Maryland Mathematics

Grade 8

Number and Operation Sense NOS

A REASON WITH IRRATIONAL NUMBERS. 8.NOS.A

1 Identify a number as irrational when its decimal expansion neither terminates nor repeats, and explain that irrational numbers cannot be expressed as the ratio of two integers. 8.NOS.A.1

2 Use rational approximations of irrational numbers to estimate their locations on a number line, compare their size, and apply this understanding to estimate the value of expressions (e.g.,) in context. 8.NOS.A.2

B REASON WITH EXPONENTS TO EXPRESS AND INTERPRET QUANTITIES. 8.NOS.B

3 Know and apply the properties of integer exponents to generate equivalent numerical expressions. 8.NOS.B.3

4 Use square and cube roots to represent solutions to equations and describe numbers. 8.NOS.B.4

a Use square and cube roots symbols to represent solutions to equations of the form and , where p is a positive rational number. 8.NOS.B.4.A

b Evaluate square roots of perfect squares from 1 to 100 and cube roots of perfect cubes from 1 to 125 by inspection. 8.NOS.B.4.B

5 Apply scientific notation to represent and compare very large and very small quantities in context, and use technology to compute with numbers in scientific notation. 8.NOS.B.5

a Express numbers as a single digit times an integer power of 10 to estimate and compare magnitudes. 8.NOS.B.5.A

b Use scientific notation to model and compute with real-world quantities, choose appropriate units, and interpret their meaning based on the context. 8.NOS.B.5.B

Algebraic Thinking AT

A USE PROPORTIONAL RELATIONSHIPS TO REPRESENT AND REASON ABOUT LINEAR EQUATIONS. 8.AT.A

1 Analyze and compare proportional relationships using slope. 8.AT.A.1

a Graph proportional relationships and interpret the unit rate as the slope of the graph. 8.AT.A.1.A

b Compare proportional relationships represented in different forms (e.g., graphs, equations, and tables) by analyzing their slopes. 8.AT.A.1.B

2 Use proportional reasoning to identify slope and represent linear relationships. 8.AT.A.2

a Use proportional reasoning to explain why the slope m is the same between any two points on a non-vertical line by showing that the ratios of vertical change to horizontal change between points are equivalent. 8.AT.A.2.A

b Use this relationship to write equations of lines in the form for lines that pass through the origin, and in the form for lines that include a vertical shift from the origin, where b represents the y-intercept. 8.AT.A.2.B

B MAKE SENSE OF AND SOLVE EQUATIONS, INEQUALITIES, AND SYSTEMS OF EQUATIONS. 8.AT.B

3 Solve linear equations in one variable. 8.AT.B.3

a Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solution. Justify each example by showing how it can be rewritten in an equivalent equation in the form x=a, a=a, or a=b (where a and b are different rational numbers) and explaining what this form reveals about the solution. 8.AT.B.3.A

b Solve linear equations in one variable with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and combing like terms. 8.AT.B.3.B

4 Solve linear inequalities in one variable. 8.AT.B.4

a Solve inequalities including those requiring the use of the distributive property and combining like terms. 8.AT.B.4.A

b Represent the solution set on a number line and describe the set of possible values in the context of the problem. 8.AT.B.4.B

5 Analyze and solve systems of two linear equations in two variables. 8.AT.B.5

a Interpret the solution to a system of two linear equations as the point where their graphs intersect and verify that the coordinates of the intersection satisfy both equations. 8.AT.B.5.A

b Solve systems of two linear equations by graphing and substitution. When using graphing, find an approximate or exact solution depending on the precision of the graph. Select a method strategically based on the structure of the system or the context of the problem and explain why the method is appropriate. 8.AT.B.5.B

c Use structure to determine when a system has no solution, one solution, or infinitely many solutions and justify the conclusion. 8.AT.B.5.C

d Model and solve contextual problems using systems of two linear equations. 8.AT.B.5.D

C REASON ABOUT FUNCTIONS. 8.AT.C

6 Determine whether a relationship is a function by analyzing whether each input is assigned to exactly one output. 8.AT.C.6

a Given a clearly defined set of input-output pairs in a table, mapping, or real-world description, determine whether the relationship is a function and explain why. 8.AT.C.6.A

b Given a graph, identify input-output pairs and determine whether the graph represents a function. 8.AT.C.6.B

7 Compare the properties (i.e., rate of change, intercepts) of two linear functions each represented in a different way (algebraically, graphically, numerically in tables, or by narrative descriptions). 8.AT.C.7

8 Identify whether a function is linear or non-linear given equations, graphs, or input-output pairs, and provide a justification using reasoning about the constant rate of change and its relationship to proportional reasoning. 8.AT.C.8

D MODEL WITH FUNCTIONS. 8.AT.D

9 Interpret the graph of a linear function in the form 8.AT.D.9

a Given the graph of a linear function, identify the slope and y-intercept. 8.AT.D.9.A

b Match a linear equation in the form to its graph. 8.AT.D.9.B

10 Construct and interpret a linear function to model a relationship between two quantities. 8.AT.D.10

a Given two input-output pairs, a graph, a table, or a description of a relationship, determine the rate of change and initial value and write the linear equation that models the situation. 8.AT.D.10.A

b Interpret the rate of change and initial value in the context of the problem. 8.AT.D.10.B

11 Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function based on a narrative description. 8.AT.D.11

Geometric Reasoning and Measurement GR

A MAKE CONJECTURES ABOUT AND VERIFY GEOMETRIC RELATIONSHIPS. 8.GR.A

1 Use the relationships between supplementary, complementary, vertical, and adjacent angles to write and solve equations for an unknown angle. 8.GR.A.1

2 Draw or build triangles using tools (ruler, protractor, technology, or physical manipulatives) given three measures of angles or sides. Determine whether the given conditions result in a unique triangle, more than one triangle, or no triangle. 8.GR.A.2

3 Use informal arguments to verify that the sum of the interior angles of a triangle is 180 degrees and why an exterior angle equals the sum of the two remote interior angles. 8.GR.A.3

B APPLY THE PYTHAGOREAN THEOREM TO REASON ABOUT RIGHT TRIANGLES. 8.GR.B

4 Understand and reason about the Pythagorean Theorem and its extensions. 8.GR.B.4

a Use diagrams, examples, or informal reasoning to explain the Pythagorean Theorem and why it applies to all right triangles. 8.GR.B.4.A

b Use the converse of the Pythagorean Theorem to determine whether a set of three side lengths forms a right triangle, and extend this reasoning to identify whether a triangle is acute or obtuse using Pythagorean inequalities. 8.GR.B.4.B

5 Apply the Pythagorean Theorem to solve problems in context. 8.GR.B.5

a Determine unknown side lengths in right triangles. 8.GR.B.5.A

b Find the distance between two points in a coordinate system using the Pythagorean Theorem. 8.GR.B.5.B

Reasoning with Data, Statistics, and Probability DS

A MAKE SENSE OF STATISTICAL INQUIRY. 8.DS.A

1 Evaluate predictions and conclusions drawn from bivariate data. 8.DS.A.1

a Determine whether observed associations in sample data justify generalizations about a broader population. 8.DS.A.1.A

b Identify limitations or potential bias in data collection or interpretation when analyzing trends in scatter plots. 8.DS.A.1.B

B DESCRIBE, ANALYZE, AND COMPARE DATA USING VISUAL AND NUMERICAL REPRESENTATIONS TO MODEL SITUATIONS AND DRAW INFERENCES. 8.DS.B

2 Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association. 8.DS.B.2

3 Compare the fit of different linear models shown on scatter plots of the same data by describing the overall pattern and the closeness of data points to each line. 8.DS.B.3

4 Use a provided linear model to make predictions based on bivariate measurement data. Interpret the meaning of the slope and y-intercept in context. 8.DS.B.4

C MODEL AND ANALYZE PROBABILITY TO INTERPRET CHANCE EVENTS AND MAKE PREDICTIONS. 8.DS.C

5 Construct a two-way table to organize data on two categorical variables collected from the same subjects. Calculate and interpret relative frequencies for rows and/or columns and use them to describe possible associations between the variables. 8.DS.C.5

6 Find probabilities of compound events by representing or simulating the sample space or simulating events. 8.DS.C.6

a Represent the sample space for a compound event using organized lists, tables, or tree diagrams. Given an event described in everyday language, identify the outcomes in the sample space that make up the event. 8.DS.C.6.A

b Determine the probability of a compound event as a fraction of outcomes in the sample space that result in the event. 8.DS.C.6.B