Grade 7 Grade-Level Expanded Expectations

RATIOS AND PROPORTIONAL RELATIONSHIPS: RP

7.RP.A	Analyze proportional relationships and use them to solve problems.	
7.RP.A.1	Compute unit rates, including those that involve complex fractions, with like or different units.	The expectation of the student is to compute unit rates, including those that involve complex fractions, with like or different units.
7.RP.A.2	Recognize and represent proportional relationships between quantities. a) Determine when two quantities are in a proportional relationship. b) Identify and/or compute the constant of proportionality (unit rate). c) Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation. d) Recognize that the graph of any proportional relationship will pass through the origin.	The expectation of the student is to recognize and represent proportional relationships between quantities in equations, tables, graphs, diagrams and real-world situations. The quantities y and x are proportional if $\frac{y}{x}$ is a constant. a. Determine when two quantities are in a proportional relationship. b. Identify and/or compute the constant of proportionality (unit rate). c. 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. d. Recognize that the graph of any proportional relationship will pass through the origin.
7.RP.A.3	Solve problems involving ratios, rates, percentages and proportional relationships.	The expectation of the student is to solve real-world and mathematical problems involving ratios and percentages using proportional relationships such as simple interest, tax markups and markdowns, gratuities and commissions, fees, percent increase and decrease and percent error.

NUMBER SENSE AND OPERATIONS: NS

7.NS.A	Apply and extend previous understandings of operations to add, subtract, multiply and divide rational numbers.

7.NS.A.1	Apply and extend previous understandings of numbers to add and subtract rational numbers. a) Add and subtract rational numbers. b) Represent addition and subtraction on a horizontal or vertical number line. c) Describe situations and show that a number and its opposite have a sum of 0 (additive inverses). d) Understand subtraction of rational numbers as adding the additive inverse. e) Determine the distance between two rational numbers on the number line is the absolute value of their difference. f) Interpret sums and differences of rational numbers.	The expectation of the student is to apply and extend previous understandings of numbers to add and subtract rational numbers. a. Add and subtract rational numbers to include fractions, decimals and integers. b. Represent addition and subtraction on a horizontal or vertical number line. c. Describe situations and show that a number and its opposite have a sum of 0 (are additive inverses). d. Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. e. Show that the distance between two rational numbers on the number line is the absolute value of their difference. f. Interpret sums and differences of rational numbers by describing real world contexts.
7.NS.A.2	Apply and extend previous understandings of numbers to multiply and divide rational numbers. a) Multiply and divide rational numbers. b) Determine that a number and its reciprocal have a product of 1 (multiplicative inverse). c) Understand that every quotient of integers (with non-zero divisor) is a rational number. d) Convert a rational number to a decimal. e) Understand that all rational numbers can be written as fractions or decimal numbers that terminate or repeat. f) Interpret products and quotients of rational numbers by describing real-world contexts.	The expectation of the student is to apply and extend previous understandings of numbers to multiply and divide rational numbers. a. Multiply and divide rational numbers to include fractions, decimals and integers. b. Determine that a number and its reciprocal have a product of 1 (multiplicative inverse). c. 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 $-(p/q) = (-p)/q = p/(-q)$. d. Convert a rational number to a decimal using long division. e. Understand that some rational numbers can be written as integers and all rational numbers can be written as fractions or decimal numbers that terminate or repeat. f. Interpret products and quotients of rational numbers by describing real-world contexts.
7.NS.A.3	Solve problems involving the four arithmetic operations with rational numbers.	The expectation of the student is to solve real-world and mathematical problems involving the four arithmetic operations with rational numbers.

EXPRESSIONS, EQUATIONS AND INEQUALITIES: EEI

7.EEI.A	Use properties of operations to generate equivalent expressions.

7.EEI.A.1	Apply properties of operations to simplify and to factor linear algebraic expressions with rational coefficients.	The expectation of the student is to apply properties of operations (*e.g., commutative, associative, distributive*) to simplify and to factor linear algebraic expressions with rational coefficients.
7.EEI.A.2	Understand how to use equivalent expressions to clarify quantities in a problem.	The expectation of the student is to understand how to use equivalent expressions to clarify quantities in a problem context. (*e.g., Adding a 5% tax to the total is the same as multiplying the total by 1.05; a + 0.05a = 1.05a.*)

7.EEI.B	Solve problems using numerical and algebraic expressions and equations.

7.EEI.B.3	Solve multi-step problems posed with rational numbers. a) Convert between equivalent forms of the same number. b) Assess the reasonableness of answers using mental computation and estimation strategies.	The expectation of the student is to solve multistep real-life and mathematical problems posed with positive and negative rational numbers in any form (*e.g., integers, fractions and decimals*) by applying properties of operations as strategies to calculate with numbers. a. Convert between forms as appropriate. b. Assess the reasonableness of answers using mental computation and estimation strategies.
7.EEI.B.4	Write and/or solve linear equations and inequalities in one variable. a) Write and/or solve equations of the form $x+p = q$ and $px = q$ in which p and q are rational numbers. b) Write and/or solve two-step equations of the form $px + q = r$ and $p(x + q) = r$, where p, q and r are rational numbers, and interpret the meaning of the solution in the context of the problem. c) Write, solve and/or graph inequalities of the form $px + q > r$ or $px + q < r$, where p, q and r are rational numbers.	The expectation of the student is to write and/or solve real-world and mathematical problems by using and solving linear equations and inequalities in one variable. a. Write and solve equations of the form $x+p = q$ and $px = q$ in which p and q are rational numbers. b. Write and solve two-step equations of the form $px + q = r$ and $p(x + q) = r$, where p, q and r are rational numbers and interpret the meaning of the solution in the context of the problem. c. Write and solve inequalities of the form $px + q > r$ or $px + q < r$, where p, q and r are rational numbers. d. Write, solve and/or graph the solution set of the inequality and interpret it in the context of a problem.

GEOMETRY AND MEASUREMENT: GM

7.GM.A	Draw and describe geometrical figures and describe the relationships between them.

7.GM.A.1	Solve problems involving scale drawings of real objects and geometric figures, including computing actual lengths and areas from a scale drawing and reproducing the drawing at a different scale.	The expectation of the student is to solve problems involving scale drawings of real-world objects and geometric figures, including computing actual lengths and areas from a scale drawing and reproducing the drawing at a different scale.
7.GM.A.2	Use a variety of tools to construct geometric shapes. a) Determine if provided constraints will create a unique triangle through construction. b) Construct special quadrilaterals given specific parameters.	The expectation of the student is to use a variety of tools (freehand, ruler, protractor and/or technology) to construct geometric shapes. a. Construct triangles given 3 sides, given 3 angles or given a combination of 3 sides and/or angles and decide if the measurements determine a unique triangle, more than one triangle or no triangle. b. Construct special quadrilaterals given specific parameters about angles or sides. (e.g., kite, trapezoid, rhombus, parallelogram and rectangle)
7.GM.A.3	Describe two-dimensional cross sections of pyramids, prisms, cones and cylinders.	The expectation of the student is to describe two-dimensional cross sections of pyramids, cones, cylinders and prisms including cross-sections that are not necessarily parallel to the base of the figure.
7.GM.A.4	Understand concepts of circles. a) Analyze the relationships among the circumference, the radius, the diameter, the area and Pi in a circle. b) Know and apply the formulas for circumference and area of circles to solve problems.	The expectation of the student is to understand concepts of circles. a. Demonstrate an understanding of the relationships among radius, diameter and circumference of a circle. b. Understand the relationship among the circumference, the diameter and π. c. Explore the relationship between circumference and area of a circle. d. Know and apply the formulas for circumference and area of circles to solve real-world and mathematical problems.
7.GM.B	**Apply and extend previous understanding of angle measure, area and volume.**	
7.GM.B.5	Use angle properties to write and solve equations for an unknown angle.	The expectation of the student is to use facts about supplementary, complementary, vertical and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.

7.GM.B.6	Understand the relationship between area, surface area and volume. a) Find the area of triangles, quadrilaterals and other polygons composed of triangles and rectangles. b) Find the volume and surface area of prisms, pyramids and cylinders.	The expectation of the student is to understand the relationship between area, surface area and volume. Solve real-world and mathematical problems involving area, volume and surface area. a. Understand the concept of area and find area of triangles, quadrilaterals and other polygons composed of triangles and rectangles. b. Understand the concepts of volume and surface area and find related measures for cubes, right triangular prisms and pyramids, right rectangular prisms and pyramids and cylinders.

DATA ANALYSIS, STATISTICS AND PROBABILITY: DSP

7.DSP.A	**Use random sampling to draw inferences about a population.**	
7.DSP.A.1	Understand that statistics can be used to gain information about a population by examining a sample of the population. a) Understand that a sample is a subset of a population. b) Understand that generalizations from a sample are valid only if the sample is representative of the population. c) Understand that random sampling is used to produce representative samples and support valid inferences.	The expectation of the student is to understand that statistics can be used to gain information about a population by examining a sample of the population. a. Understand that a sample is a subset of a population and both the sample and the population have similar characteristics. b. Understand that generalizations from a sample are valid only if the sample is representative of the population. c. Understand that random sampling is used to produce representative samples and support valid inferences.
7.DSP.A.2	Use data from multiple samples to draw inferences about a population and investigate variability in estimates of the characteristic of interest.	The expectation of the student is to use data from multiple samples to draw inferences about a population and investigate variability in estimates of the characteristic of interest. *(e.g., 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 each of the estimates or predictions might be.)*
7.DSP.B	**Draw informal comparative inferences about two populations.**	

7.DSP.B.3	Analyze different data distributions using statistical measures.	The expectation of the student is to analyze different data distributions using statistical measures. 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. (*e.g., 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.*)
7.DSP.B.4	Compare the numerical measures of center, measures of frequency and measures of variability from two random samples to draw inferences about the population.	The expectation of the student is to compare the numerical measures of center (mean and median), measures of frequency (mode) and measures of variability (range, interquartile range and mean absolute deviation) from two random samples to draw inferences about the populations.
7.DSP.C	**Develop, use and evaluate probability models.**	
7.DSP.C.5	Investigate the probability of chance events. a) Determine probabilities of simple events. b) Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring.	The expectation of the student is to investigate probability of chance events. a. Determine probabilities of simple (single) events. b. Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. c. Understand that a probability near 0 indicates an unlikely event, a probability near 1/2 indicates an event that is neither unlikely nor likely and a probability near 1 indicates a likely event.
7.DSP.C.6	Investigate the relationship between theoretical and experimental probabilities for simple events. a) Predict outcomes using theoretical probability. b) Perform experiments that model theoretical probability. c) Compare theoretical and experimental probabilities.	The expectation of the student is to investigate the relationship between theoretical and experimental probabilities for simple events. a. Predict outcomes using theoretical probability. b. Perform experiments that model theoretical probability. c. Compare theoretical and experimental probabilities.

7.DSP.C.7	Explain possible discrepancies between a developed probability model and observed frequencies.
	  a) Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events.
	  b) Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process.
		The expectation of the student is to explain possible discrepancies between a developed probability model and observed frequencies. 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. (*e.g.*, *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. (*e.g.*, *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 penny appear to be equally likely based on the observed frequencies?*)

7.DSP.C.8	Find probabilities of compound events using organized lists, tables, tree diagrams and simulations.
	  a) Represent the sample space of a compound event.
	  b) Design and use a simulation to generate frequencies for compound events.
		The expectation of the student is to find probabilities of compound events using organized lists, tables, tree diagrams and simulations.
		  a. 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.
		  b. Design and use a simulation to generate frequencies for compound events.