equations and sketch graphs of functions that are not linear. 8.F.E.3.P

Ba. The Basic student is able to recognize the equation y = mx + b as defining a linear function, whose graph is a straight line and sketch graphs of functions that are not linear. 8.F.E.3.BA

BeB. The Below Basic student may be able to recognize the equation y = mx + b as defining a linear function, whose graph is a straight line. 8.F.E.3.BEB

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**F. Use functions to model relationships between quantities.** 8.F.F

4. Apply the concepts of linear functions to real-world and mathematical situations. 8.F.F.4

A. Understand that the slope is the constant rate of change and the y-intercept is the point where x = 0. 8.F.F.4.A

B. Determine the slope and the y-intercept of a linear function given multiple representations, including two points, tables, graphs, equations, and verbal descriptions. 8.F.F.4.B

C. Construct a function in slope-intercept form that models a linear relationship between two quantities. 8.F.F.4.C

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D. Interpret the meaning of the slope and the y-intercept of a linear function in the context of the situation. 8.F.F.4.D

Ad. Apply the concepts of linear functions to real-world and mathematical situations. Analyze the meaning of the slopes and the y-intercepts of two linear functions given as a written description and justify conclusions in the context of the situation. 8.F.F.4.AD

P. Apply the concepts of linear functions to real-world and mathematical situations. 8.F.F.4.P

A. Recognize that the slope is the constant rate of change and the y-intercept is the point where x = 0 from an equation, graph, table, and verbal description. 8.F.F.4.P.A

B. Determine the slope and the y-intercept of a linear function given multiple representations, including two points, tables, graphs, equations, and verbal descriptions. 8.F.F.4.P.B

C. Construct a function in slope-intercept form that models a linear relationship between two quantities. 8.F.F.4.P.C

D. Interpret the meaning of the slope and the y-intercept of a linear function in the context of the situation. 8.F.F.4.P.D

Ba. Apply the concepts of linear functions to real-world and mathematical situations. 8.F.F.4.BA

A. Recognize that the slope is the constant rate of change and the y-intercept is the point where x = 0 from an equation and a graph. 8.F.F.4.BA.A

B. Determine the slope and the y-intercept of a linear function given multiple representations, including graphs and equations in slope-intercept form. 8.F.F.4.BA.B

C. Identify a function in slope-intercept form that models a linear relationship between two quantities. 8.F.F.4.BA.C

D. Interpret the meaning of the slope of a linear function in the context of the situation. 8.F.F.4.BA.D

BeB. May be able to apply the concepts of linear functions to real-world and mathematical situations. 8.F.F.4.BEB

A. Recognize that the slope is the constant rate of change and the y-intercept is the point where x = 0 from a graph. 8.F.F.4.BEB.A

B. Determine the slope and the y-intercept of a linear function given an equation in slope-intercept form. 8.F.F.4.BEB.B

C. Match a function in slope-intercept form to the model of a linear relationship between two quantities. 8.F.F.4.BEB.C

5. Describe qualitatively the functional relationship between two quantities by analyzing a graph where the function is increasing, decreasing, constant, linear, or nonlinear. Sketch a graph that exhibits the qualitative features of a function that has been described verbally. 8.F.F.5

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Ad. Describe qualitatively the functional relationship between two quantities by analyzing a written real-world scenario where the function is increasing, decreasing, constant, linear, or nonlinear. Sketch a graph that exhibits the qualitative features of a function that has been described in a real-world scenario. 8.F.F.5.AD

P. Describe qualitatively the functional relationship between two quantities by analyzing a graph where the function is increasing, decreasing, constant, linear, or nonlinear. Sketch a graph that exhibits the qualitative features of a function that has been described verbally. 8.F.F.5.P

Ba. Describe qualitatively the functional relationship between two quantities by analyzing a graph where the function is increasing, decreasing, constant, linear, or nonlinear. 8.F.F.5.BA

BeB. May be able to describe qualitatively the functional relationship between two quantities by labeling a graph where the function is increasing, decreasing, constant, linear, or nonlinear when given a word bank. 8.F.F.5.BEB