Mathematics | Grade 6 – ILLUSTRATIVE MATHEMATICS

RATIOS AND PROPORTIONAL RELATIONSHIPS: RP		
6.RP.A.1	Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. *For example, the ratio of wings to beaks in a bird house at the zoo was 2:1, because for every 2 wings there was 1 beak. Another example could be for every vote candidate A received, candidate C received nearly three votes*	6.2.1, 6.2.2, 6.2.3, 6.2.4, 6.2.5, 6.6.16, 6.9.4
6.RP.A.2	Understand the concept of a unit rate *a/b* associated with a ratio *a:b* with *b ≠ 0*. Use rate language in the context of a ratio relationship. *For example, this recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar. Also, we paid $75 for 15 hamburgers, which is a rate of $5 per hamburger.* (Expectations for unit rates in 6^{th} grade are limited to non-complex fractions).	6.2.10, 6.3.1, 6.3.5, 6.3.6, 6.3.7, 6.9.6
6.RP.A.3	Use ratio and rate reasoning to solve real-world and mathematical problems (e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diadiagrams,or equations).	6.2.6, 6.2.7, 6.2.10, 6.2.12, 6.2.13, 6.2.14, 6.2.15, 6.2.16, 6.2.17, 6.3.6, 6.3.7, 6.3.8, 6.3.9, 6.3.15, 6.9.4, 6.9.5, 6.9.6
6.RP.A.3a	Make tables of equivalent ratios relating quantities with whole number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.	6.2.11, 6.2.12, 6.2.13, 6.6.16, 6.6.17
6.RP.A.3b	Solve unit rate problems including those involving unit pricing and constant speed. *For example, if a runner ran 10 miles in 90 minutes, running at that speed, how long will it take him to run 6 miles? How fast is he running in miles per hour?*	6.2.8, 6.2.9, 6.2.10, 6.3.5, 6.3.6, 6.3.7, 6.3.8, 6.3.9, 6.6.16, 6.6.17
6.RP.A.3c	Find a percent of a quantity as a rate per 100 (e.g.,30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.	6.3.10, 6.3.11, 6.3.12, 6.3.13, 6.3.14, 6.3.15, 6.3.16, 6.6.7, 6.9.4, 6.9.6
6.RP.A.3d	Use ratio reasoning to convert customary and metric measurement units (within the same system); manipulate and transform units appropriately when multiplying or dividing quantities.	6.3.3, 6.3.4, 6.3.9
NUMBER SENSE AND OPERATIONS: NS		
6.NS.A.1	Interpret and compute quotients of fractions, and solve contextual problems involving division of fractions by fractions (e.g., using visual fraction models and equations to represent the problem is suggested).	6.4.3, 6.4.4, 6.4.5, 6.4.6, 6.4.7, 6.4.8, 6.4.9, 6.4.10, 6.4.11, 6.4.12, 6.4.13, 6.4.14, 6.4.16, 6.4.17

	For example, create a story context for (2/3) ÷ (3/4) and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that (2/3) ÷ (3/4) = 8/9 because 3/4 times 8/9 is 2/3 ((a/b) ÷ (c/d) = ad/bc.) *Further example: How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How wide is a rectangular strip of land with length 3/4 mi and area 1/2 square mi?*	
6.NS.B	Compute with non-negative multi-digit numbers, and find common factors and multiples.	6.5.5, 6.5.6, 6.9.1, 6.9.2
6.NS.B.2	Fluently divide multi-digit numbers using a standard algorithm.	6.5.9, 6.5.10, 6.5.11, 6.5.13, 6.5.14
6.NS.B.3	Fluently add, subtract, multiply, and divide multi-digit decimals using a standard algorithm for each operation.	6.5.2, 6.5.3, 6.5.4, 6.5.7, 6.5.8, 6.5.12, 6.5.13, 6.5.14, 6.5.15, 6.6.4, 6.8.12, 6.9.6
6.NS.B.4	Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor. For example, express 36 + 8 as 4 (9 + 2).	6.7.16, 6.7.17, 6.7.18
6.NS.C.5	Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.	6.7.1, 6.7.5
6.NS.C.6	Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.	6.7.1, 6.7.2, 6.7.4, 6.7.7, 6.7.14
6.NS.C.6a	Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself. For example, – (–3) = 3, and that 0 is its own opposite.	6.7.2, 6.7.4, 6.7.7
6.NS.C.6b	Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.	6.7.11, 6.7.14
6.NS.C.6c	Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.	6.7.2, 6.7.11, 6.7.12, 6.7.13, 6.7.15
6.NS.C.7	Understand ordering and absolute value of rational numbers.	6.7.4, 6.7.6, 6.7.7

6.NS.C.7a	Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. *For example, interpret –3 > –7 as a statement that –3 is located to the right of –7 on a number line oriented from left to right.*	6.7.3, 6.7.9
6.NS.C.7b	Write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write –3 oC > –7 oC to express the fact that –3 oC is warmer than –7 oC.*	6.7.3, 6.7.8
6.NS.C.7c	Understand the absolute value of a rational number as its distance from 0 on the number line and distinguish comparisons of absolute value from statements about order in a real-world context. *For example, an account balance of -24 dollars represents a greater debt than an account balance -14 dollars because -24 is located to the left of -14 on the number line.*	6.7.6, 6.7.13
6.NS.C.8	Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.	6.7.11, 6.7.13, 6.7.14, 6.7.15, 6.7.19
EXPRESSIONS AND EQUATIONS: EE		
6.EE.A.1	Write and evaluate numerical expressions involving whole-number exponents.	6.1.17, 6.1.18, 6.6.12, 6.6.13, 6.6.14, 6.6.15
6.EE.A.2	Write and evaluate numerical expressions involving whole-number exponents.	6.6.10, 6.6.11, 6.6.19
6.EE.A.2a	Write expressions that record operations with numbers and with variables. *For example, express the calculation "Subtract y from 5" as 5 - y.*	6.1.5, 6.1.9, 6.1.18, 6.6.6
6.EE.A.2b	Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. *For example, describe the expression 2 (8 + 7) as a product of two factors; view (8 + 7) as both a single entity and a sum of two terms.*	6.7.10
6.EE.A.2c	Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations).	6.1.5, 6.1.6, 6.1.9, 6.1.10, 6.6.6, 6.6.14, 6.6.15
6.EE.A.3	Apply the properties of operations (including, but not limited to, commutative, associative, and distributive properties) to generate equivalent expressions. The distributive property is prominent here.	6.6.10, 6.6.11

	For example, apply the distributive property to the expression 3 (2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6 (4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y.	
6.EE.B	Apply and extend previous understandings of arithmetic to algebraic expressions.	
6.EE.B.4	Identify when expressions are equivalent (i.e., when the expressions name the same number regardless of which value is substituted into them). For example, the expression 5b + 3b is equivalent to (5 +3) b, which is equivalent to 8b.	
6.EE.B.5	Understand solving an equation or inequality is carried out by determining if any of the values from a given set make the equation or inequality true. Use substitution to determine whether a given number in a specified set makes an equation or inequality true.	6.6.2, 6.6.3, 6.6.4, 6.6.5, 6.6.8, 6.6.15, 6.7.9, 6.7.10
6.EE.B.6	Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.	6.6.1, 6.6.3, 6.6.4, 6.6.5, 6.6.6, 6.6.7, 6.7.8, 6.7.10
6.EE.B.7	Solve real-world and mathematical problems by writing and solving one-step equations of the form x + p = q and px = q for cases in which p, q, and x are all nonnegative rational numbers.	6.6.3, 6.6.4, 6.6.5, 6.6.7, 6.6.19
6.EE.B.8	Interpret and write an inequality of the form x > c or x < c which represents a condition or constraint in a real-world or mathematical problem. Recognize that inequalities have infinitely many solutions; represent solutions of inequalities on number line diagrams.	6.7.8, 6.7.9, 6.7.10
6.EE.C.9	Use variables to represent two quantities in a real-world problem that change in relationship to one another. *For example, Susan is putting money in her savings account by depositing a set amount each week ($50). Represent her savings account balance with respect to the number of weekly deposits (s = 50w, illustrating the relationship between balance amount s and number of weeks w).*	6.6.16, 6.6.17, 6.6.18, 6.6.19
6.EE.C.9a	Write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable.	6.6.16, 6.6.17, 6.6.18, 6.6.19
6.EE.C.9b	Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation	6.6.16, 6.6.17, 6.6.18, 6.6.19
GEOMETRY: G		
6.GM.A.1	Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and othershapes; know and apply these techniques in the context of solving real-world and mathematical problems.	6.1.2, 6.1.3, 6.1.4, 6.1.5, 6.1.6, 6.1.7, 6.1.8, 6.1.9, 6.1.10, 6.1.11, 6.1.19, 6.4.14

6.GM.A.2	Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Know and apply the formulas V = lwh and V = Bh where B is the area of the base to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.	6.1.15, 6.4.14, 6.4.15, 6.4.17
6.GM.A.3	Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side that joins two vertices (vertical or horizontal segments only). Know and apply these techniques in the context of solving real-world and mathematical problems.	6.7.15, 6.7.19
6.GM.A.4	Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems	6.1.12, 6.1.13, 6.1.14, 6.1.15, 6.1.16, 6.1.18, 6.1.19
STATISTICS AND PROBABILITY: SP		
6.SP.A.1	Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. *For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.*	6.8.2, 6.8.3, 6.8.6, 6.8.7, 6.8.17
6.SP.A.2	Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center (mean, median, mode), spread (range), and overall shape.	6.8.4, 6.8.5, 6.8.7, 6.8.8, 6.8.11, 6.8.18
6.SP.A.3	Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number..	6.8.6, 6.8.9, 6.8.10, 6.8.11
6.SP.B	Summarize and describe distributions.	6.8.1, 6.8.2, 6.8.4, 6.8.5, 6.8.7, 6.8.9, 6.8.13, 6.8.18
6.SP.B.4	Display a single set of numerical data using dot plots (line plots), box plots, pie charts and stem plots.	6.8.3, 6.8.4, 6.8.5, 6.8.6, 6.8.7, 6.8.8, 6.8.16, 6.8.17
6.SP.B.5	Summarize numerical data sets in relation to the context.	6.8.17
6.SP.B.5a	Report the number of observations.	6.8.3, 6.8.4
6.SP.B.5b	Describe the nature of the attribute under investigation, including how it was measured and its units of measurement.	6.8.2, 6.8.3, 6.8.5, 6.8.6, 6.8.7, 6.8.14
6.SP.B.5c	Give quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context of the data	6.8.9, 6.8.10, 6.8.11, 6.8.12, 6.8.13, 6.8.14, 6.8.15, 6.8.16, 6.8.18
6.SP.B.5d	Analyze the choice of measures of center and variability based on the shape of the data distribution and/or the context of the data.	6.8.12, 6.8.14, 6.8.15, 6.8.16, 6.8.18

Mathematics | Grade 7 – ILLUSTRATIVE MATHEMATICS

RATIOS AND PROPORTIONAL RELATIONSHIPS: RP		
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 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2/1/4 miles per hour, equivalently 2 miles per hour.*	7.2.8, 7.4.2, 7.4.3, 7.9.5
7.RP.A.2b	Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships	7.2.2, 7.2.3, 7.2.5
7.RP.A.3	Use proportional relationships to solve multi-step ratio and percent problems. *Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.*	7.3.5, 7.4.6, 7.4.7, 7.4.8, 7.4.9, 7.4.10, 7.4.11, 7.4.12, 7.4.13, 7.4.14, 7.4.15, 7.4.16, 7.9.1, 7.9.2, 7.9.3, 7.9.4, 7.9.6, 7.9.8, 7.9.13
NUMBER SENSE AND OPERATIONS: NS		
7.NS.A.1	Apply and extend previous understandings of numbers to add and subtract rational numbers.	7.5.1, 7.5.4, 7.5.6, 7.6.18, 7.7.6
7.NS.A.1a	Describe situations in which opposite quantities combine to make 0.	7.5.2, 7.5.3
7.NS.A.1b	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	7.5.1, 7.5.2, 7.5.3
7.NS.A.1c	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.	7.5.1, 7.5.3, 7.5.5, 7.5.6, 7.5.7, 7.6.18
7.NS.A.1d	Apply properties of operations as strategies to add and subtract rational numbers.	7.5.3
7.NS.A.2	Apply and extend previous understandings of numbers to multiply and divide rational numbers.	7.5.9, 7.5.11
7.NS.A.2a	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)(–1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts	7.5.8, 7.5.9

7.NS.A.2b	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). Interpret quotients of rational numbers by describing real-world contexts.	7.5.11
7.NS.A.2c	Apply properties of operations as strategies to multiply and divide rational numbers.	7.5.9, 7.5.10
7.NS.A.2d	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.	7.4.5, 7.5.1, 7.8.16, 7.9.4
7.NS.A.3	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.)	7.5.7, 7.5.12, 7.5.13, 7.5.14, 7.5.15, 7.5.16, 7.5.17, 7.9.3, 7.9.6
EXPRESSIONS AND EQUATIONS: EE		
7.EE.A.1	Apply properties of operations to simplify and to factor linear algebraic expressions with rational coefficients.	7.6.18, 7.6.19, 7.6.20, 7.6.21, 7.6.22, 7.9.7
7.EEI.A.2	Understand that rewriting an expression in different forms in a contextual problem can provide multiple ways of interpreting the problem and how the quantities in it are related. *For example, shoes are on sale at a 25% discount. How is the discounted price P related to the original cost C of the shoes? C - .25C = P. In other words, P is 75% of the original cost for C - .25C can be written as .75C.*	7.6.12
7.EEI.B	Solve problems using numerical and algebraic expressions and equations.	7.9.8
7.EEI.B.3	Solve multi-step problems posed with rational numbers	7.3.11, 7.5.12, 7.5.17, 7.6.2, 7.6.3, 7.6.4, 7.6.5, 7.6.6, 7.6.11, 7.6.12
7.EE.B.3a	Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate.	7.5.15, 7.5.16, 7.6.4, 7.6.5, 7.6.7, 7.6.8, 7.6.9, 7.6.10, 7.6.11, 7.6.12, 7.9.7
7.EE.B.3b	Assess the reasonableness of answers using mental computation and estimation strategies	7.6.14, 7.6.16, 7.6.17
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.	7.5.15, 7.6.5, 7.6.9, 7.6.11, 7.6.12, 7.6.13, 7.6.15, 7.7.5, 7.9.3
7.EE.B.4a	Solve contextual 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?*	7.5.15, 7.5.16, 7.6.4, 7.6.5, 7.6.7, 7.6.8, 7.6.9, 7.6.10, 7.6.11, 7.6.12, 7.9.7

7.EE.B.4b	Solve contextual problems leading to inequalities of the form px + q > r or px + q < r, where p, q, and r are specific rational numbers. Graph the solution set of the inequality on a number line 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. (Note that inequalities using >, <, ≤, ≥ are included in this standard).*	7.6.14, 7.6.16, 7.6.17
GEOMETRY: G		
7.G.A	Draw, construct, and describe geometrical figures and describe the relationships between them.	7.3.2, 7.3.7, 7.7.1, 7.7.4, 7.7.9
7.G.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.	7.1.1, 7.1.2, 7.1.3, 7.1.4, 7.1.5, 7.1.6, 7.1.7, 7.1.8, 7.1.9, 7.1.10, 7.1.11, 7.1.12, 7.1.13, 7.2.1, 7.3.6, 7.3.11, 7.9.4, 7.9.13
7.G.A.2	Draw 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.	7.3.2, 7.7.6, 7.7.7, 7.7.8, 7.7.9, 7.7.10, 7.7.17
7.G.B.3	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.	7.1.6, 7.2.8, 7.3.6, 7.7.12, 7.7.13, 7.7.14, 7.7.15, 7.7.16, 7.7.17, 7.9.4, 7.9.5, 7.9.9
7.G.B.4	Know and 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.	7.7.2, 7.7.3, 7.7.4, 7.7.5 7.3.3, 7.3.4, 7.3.5, 7.3.7, 7.3.8, 7.3.9, 7.3.10, 7.3.11, 7.9.4, 7.9.11, 7.9.12
7.G.B.5	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.	7.7.2, 7.7.3, 7.7.4, 7.7.5
STATISTICS AND PROBABILITY: SP		
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 that random sampling tends to produce representative samples and support valid inferences.	7.8.12, 7.8.13, 7.8.14, 7.8.15, 7.8.20

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.*	7.8.13, 7.8.14, 7.8.15, 7.8.16, 7.8.17, 7.8.20
7.SP.B.3	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; on a dot plot or box plot, the separation between the two distributions of heights is noticeable.*	7.8.11, 7.8.18
7.SP.B.4	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 7th grade science book are generally longer than the words in a chapter of a 4th grade science book.*	7.8.15, 7.8.16, 7.8.18, 7.8.19, 7.8.20, 7.9.3
7.SP.C	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 around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.	7.8.6
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 around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.	7.8.2, 7.8.3, 7.8.4, 7.8.5, 7.8.6
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.	7.8.1, 7.8.3, 7.8.4, 7.8.5, 7.8.6
7.SP.C.7	Explain possible discrepancies between a developed probability model and observed frequencies.	7.8.3, 7.8.4, 7.8.5, 7.8.14
7.SP.C7a	Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events.	7.8.3, 7.8.20

7.SP.C7b	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 penny appear to be equally likely based on the observed frequencies?*	No tasks yet illustrate this standard
7.SP.C.8	Summarize numerical data sets in relation to their context.	7.8.2, 7.8.3, 7.8.4, 7.8.5, 7.8.6
7.SP.C.8a	Give quantitative measures of center (median and/or mean) and variability (range and/or interquartile range), as well as describe any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered	7.8.9
7.SP.C.8b	Know and relate the choice of measures of center (median and/or mean) and variability (range and/or interquartile range) to the shape of the data distribution and the context in which the data were gathered.	7.8.8, 7.8.9

Mathematics | Grade 8 – ILLUSTRATIVE MATHEMATICS

NUMBER SENSE AND OPERATIONS: NS

8.NS.A.1	Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbersshow that the decimal expansion repeats eventually or terminates, and convert a decimal expansion which repeats eventually or terminates into a rational number.	8.8.14, 8.8.15
8.NS.A.2	Use rational approximations of irrational numbers to compare the size of irrational numbers locating them approximately on a number line diagram. Estimate the value of irrational expressions such as $\pi\pi 2$. *For example, by truncating the decimal expansion of $\sqrt{2}$, show that $\sqrt{2}$ is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.*	8.8.1, 8.8.4, 8.8.5, 8.8.12, 8.8.13

EXPRESSIONS AND EQUATIONS: EE

8.EE.A.1	Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example, $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$*	8.7.2, 8.7.3, 8.7.4, 8.7.5, 8.7.6, 8.7.7, 8.7.8, 8.7.11, 8.7.14

8.EE.A.2	Use square root and cube root symbols to represent solutions to equations of the form $xx2 = pp$ and $xx3 = pp$, where pp is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational.	8.8.2, 8.8.3, 8.8.4, 8.8.5, 8.8.10, 8.8.12, 8.8.13
8.EE.A.3	Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities and to express how many times as much one is than the other. *For example, estimate the population of the United States as 3 x 10 8 and the population of the world as 7 x 10 9 , and determine that the world population is more than 20 times larger.*	8.7.9, 8.7.10, 8.7.11, 8.7.12, 8.7.14, 8.7.16
8.EE.A.4	Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology	8.7.10, 8.7.11, 8.7.12, 8.7.13, 8.7.14, 8.7.15, 8.7.16
8.EE.B.5	Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. *For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.*	8.3.2, 8.3.3, 8.3.4, 8.3.6
8.EE.B.6	Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; know and derive the equation y = mx for a line through the origin and the equation y = mx + b for a line intercepting the vertical axis at b.	8.2.10, 8.2.11, 8.2.12, 8.3.7, 8.3.10, 8.3.11, 8.3.14
8.EE.C	Analyze and solve linear equations and inequalities and pairs of simultaneous linear equations.	8.3.12, 8.3.13, 8.4.2, 8.4.3, 8.4.4, 8.4.5, 8.4.9, 8.4.10
8.EE.C.7	Solve linear equations and inequalities in one variable.	8.4.3, 8.4.4, 8.4.5, 8.4.6, 8.4.9
8.EE.C.7a	Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form x = a, a = a, or a = b results (where a and b are different numbers).	8.4.7, 8.4.8
8.EE.C.7b	Solve linear equations and inequalities with rational number coefficients, including equations and inequalities whose solutions require expanding expressions using the distributive property and combining like terms.	8.4.6
8.EE.C.8	Analyze and solve systems of linear equations.	8.4.9, 8.4.10, 8.4.11, 8.4.12, 8.4.13, 8.4.14, 8.4.15
8.EE.C.8a	Understand that solutions to a system of two line a equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.	8.3.13, 8.3.14, 8.4.12, 8.4.13

8.EE.C.8b	Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6*	8.4.12, 8.4.15
8.EE.C.8c	Solve real-world and mathematical problems leading to two linear equations in two variables. *For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.*	8.4.15, 8.4.16
GEOMETRY: G		
8.G.A.1	Verify experimentally the congruence properties of rigid transformations.	8.1.2, 8.1.3, 8.1.4, 8.1.6, 8.1.11, 8.1.14, 8.3.8
8.G.A.1a	Lines are taken to lines, and line segments to line segments of the same length.	8.1.7, 8.1.8, 8.1.9, 8.1.10, 8.1.13
8.G.A.1b	Angles are taken to angles of the same measure.	8.1.7, 8.1.8, 8.1.9, 8.1.10
8.G.A.1c	Parallel lines are taken to parallel lines.	8.1.9
8.G.A.2	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.	8.1.5, 8.1.6, 8.2.4, 8.2.5, 8.2.12
8.G.A.3	Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. *For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.*	8.1.14, 8.1.15, 8.1.16, 8.2.8, 8.2.13, 8.9.2
8.G.B.4	Explain a proof of the Pythagorean Theorem and its converse.	8.8.6, 8.8.7, 8.8.9
8.G.B.5	Know and apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.	8.8.6, 8.8.7, 8.8.8, 8.8.10, 8.8.16
8.G.B.6	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.	8.8.11
8.G.C.7	Know and understand the formulas for the volumes of cones, cylinders, and spheres, and use them to solve real-world and mathematical problems.	8.8.6, 8.8.7, 8.8.8, 8.8.10, 8.8.16
STATISTICS AND PROBABILITY: SP		

8.SP.A.1	Construct and interpret scatter plots of bivariate measurement data to investigate patterns of association between two quantities.	8.6.1, 8.6.2, 8.6.3, 8.6.4, 8.6.5, 8.6.6, 8.6.7, 8.6.8
8.SP.A.2	Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line and informally assess the model fit by judging the closeness of the data points to the line.	8.6.4, 8.6.5, 8.6.6, 8.6.8
8.SP.A.3	Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. *For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.*	8.6.3, 8.6.6, 8.6.8
8.SP.A.4	Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. 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. 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	8.6.9, 8.6.10
FUNCTIONS: F		
8.F.A.1	Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. (Function notation is not required in 8th grade.)	8.5.1, 8.5.2, 8.5.3, 8.5.4, 8.5.5, 8.5.17, 8.9.4
8.F.A.2	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a linear function represented by a table of values and another linear function represented by an algebraic expression, determine which function has the greater rate of change.	8.5.7, 8.5.8
8.F.A.3	Know and interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. *For example, the function A = s2 giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.*	8.5.4, 8.5.7, 8.5.8, 8.5.18
8.F.B.4	Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models and in terms of its graph or a table of values	8.5.8, 8.5.9, 8.5.10, 8.5.11

8.F.B.5	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 that has been described verbally.	8.5.5, 8.5.6, 8.5.10