Colorado Extended Evidence Outcomes: Mathematics

High School

The Real Number System: Extend the properties of exponents to rational exponents. HS.N-RN.A

1 **Write and evaluate numerical expressions involving whole-number exponents of 2 or 3 (squared and cubed).** HS.N-RN.A.1

2 **Rewrite expressions involving whole number exponents using expanded form, e.g., y3 = y times y times y.** HS.N-RN.A.2

The Real Number System: Use properties of rational and irrational numbers. HS.N-RN.B

3 **N/A** HS.N-RN.B.3

Quantities: Reason quantitatively and use units to solve problems. HS.N-Q.A

1 **Use units as a way to understand problems and to guide the solution of multi-step problems.** HS.N-Q.A.1

- a For example, a problem asking “How many eggs will I use today if I’m using half of three dozen eggs today and the other half tomorrow?” requires a student to make sense of “dozen” either at the beginning (3 dozen is 36 eggs, and half is 18 eggs) or at the end (half of 3 dozen is 1.5 dozen, which is 18 eggs) of their solution. HS.N-Q.A.1.A

2 **Define appropriate quantities for the purpose of descriptive modeling.** HS.N-Q.A.2

- a For example, fuel economy can be described as miles per gallon (instead of feet per barrel of gasoline) because miles and gallons are the way we typically measure driving distances and fuel use. HS.N-Q.A.2.A

3 **Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.** HS.N-Q.A.3

- a For example, students should be able to give an example of when knowing time to a fraction of a second (like running in a race) versus the nearest year (like giving your age). HS.N-Q.A.3.A

The Complex Number System: Perform arithmetic operations with complex numbers. HS.N-CN.A

1 **Know that different kinds of numbers are needed to represent different quantities.** HS.N-CN.A.1

- a For example, we need the counting numbers to count whole things, fractions and decimals to represent parts of wholes (or between wholes on the number line), and negative numbers to represent quantities less than zero. HS.N-CN.A.1.A

2 **Use the commutative, associative, and distributive properties to add, subtract, and multiple real (whole) numbers (EE.C-CN.2.a).** HS.N-CN.A.2

	3 N/A HS.N-CN.A.3
The Complex Number System: Represent complex numbers and their operations on the complex plane. HS.N-CN.B	4 N/A HS.N-CN.B.4
	5 N/A HS.N-CN.B.5
	6 N/A HS.N-CN.B.6
The Complex Number System: Use complex numbers in polynomial identities and equations. HS.N-CN.C	7 **Solve real-world problems with real coefficients that have real number solutions.** HS.N-CN.C.7
	8 N/A HS.N-CN.C.8
	9 N/A HS.N-CN.C.9
Vector & Matrix Quantities: Represent and model with vector quantities. HS.N-VM.A	1 N/A HS.N-VM.A.1
	2 N/A HS.N-VM.A.2
	3 N/A HS.N-VM.A.3
Vector & Matrix Quantities: Perform operations on vectors. HS.N-VM.B	4 N/A HS.N-VM.B.4
	5 N/A HS.N-VM.B.5
Vector & Matrix Quantities: Perform operations on matrices and use matrices in applications. HS.N-VM.C	6 N/A HS.N-VM.C.6
	7 N/A HS.N-VM.C.7
	8 N/A HS.N-VM.C.8
	9 N/A HS.N-VM.C.9
	10 N/A HS.N-VM.C.10
	11 N/A HS.N-VM.C.11
	12 N/A HS.N-VM.C.12

Seeing Structure in Expressions: Interpret the structure of expressions. HS.A-SSE.A	**1 Interpret expressions that represent a quantity in terms of its context.** HS.A-SSE.A.1 a Interpret parts of an expression, such as terms, factors, and coefficients. HS.A-SSE.A.1.A b For example, the expression 100w + 500 could represent earning $100 per week (w) and a starting balance of $500. HS.A-SSE.A.1.B
	2 Use the structure of a simple expression to identify ways to rewrite it. HS.A-SSE.A.2 a For example, 3x can be written as x + x + x. HS.A-SSE.A.2.A
Seeing Structure in Expressions: Write expressions in equivalent forms to solve problems. HS.A-SSE.B	**3 Choose and produce an equivalent form of a one-variable expression to reveal and explain properties of the quantity represented by the expression.** HS.A-SSE.B.3 a For example, 80w + 20w + 200 + 300 might describe earning $80 per week at one job and $20 per week at another job, as well as one-time gifts of $200 from a parent and $300 from a grandparent. That could be re-written in the equivalent form as 100w + 500, which would then help show the total earned per week ($100) and the sum of the one-time gifts ($500). HS.A-SSE.B.3.A
	4 Determine the successive term in a geometric sequence given the common ration (EE.A.SSE.4). HS.A-SSE.B.4
Arithmetic with Polynomials & Rational Expressions: Perform arithmetic operations on polynomials. HS.A-APR.A	**1 Add and subtract first-degree polynomials, i.e., combine like terms.** HS.A-APR.A.1
Arithmetic with Polynomials & Rational Expressions: Understand the relationship between zeros and factors of polynomials. HS.A-APR.B	**2 N/A** HS.A-APR.B.2
	3 N/A HS.A-APR.B.3
Arithmetic with Polynomials & Rational Expressions: Use polynomial identities to solve problems. HS.A-APR.C	**4 N/A** HS.A-APR.C.4
	5 N/A HS.A-APR.C.5
Arithmetic with Polynomials & Rational Expressions: Rewrite	**6 N/A** HS.A-APR.D.6

rational expressions. HS.A-APR.D	**7** **N/A** HS.A-APR.D.7
Creating Equations: Create equations that describe numbers or relationships.★ HS.A-CED.A	**1** **Create equations and inequalities in one variable and use them to solve problems.** HS.A-CED.A.1 a Include equations arising from linear functions. HS.A-CED.A.1.A
	2 **Create equations in two variables to represent linear relationships between quantities and graph equations on coordinate axes with labels and scales.** HS.A-CED.A.2
	3 **Identify solutions as viable or nonviable options in a modeling context.** HS.A-CED.A.3 a For example, if the speed limit is 70 miles per hour and you have 4 hours of travel time, destinations less than or equal to 280 miles away are going to be possible to reach in that time. Destinations greater than 280 miles away are not. HS.A-CED.A.3.A
	4 **N/A** HS.A-CED.A.4
Reasoning with Equations & Inequalities: Understand solving equations as a process of reasoning and explain the reasoning. HS.A-REI.A	**1** **Explain each step in solving a simple given equation involving one or two operations, such as 3x + 1 = 7 (Step 1), 3x = 6 (Step 2), and x = 2 (Step 3).** HS.A-REI.A.1
	2 **N/A** HS.A-REI.A.2
Reasoning with Equations & Inequalities: Solve equations and inequalities in one variable. HS.A-REI.B	**3** **Solve linear equations in one variable.** HS.A-REI.B.3
	4 **N/A** HS.A-REI.B.4
Reasoning with Equations & Inequalities: Solve systems of equations. HS.A-REI.C	**5** **N/A** HS.A-REI.C.5
	6 **Solve systems of linear equations approximately with graphs, focusing on pairs of linear equations in two variable.** HS.A-REI.C.6
	7 **N/A** HS.A-REI.C.7
	8 **N/A** HS.A-REI.C.8
	9 **N/A** HS.A-REI.C.9
Reasoning with Equations &	**10** **Graph an equation in two variables given a table of values.** HS.A-REI.D.10

Inequalities: Represent and solve equations and inequalities graphically. HS.A-REI.D

11 **Confirm that the point of intersection for a given system of linear equations is the point that makes both equations true.** HS.A-REI.D.11

12 **Interpret the meaning of a point on a graphed line in context.** HS.A-REI.D.12

- a For example, the line d = 50h could represent distance traveled when moving at 50 miles per hour. The point (2,100) represents traveling 100 miles after 2 hours). HS.A-REI.D.12.A

Interpreting Functions: Understand the concept of a function and use function notation. HS.F-IF.A

1 **Demonstrate an understanding that a function is a correspondence from one set to another set.** HS.F-IF.A.1

2 **Evaluate functions for inputs in their domains.** HS.F-IF.A.2

3 **Match the place in a sequence with the value in the sequence.** HS.F-IF.A.3

- a For example, for a sequence defined by the rule “Add 5 starting at 0,” match the 3rd place with the value 15. HS.F-IF.A.3.A

Interpreting Functions: Interpret functions that arise in applications in terms of the context. HS.F-IF.B

4 **For a function that models a relationship between two quantities, interpret key features of graphs, including intercepts and patterns of increase and decrease.** HS.F-IF.B.4

5 **Relate the domain of a function that models a real-world scenario to its graph and identify appropriate numbers (e.g., real, integer, whole) for the domain.** HS.F-IF.B.5

- a For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function. HS.F-IF.B.5.A

6 **Estimate the rate of change from a graph.** HS.F-IF.B.6

Interpreting Functions: Analyze functions using different representations. HS.F-IF.C

8 **N/A** HS.F-IF.C.8

9 **N/A** HS.F-IF.C.9

10 **N/A** HS.F-IF.C.10

Building Functions: Build a function that models a relationship between two quantities. HS.F-BF.A

1 **Write or select a function that describes a relationship between two quantities.** HS.F-BF.A.1

2 **Write or select arithmetic and geometric sequences of whole numbers that match a given recursive rule.** HS.F-BF.A.2

Building Functions: Build new functions from existing functions. HS.F-BF.B

3 **N/A** HS.F-BF.B.3

4 **N/A** HS.F-BF.B.4

	5 N/A HS.F-BF.B.5
Linear, Quadratic & Exponential Models: Construct and compare linear, quadratic, and exponential models and solve problems.★ HS.F-LE.A	1 Distinguish between situations that can be modeled with linear functions and with exponential functions. HS.F-LE.A.1
	2 Construct a linear function such as y + mx to show that these functions increase by equal amounts over equal intervals. HS.F-LE.A.2
	3 Use graphs to describe a quantity increasing exponentially eventually exceeds a quantity increasing linearly. HS.F-LE.A.3
	4 N/A HS.F-LE.A.4
Linear, Quadratic, & Exponential Models: Interpret expressions for functions in terms of the situation they model.★ HS.F-LE.B	5 N/A HS.F-LE.B.5
Trigonometric Functions: Extend the domain of trigonometric functions using the unit circle. HS.F-TF.A	1 N/A HS.F-TF.A.1
	2 N/A HS.F-TF.A.2
	3 N/A HS.F-TF.A.3
	4 N/A HS.F-TF.A.4
Trigonometric Functions: Model periodic phenomena with trigonometric functions. HS.F-TF.B	5 N/A HS.F-TF.B.5
	6 N/A HS.F-TF.B.6
	7 N/A HS.F-TF.B.7
Trigonometric Functions: Prove and apply trigonometric identities. HS.F-TF.C	8 N/A HS.F-TF.C.8
	9 N/A HS.F-TF.C.9
Interpreting Categorical & Quantitative Data: Summarize, represent, and interpret data on a single count or measurement variable. HS.S-ID.A	1 Model data in context with plots on the real number line (dot plots, histograms). HS.S-ID.A.1
	2 Use visual displays of data distributions with similar scales to judge which distribution has the greater center and/or greater spread. HS.S-ID.A.2
	3 Interpret general trends about the center and spread of data given a graph or chart. HS.S-ID.A.3

	4 **Calculate the mean of a given data containing up to at least five data points (EE.S-ID.4).** HS.S-ID.A.4
Interpreting Categorical & Quantitative Data: Summarize, represent, and interpret data on two categorical and quantitative variables. HS.S-ID.B	**5** **N/A** HS.S-ID.B.5
	6 **Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.** HS.S-ID.B.6 a Informally fit a linear function for a scatter plot that suggests a linear association. HS.S-ID.B.6.A
	7 **Distinguish between correlation and causation.** HS.S-ID.B.7
Interpreting Categorical & Quantitative Data: Interpret linear models. HS.S-ID.C	**8** **Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.** HS.S-ID.C.8 a For example, a linear model y = 2x + 5 that fits a scatterplot of height of a tree versus years since planting could represent an average growth of 2 feet per year and a height of 5 feet when initially planted. HS.S-ID.C.8.A
	9 **N/A** HS.S-ID.C.9
Making Inferences & Justifying Conclusions: Understand and evaluate random processes underlying statistical experiments. HS.S-IC.A	**1** **Demonstrate an understanding that a sample can tell us something about the population it comes from.** HS.S-IC.A.1 a For example, predict that the average height of all 10th graders is about 5 feet 7 inches if the average height of one class is about 5 feet 7 inches. HS.S-IC.A.1.A
	2 **Determine the likelihood of an event occurring when the outcomes are equally likely to occur.** HS.S-IC.A.2
	a **For example, determine that the likelihood of a coin landing heads is 0.5 because there are two sides and each is equally likely to land facing up (EE.S-IC.1-2).** HS.S-IC.A.2.A
Making Inferences & Justifying Conclusions: Make inferences and justify conclusions from sample surveys, experiments, and observational studies. HS.S-IC.B	**3** **N/A** HS.S-IC.B.3
	4 **N/A** HS.S-IC.B.4
	5 **N/A** HS.S-IC.B.5
	6 **N/A** HS.S-IC.B.6
Conditional Probability & the Rules of Probability: Understand independence and conditional probability	**1** **N/A** HS.S-CP.A.1
	2 **N/A** HS.S-CP.A.2
	3 **N/A** HS.S-CP.A.3

and use them to interpret data. HS.S-CP.A	**4** N/A HS.S-CP.A.4
	5 **Recognize independent and dependent probability in everyday language and everyday situations.** HS.S-CP.A.5 a For example, recognize that the probability of flippind heads on a second coin flip is independent of the first flip, but the probability of being dealt an ace from a deck of cards depends on what cards have already been dealt. HS.S-CP.A.5.A
Conditional Probability & the Rules of Probability: Use the rules of probability to compute probabilities of compound events in a uniform probability model. HS.S-CP.B	**6** N/A HS.S-CP.B.6
	7 N/A HS.S-CP.B.7
	8 N/A HS.S-CP.B.8
	9 N/A HS.S-CP.B.9
Using Probability to Make Decisions: Calculate expected values and use them to solve problems. HS.S-MD.A	**1** N/A HS.S-MD.A.1
	2 N/A HS.S-MD.A.2
	3 N/A HS.S-MD.A.3
Using Probability to Make Decisions: Use probability to evaluate outcomes of decisions. HS.S-MD.B	**4** N/A HS.S-MD.B.4
	5 N/A HS.S-MD.B.5
	6 N/A HS.S-MD.B.6
Congruence: Experiment with transformations in the plane. HS.G-CO.A	**1** **Know the attributes of perpendicular lines, parallel lines, line segments, angles, and circles (EE.G-CO.1).** HS.G-CO.A.1
	2 N/A HS.G-CO.A.2
	3 N/A HS.G-CO.A.3
	4 **Describe rotations with an angle measure (90, 180, and 270 degrees), reflections with a line of symmetry, and translations with a direction and distance.** HS.G-CO.A.4
	5 **Given a geometric figure and a rotation, reflection, or translation of that figure, identify the corresponding parts.** HS.G-CO.A.5
Congruence: Understand congruence in terms of rigid motions. HS.G-CO.B	**6** **Given a geometric figure, rotate (90, 180, or 270 degrees) or translate it a given amount or reflect it over a given line of symmetry.** HS.G-CO.B.6

	7	Show that two triangles are congruent by matching up their three pairs of corresponding sides and three pairs of corresponding angles. HS.G-CO.B.7
	8	Explain how every triangle with the same three length sides is congruent, but the same is not true for every triangle with the same three angles. HS.G-CO.B.8
Congruence: Prove geometric theorems. HS.G-CO.C	9	N/A HS.G-CO.C.9
	10	N/A HS.G-CO.C.10
	11	N/A' HS.G-CO.C.11
Congruence: Make geometric constructions. HS.G-CO.D	12	N/A HS.G-CO.D.12
	13	N/A HS.G-CO.D.13
Similarity, Right Triangles, and Trigonometry: Understand similarity in terms of similarity transformations. HS.G-SRT.A	1	N/A HS.G-SRT.A.1
	2	N/A HS.G-SRT.A.2
	3	N/A HS.G-SRT.A.3
Similarity, Right Triangles, and Trigonometry: Prove theorems involving similarity. HS.G-SRT.B	4	N/A HS.G-SRT.B.4
	5	N/A HS.G-SRT.B.5
Similarity, Right Triangles, and Trigonometry: Define trigonometric ratios and solve problems involving right triangles. HS.G-SRT.C	6	N/A HS.G-SRT.C.6
	7	N/A HS.G-SRT.C.7
	8	N/A HS.G-SRT.C.8
Similarity, Right Triangles, and Trigonometry: Apply trigonometry to general triangles. HS.G-SRT.D	9	N/A HS.G-SRT.D.9
	10	N/A HS.G-SRT.D.10
	11	N/A HS.G-SRT.D.11
Circles: Understand and apply theorems about	1	N/A HS.G-C.A.1

circles. HS.G-C.A	**2** N/A HS.G-C.A.2
	3 N/A HS.G-C.A.3
	4 N/A HS.G-C.A.4
Circles: Find arc lengths and areas of sectors of circles. HS.G-C.B	**5** N/A HS.G-C.B.5
Expressing Geometric Properties with Equations: Translate between the geometric description and the equation for a conic section. HS.G-GPE.A	**1** N/A HS.G-GPE.A.1
	2 N/A HS.G-GPE.A.2
	3 N/A HS.G-GPE.A.3
Expressing Geometric Properties with Equations: Use coordinates to prove simple geometric theorems algebraically. HS.G-GPE.B	**4** N/A HS.G-GPE.B.4
	5 N/A HS.G-GPE.B.5
	6 N/A HS.G-GPE.B.6
	7 Use coordinates and measure to find perimeters of polygons and areas of triangles and rectangles. HS.G-GPE.B.7
Geometric Measurement and Dimension: Explain volume formulas and use them to solve problems. HS.G-GMD.A	**1** Predict the circumference or area of a circle or the volume of a cylinder, pyramid, or cone and then use a formula or model to test that prediction. HS.G-GMD.A.1
	2 N/A HS.G-GMD.A.2
	3 Use volume formulas for cylinders, pyramids, and cones to solve problems. HS.G-GMD.A.3
Geometric Measurement and Dimension: Visualize relationships between two-dimensional and three-dimensional objects. HS.G-GMD.B	**4** Identify the shapes of two-dimensional cross-sections of three-dimensional objects (EE.G.GMD.4). HS.G-GMD.B.4
Modeling with Geometry: Apply geometric concepts in modeling situations. HS.G-MG.A	**1** N/A HS.G-MG.A.1
	2 N/A HS.G-MG.A.2

3 **N/A** HS.G-MG.A.3