Maryland
STATE DEPARTMENT OF EDUCATION

DRAFT Math 7 Standards

Maryland College and Career Ready Standards for Mathematics

Standards Crosswalk Document

Mathematics Branch

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Number and Operation Sense (NOS)

Previously The Number System (NS)

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

PREVIOUSLY 7.NS.A APPLY AND EXTEND PREVIOUS UNDERSTANDING OF OPERATIONS WITH FRACTIONS.

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7.NOS.A.1	Add and subtract rational numbers using multiple strategies and representations. a. Describe situations in which opposite quantities combine to make 0. 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). c. Use the additive inverse to rewrite subtraction as addition ($p-q=p+(-q)$). Use strategies such as number lines and absolute value to determine the distance between two rational numbers and solve problems in context. d. Model and solve multistep contextual problems involving addition and subtraction of rational numbers, using efficient and flexible strategies.	**7.NS.A.1**	Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. a. Describe situations in which opposite quantities combine to make 0. For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged. b. Understand $p+q$ as the number located a distance $\|q\|$ from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts. c. Understand subtraction of rational numbers as adding the additive inverse, $p-q=p+(-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference and apply this principle in real-world contexts. d. Apply properties of operations as strategies to add and subtract rational numbers.

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7.NOS.A.2	Multiply and divide rational numbers using multiple strategies and representations. 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 $(-1) \times (-1) = 1$. b. Interpret quotients of rational numbers in context and represent division of signed numbers in different forms, such as $-\frac{p}{q} = \frac{-p}{q} = \frac{p}{-q}$ when the divisor is not zero. c. Use properties of operations to multiply and divide rational numbers efficiently. 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. e. Model and solve multistep contextual problems involving multiplication and division of rational numbers, using efficient and flexible strategies.	**7.NS.A.2** **7.NS.A.3**	Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1) \times (-1) = 1$ and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts. b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $-\frac{p}{q} = \frac{-p}{q} = \frac{p}{-q}$. Interpret quotients of rational numbers by describing real-world contexts. c. Apply properties of operations as strategies to multiply and divide rational numbers. d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats. e. Solve real-world and mathematical problems involving the four operations with rational numbers. (Computations with rational numbers extend the rules for manipulating fractions to complex fractions.)
7.NOS.A.3	Solve multistep problems involving positive and negative rational numbers in any form (i.e., fractions, decimals, percents).	**7.EE.B.3**	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with

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	a. Apply properties of operations to efficiently compute with rational numbers and convert between forms when appropriate to support problem solving. b. Evaluate the reasonableness of solutions using estimation, mental math, and understanding of the context.		numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar $9\frac{3}{4}$ inches long in the center of a door that is $27\frac{1}{2}$ inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.

Algebraic Thinking (AT)

Previously Ratios and Proportional Relationships (RP); Expressions and Equations (EE)

7.AT.A REPRESENT PROPORTIONAL RELATIONSHIPS AND REASON ABOUT THE REPRESENTATIONS TO SOLVE PROBLEMS. PREVIOUSLY 7.RP.A ANALYZE PROPORTIONAL RELATIONSHIPS AND USE THEM TO SOLVE REAL-WORLD AND MATHEMATICAL PROBLEMS.

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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 $\frac{1}{2}$ mile in each $\frac{1}{4}$ hour, compute the unit rate as the complex fraction $\frac{\frac{1}{2}}{\frac{1}{4}}$ miles per hour, or equivalently 2 miles per hour.*	**7.RP.A.1**	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. For example, if a person walks $\frac{1}{2}$ mile in each $\frac{1}{4}$ hour, compute the unit rate as the complex fraction $\frac{\frac{1}{2}}{\frac{1}{4}}$ miles per hour, equivalently 2 miles per hour.
7.AT.A.2	Identify proportional relationships between quantities. 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. b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and narrative descriptions of proportional relationships.	**7.RP.A.2**	Recognize and represent proportional relationships between quantities. a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin. b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. c. Represent proportional relationships by equations. For example, if total cost t is proportional to the number n of items purchased at a constant price p,

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			the relationship between the total cost and the number of items can be expressed as $t=pn$. d. Explain what a point (x,y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0,0) and (1,r) where r is the unit rate.
7.AT.A.3	Represent proportional relationships between quantities. a. Represent proportional relationships using equations. 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, r), where r is the unit rate.	**7.RP.A.2**	[Standard detailed above]
7.AT.A.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.RP.A.3**	Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.

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

PREVIOUSLY 7.EE.A USE PROPERTIES OF OPERATIONS TO GENERATE EQUIVALENT EXPRESSIONS.

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7.AT.B.5	Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.	**7.EE.A.1**	Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.

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7.AT.B.6	Rewrite an expression in different forms to shed light on the represented context and how the quantities in it are related. For example, $a+0.5\cdot a=1.05a$ means that "increase by 5%" is the same as "multiply by 1.05."	**7.EE.A.2**	Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. For example, $a+0.5\cdot a=1.05a$ means that "increase by 5%" is the same as "multiply by 1.05."

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

PREVIOUSLY 7.EE.B SOLVE REAL-LIFE AND MATHEMATICAL PROBLEMS USING NUMERICAL AND ALGEBRAIC EXPRESSIONS AND INEQUALITIES.

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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.	[New standard]	[New standard]
7.AT.C.8	Use variables to represent quantities and write and solve equations to model and reason about relationships in context. a. Write equations of the form $px+q=r$ and $p(x+q)=r$ where p, q, and r are specific rational numbers. b. Solve equations of these forms flexibly and efficiently. Explain the solution process and how it connects to the original statement of equality. c. Solve word problems leading to equations of these forms and interpret the solution in terms of the context.	**7.EE.B.4**	Use variables to represent quantities in a real-world or mathematical problem and construct simple equations and inequalities to solve problems by reasoning about the quantities. a. Solve word problems leading to equations of the form $px+q=r$ and $p(x+q)=r$, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width? b. b. Solve word problems leading to inequalities of the form $px+q>r$ or $px+q<r$, where p, q, and r are specific

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			rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. For example: As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make and describe the solutions.
7.AT.C.9	Use variables to represent quantities and write and solve inequalities to model and reason about constraints and conditions in context. a. Write inequalities of the form $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers. b. Solve inequalities of these forms and graph the solution set on a number line. c. Interpret the solution set in terms of the context by describing what values are possible or reasonable in the given situation.	**7.EE.B.4**	[Standard detailed above]

Geometric Reasoning (GR)

Previously Geometry (G)

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

PREVIOUSLY 7.G.A DRAW, CONSTRUCT, AND DESCRIBE GEOMETRIC FIGURES AND DESCRIBE THE RELATIONSHIP BETWEEN THEM.

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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.G.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.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.G.A.3**	Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.
[Not applicable]	[In Math 8]	**7.G.A.2**	Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.

7.GR.B APPLY GEOMETRIC MEASUREMENT AND REASONING TO SOLVE PROBLEMS AND JUSTIFY SOLUTIONS IN CONTEXT. PREVIOUSLY 7.G.B SOLVE REAL-LIFE AND MATHEMATICAL PROBLEMS INVOLVING ANGLE MEASURE, AREA, SURFACE AREA, AND VOLUME.

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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.G.B.4**	Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.
7.GR.B.4	Solve mathematical problems with and without context involving area, surface area, and volume of two- and three-dimensional objects. 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. b. Solve problems involving volume of curved-surface solids, including cones, cylinders, and spheres—figures without edges. 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.G.B.6** **8.G.C.9**	Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.
[Not applicable]	[In Math 8]	**7.G.B.5**	Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve equations for an unknown angle in a figure.

Reasoning with Data, Statistics, and Probability (DS)

Previously Statistics and Probability (SP)

7.DS.A MAKE SENSE OF STATISTICAL INQUIRY.

PREVIOUSLY 7.SP.A USE RANDOM SAMPLING TO DRAW INFERENCES ABOUT A POPULATION.

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7.DS.A.1	Determine when generalizations about a population are appropriate based on how the sample was selected. 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. b. Explain how a random sample increases the likelihood that the sample represents the population.	**7.SP.A.1**	Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand random sampling tends to produce representative samples and support valid inferences.
7.DS.A.2	Use data from random samples to make and evaluate estimates or predictions about a population. a. Use data from a single random sample to estimate an unknown characteristic of a population. 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.SP.A.2**	Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.

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

PREVIOUSLY 7.SP.B DRAW INFORMAL COMPARATIVE INFERENCES ABOUT TWO POPULATIONS.

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7.DS.B.3	Compare two numerical data distributions using visual displays and numerical measures to draw inferences about differences between populations. a. Use histograms and other visualizations to describe similarities and differences in the range, shape, and clustering of the data sets. 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. 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.SP.B.3** **7.SP.B.4**	Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable. Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.

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

PREVIOUSLY 7.SP.C INVESTIGATE CHANCE PROCESSES AND DEVELOP, USE, AND EVALUATE PROBABILITY MODELS.

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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	**7.SP.C.5**	Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability

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	context, and compare the likelihood of different events.		around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.
7.DS.C.5	Understand and apply long-run relative frequency to approximate probabilities and make predictions about chance events. a. Use data collection or simulation to approximate the probability of a chance event by observing its long-run relative frequency. b. Use a known or estimated probability to evaluate whether the number of outcomes in a given number of simulation trials is reasonable. c. Use visual representations (e.g., bar graphs, pie charts) to compare and interpret probabilities.	**7.SP.C.6**	Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.
7.DS.C.6	Develop and use probability models to find probabilities of events and compare them to observed results. a. Create a uniform probability model for situations where outcomes are equally likely and use the model to calculate the probability of an event. b. Create a probability model using observed frequencies and use it to estimate the probability of an event. c. Compare probabilities from a model to observed data and explain possible reasons for any differences.	**7.SP.C.7**	Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected. b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning

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			penny appear to be equally likely based on the observed frequencies?
[Not applicable]	[In Math 8]	**7.SP.C.8**	Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. a. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. b. Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event. c. Design and use a simulation to generate frequencies for compound events. For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?