Maryland Mathematics

Grade 7

Number and Operation Sense NOS

A USE STRUCTURE AND REPRESENTATIONS TO REASON WITH RATIONAL NUMBERS. 7.NOS.A

1. Add and subtract rational numbers using multiple strategies and representations. 7.NOS.A.1
   - a. Describe situations in which opposite quantities combine to make 0. 7.NOS.A.1.A
   - b. Model the addition of rational numbers as movement along a number line, where the direction and distance depend on the sign and magnitude of the addend. Show that a number and its opposite have a sum of 0 (are additive inverses). 7.NOS.A.1.B
   - c. Rewrite subtraction as addition using the additive inverse . Use strategies such as number lines and applying absolute value of the difference to determine the distance between two rational numbers and solve problems in context. 7.NOS.A.1.C
   - d. Model and solve multistep contextual problems involving addition and subtraction of rational numbers, using efficient and flexible strategies. 7.NOS.A.1.D
2. Multiply and divide rational numbers using multiple strategies and representations. 7.NOS.A.2
   - a. Model multiplication of rational numbers using number lines, arrays, or area models to show how properties of operations (e.g., the distributive property) lead to rules for signed number multiplication, including . 7.NOS.A.2.A
   - b. Interpret quotients of rational numbers in context and represent division of signed numbers in different forms, such as when the divisor is not zero. 7.NOS.A.2.B
   - c. Use properties of operations to multiply and divide rational numbers flexibly and efficiently. 7.NOS.A.2.C
   - d. Analyze the decimal representation of a quotient resulting from dividing rational numbers to determine whether it terminates or repeats and use this pattern to explain why all rational numbers have decimal forms that either terminate or repeat. 7.NOS.A.2.D
   - e. Model and solve multistep contextual problems involving multiplication and division of rational numbers, using efficient and flexible strategies. 7.NOS.A.2.E

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3 Solve multistep problems involving positive and negative rational numbers in any form (i.e., fractions, decimals, percents) using all four operations. 7.NOS.A.3

a Apply properties of operations to efficiently compute with rational numbers and convert between forms when appropriate to support problem solving. 7.NOS.A.3.A

b Evaluate the reasonableness of solutions using estimation, mental math, and understanding of the context. 7.NOS.A.3.B

Algebraic Thinking AT

A REPRESENT AND REASON ABOUT PROPORTIONAL RELATIONSHIPS TO SOLVE PROBLEMS. 7.AT.A

1 Compute unit rates associated with ratios of fractions, including ratios of lengths, areas, and other quantities measured in like or different units. Example: If a person walks mile in each hour, compute the unit rate as the complex fraction miles per hour, or equivalently 2 miles per hour. 7.AT.A.1

2 Identify proportional relationships between quantities. 7.AT.A.2

a Determine whether two quantities are in a proportional relationship, for example, by testing for equivalent ratios in a table or by graphing on a coordinate plane and observing whether the graph is a straight line through the origin. 7.AT.A.2.A

b Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and narrative descriptions of proportional relationships. 7.AT.A.2.B

3 Represent proportional relationships between quantities. 7.AT.A.3

a Represent proportional relationships using equations. 7.AT.A.3.A

b Explain what a point (x, y) on the graph of a proportional relationship represents in terms of the context, with special attention to the points (0, 0) and (1,), where is the unit rate. 7.AT.A.3.B

4 Solve ratio and percent problems in context (e.g., simple interest, tax, markups and markdowns, tips, commissions, fees, percent increase or decrease, and percent error) by applying proportional reasoning. 7.AT.A.4

B LOOK FOR AND MAKE USE OF STRUCTURE TO REWRITE EXPRESSIONS IN EQUIVALENT FORMS AND REASON ABOUT THEIR PROPERTIES. 7.AT.B

5 Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. 7.AT.B.5

6 Rewrite an expression in different forms to shed light on the represented context and how the quantities in it are related. For example, means that an "increase by 5%" is the same as "multiply by 1.05." 7.AT.B.6

C MODEL WITH AND SOLVE EQUATIONS AND INEQUALITIES. 7.AT.C

7 Analyze contextual situations to determine whether an equation or inequality best represents the relationship between quantities. Justify the choice based on the context. 7.AT.C.7

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8 Use variables to represent quantities and write and solve equations to model and reason about relationships in context. 7.AT.C.8

a Write equations of the form and where p, q, and r are specific rational numbers. 7.AT.C.8.A

b Solve equations of these forms flexibly and efficiently. Explain the solution process and how it connects to the original statement of equality. 7.AT.C.8.B

c Solve word problems leading to equations of these forms and interpret the solution in terms of the context. 7.AT.C.8.C

9 Use variables to represent quantities and write and solve inequalities to model and reason about constraints and conditions in context. 7.AT.C.9

a Write inequalities of the form or , where , , and are specific rational numbers. 7.AT.C.9.A

b Solve inequalities of these forms and graph the solution set on a number line. 7.AT.C.9.B

c Interpret the solution set in terms of the context by describing what values are possible or reasonable in the given situation. 7.AT.C.9.C

Geometric Reasoning and Measurement GR

A USE STRUCTURE AND REPRESENTATION TO ANALYZE GEOMETRIC FIGURES. 7.GR.A

1 Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale. 7.GR.A.1

2 Describe the two-dimensional figures that result from slicing three-dimensional figures (e.g., right rectangular prisms, right cylinders) with a plane. Use the resulting shapes to explain how the structure of the solid connects to volume and surface area. 7.GR.A.2

B REASON WITH AND ABOUT GEOMETRIC FORMULAS TO SOLVE PROBLEMS AND JUSTIFY SOLUTIONS IN CONTEXT. 7.GR.B

3 Apply the formulas for the area and circumference of a circle to solve problems in context. Use informal reasoning and visual models to explain the relationship between the circumference and area of a circle. 7.GR.B.3

4 Solve mathematical problems with and without context involving area, surface area, and volume of two- and three-dimensional objects. 7.GR.B.4

a Solve problems involving area, surface area, and volume of polygonal figures and polyhedral solids, including triangles, quadrilaterals, other polygons, cubes, right prisms, and pyramids—figures defined by edges and flat faces. 7.GR.B.4.A

b Solve problems involving volume of curvedsurface solids, including cones, cylinders, and spheres—figures without edges. 7.GR.B.4.B

c Interpret and justify solutions in context by comparing different geometric representations, estimating or checking for reasonableness, and explaining how the result applies to the context. 7.GR.B.4.C

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Reasoning with Data, Statistics, and Probability DS

A MAKE SENSE OF STATISTICAL INQUIRY. 7.DS.A

1 Determine when generalizations about a population are appropriate based on how the sample was selected. 7.DS.A.1

- a Decide whether a sample is representative of a population by explaining how it was selected and how that selection affects the accuracy of conclusions. 7.DS.A.1.A
- b Explain how a random sample increases the likelihood that the sample represents the population. 7.DS.A.1.B

2 Use data from random samples to make and evaluate estimates or predictions about a population. 7.DS.A.2

- a Use data from a single random sample to estimate an unknown characteristic of a population. 7.DS.A.2.A
- b Generate and compare multiple random samples of the same size and use the variability across samples to assess how reliable an estimate or prediction is. 7.DS.A.2.B

B DESCRIBE, ANALYZE, AND COMPARE DATA USING VISUAL AND NUMERICAL REPRESENTATIONS TO MODEL SITUATIONS AND DRAW INFERENCES. 7.DS.B

3 Compare two numerical data distributions using visual displays and numerical measures to draw inferences about differences between populations. 7.DS.B.3

- a Use histograms and other visualizations to describe similarities and differences in the range, shape, and clustering of the data sets. 7.DS.B.3.A
- b Use measures of center (e.g., mean or median) and measures of variability (e.g., range or interquartile range) to describe the size and significance of the difference between the distributions. 7.DS.B.3.B
- c Use both visual and numerical comparisons to describe how different the two groups are and whether the difference is meaningful in the context of the data. 7.DS.B.3.C

C MODEL AND ANALYZE PROBABILITY TO INTERPRET CHANCE EVENTS, COMPARE MODELS WITH OBSERVED DATA, AND MAKE PREDICTIONS. 7.DS.C

4 Explain that a probability of 0 means the event is impossible, 1 means it is certain, and values closer to 0 or 1 indicate how unlikely or likely the event is. Use this understanding to estimate the probability of chance events based on knowledge about the context, and compare the likelihood of different events. 7.DS.C.4

5 Understand and apply long-run relative frequency to approximate probabilities and make predictions about chance events. 7.DS.C.5

- a Use data collection or simulation to approximate the probability of a chance event by observing its long-run relative frequency. 7.DS.C.5.A
- b Use a known or estimated probability to evaluate whether the number of outcomes in a given number of simulation trials is reasonable. 7.DS.C.5.B
- c Use visual representations (e.g., bar graphs, circle graphs) to compare and interpret probabilities. 7.DS.C.5.C

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6 Develop and use probability models to find probabilities of events and compare them to observed results. 7.DS.C.6

a Create a uniform probability model for situations where outcomes are equally likely and use the model to calculate the probability of an event. 7.DS.C.6.A

b Create a probability model using observed frequencies and use it to estimate the probability of an event. 7.DS.C.6.B

c Compare probabilities from a model to observed data and explain possible reasons for any differences. 7.DS.C.6.C