Miami-Dade County Public Schools
Florida's B.E.S.T. Mathematics
Grade 8 - Achievement Level Descriptor Tables

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MA.8.NSO.1.1 (Context: Mathematical)			
Extend previous understanding of rational numbers to define irrational numbers within the real number system. Locate an approximate value of a numerical expression involving irrational numbers on a number line. *Example*: Within the expression 1 + √30, the irrational number √30 can be estimated to be between 5 and 6 because 30 is between 25 and 36. By considering $(5.4)^2$ and $(5.5)^2$, a closer approximation for √30 is 5.5. So, the expression 1 + √30 is equivalent to about 6.5.			
Benchmark Clarifications			
Clarification 1: Instruction includes the use of number line and rational number approximations, and recognizing pi (π) as an irrational number. *Clarification 2*: Within this benchmark, the expectation is to approximate numerical expressions involving one arithmetic operation and estimating square roots or pi (π).			
Assessment Limits			
Irrational numbers are limited to pi (π) and square roots. Approximate values of square roots must be based on the value of the square roots of neighboring perfect squares.			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
identifies numbers as rational or irrational.	**defines** irrational numbers within the real number system and **locates an approximate value** of an irrational number **on a number line.**	defines irrational numbers within the real number system and locates an approximate value of a **two-term numerical expression** involving irrational numbers on a number line.	defines irrational numbers within the real number system and locates an approximate value of a numerical expression involving irrational numbers on a number line **and explains their reasoning.**

MA.8.NSO.1.2 (Context: Mathematical)			
Plot, order and compare rational and irrational numbers, represented in various forms.			
Benchmark Clarifications			
Clarification 1: Within this benchmark, it is not the expectation to work with the number e. *Clarification 2*: Within this benchmark, the expectation is to plot, order and compare square roots and cube roots. *Clarification 3*: Within this benchmark, the expectation is to use symbols (<, > or =).			
Assessment Limits			
Items must include at least one irrational number or radical. Irrational numbers are limited to pi (π), square roots, and cube roots. Items requiring the student to compare fractions with irrational numbers or decimals are limited to fractions that result in a terminating decimal. Items may use the words "is less than," "is greater than," or "is equal to." Approximate values of square roots must be based on the value of the square roots of neighboring perfect squares.			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
given an **irrational** square root or cube root, **determines the integer values it lies between**.	**plots, orders, and compares, using <, >, =, rational and irrational** numbers (when roots are included**, roots will have the same index**).	plots, orders, and compares, using <, >, =, rational and irrational numbers **represented in various forms (must include at least one square root and one cube root).**	**explains and justifies how** to plot, order, and compare rational and irrational numbers represented in various forms.

MA.8.NSO.1.3 (Context: Mathematical)			
Extend previous understanding of the Laws of Exponents to include integer exponents. Apply the Laws of Exponents to evaluate numerical expressions and generate equivalent numerical expressions, limited to integer exponents and rational number bases, with procedural fluency. *Example*: The expression $\frac{2^4}{2^7}$ is equivalent to 2^{-3} which is equivalent to $\frac{1}{8}$.			
Benchmark Clarifications			
Clarification 1: Refer to the K-12 Formulas (Appendix E) for the Laws of Exponents.			
Assessment Limits			
Items must incorporate a negative exponent in either the given expression or the student-generated expression. Items requiring the student to evaluate numerical expressions must incorporate at least one Law of Exponents or a negative exponent. Items will require the student to evaluate a numerical expression with negative exponents, generate an equivalent expression, or generate and evaluate an expression.			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
applies the Laws of Exponents to **identify** equivalent numerical expressions, limited to integer exponents and rational number bases, and applies **one property from the Law of Exponents.**	applies the Laws of Exponents to **evaluate** numerical expressions and identify equivalent numerical expressions, limited to integer exponents and rational number bases.	applies the Laws of Exponents to evaluate numerical expressions and **generate** equivalent numerical expressions, limited to integer exponents and rational number bases, **with procedural fluency.**	**analyzes an error** in the application of the Laws of Exponents used to evaluate numerical expressions and **justifies the reasoning**.

MA.8.NSO.1.4 (Context: Mathematical & Real-World)			
Express numbers in scientific notation to represent and approximate very large or very small quantities. Determine how many times larger or smaller one number is compared to a second number. *Example*: Roderick is comparing two numbers shown in scientific notation on his calculator. The first number was displayed as 2.3147E27 and the second number was displayed as 3.5982E − 5. Roderick determines that the first number is about 10^{32} times bigger than the second number.			
Benchmark Clarifications			
No Benchmark Clarifications			
Assessment Limits			
Items may require the student to rewrite numbers in scientific notation or in standard form.			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
given two numbers in scientific notation with **different powers of 10**, **determines which one is larger or smaller**.	**expresses** numbers in scientific notation to **represent and approximate very large quantities**.	expresses numbers in scientific notation to represent and approximate very large or **very small quantities** and **determines how many times larger or smaller one number is compared to a second number.**	(intentionally left blank)

MA.8.NSO.1.5 (Context: Mathematical)			
Add, subtract, multiply, and divide numbers expressed in scientific notation with procedural fluency. *Example*: The sum of 2.31×10^{15} and 9.1×10^{13} is 2.401×10^{15}.			
Benchmark Clarifications			
Clarification 1: Within this benchmark, for addition and subtraction with numbers expressed in scientific notation, exponents are limited to within 2 of each other.			
Assessment Limits			
Items may require the student to rewrite numbers in scientific notation or in standard form. Numbers are limited to the thousandths place or less when expressed in scientific notation.			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
adds and subtracts numbers expressed in scientific notation in the same power of 10 wherein the **sum of the coefficients is not larger than 10**.	**adds and subtracts** numbers expressed in scientific notation in the **same power of 10** and **multiplies and divides** numbers expressed **in scientific notation**.	**adds, subtracts**, multiplies, and divides numbers expressed **in scientific notation**.	adds, subtracts, multiplies, and divides numbers expressed in scientific notation, **including combinations** of these operations.

MA.8.NSO.1.6 (Context: Real-World)			
Solve real-world problems involving operations with numbers expressed in scientific notation.			
Benchmark Clarifications			
Clarification 1: Instruction includes recognizing the importance of significant digits when physical measurements are involved. *Clarification 2*: Within this benchmark, for addition and subtraction with numbers expressed in scientific notation, exponents are limited to within 2 of each other.			
Assessment Limits			
Items may require the student to rewrite numbers in scientific notation or in standard form. Numbers are limited to the thousandths place or less when expressed in scientific notation.			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
solves real-world problems by **adding and subtracting** numbers expressed in scientific notation in the same power of 10 wherein the **sum of the coefficients is not larger than 10**.	solves real-world problems by **adding and subtracting** numbers expressed in scientific notation in the **same power of 10**, and **multiplies and divides** numbers expressed **in scientific notation.**	solves real-world problems by **adding, subtracting, multiplying, and dividing** numbers expressed in **scientific notation**.	solves real-world problems by adding, subtracting, multiplying, and dividing numbers expressed in scientific notation and **interprets the solution in the context of the situation**.

MA.8.NSO.1.7 (Context: Mathematical & Real-World)			
Solve multi-step mathematical and real-world problems involving the order of operations with rational numbers including exponents and radicals. *Example*: The expression $(-\frac{1}{2})^2 + \sqrt{(2^3 + 8)}$ is equivalent to $\frac{1}{4} + \sqrt{16}$ which is equivalents to $\frac{1}{4} + 4$ which is equivalent to $\frac{17}{4}$.			
Benchmark Clarifications			
Clarification 1: Multi-step expressions are limited to 6 or fewer steps. *Clarification 2*: Within this benchmark, the expectation is to simplify radicals by factoring square roots of perfect squares up to 225 and cube roots of perfect cubes from -125 to 125.			
Assessment Limits			
Decimals are limited to the thousandths place or less. Expressions must be given and must incorporate a negative exponent and/or a radical. The value of the radicand must be a perfect square or perfect cube. Integer exponents are limited to values between –3 and 3, inclusive. Expressions that include the use of both fractions and decimals must use fractions that only result in a terminating decimal.			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
solves multi-step mathematical problems with **up to 4 steps** involving the order of operations with rational numbers including **integer exponents**.	solves multi-step mathematical **and real-world problems** with **up to 5 steps** involving the order of operations with rational numbers including integer exponents.	solves multi-step mathematical and real-world problems with **up to 6 steps** involving the order of operations with rational numbers including **exponents and radicals.**	solves **and explains** multi-step mathematical and real-world problems with up to 6 steps and **justifies each step** in applying the order of operations with rational numbers including exponents and radicals.

MA.8.AR.1.1 (Context: Mathematical)			
Apply the Laws of Exponents to generate equivalent algebraic expressions, limited to integer exponents and monomial bases. *Example*: The expression $(3x^3y^{-2})^3$ is equivalent to $27x^9y^{-6}$.			
Benchmark Clarifications			
Clarification 1: Refer to the K-12 Formulas (Appendix E) for the Laws of Exponents.			
Assessment Limits			
Items are limited to the use of monomials and one-term algebraic expressions involving multiplication and/or division. Items are limited to the use of no more than two variables. Items including one variable are limited to no more than three laws. Items including two different variables are limited to the application of no more than two Laws of Exponents.			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
applies the Laws of Exponents to **identify** equivalent algebraic expressions, using **integer** exponents and monomial bases using **one law** of exponents.	applies the Laws of Exponents to identify equivalent algebraic expressions, using **positive exponents** and monomial bases using **laws** of exponents.	applies the Laws of Exponents to **generate** equivalent algebraic expressions, using **integer exponents** and monomial bases using laws of exponents.	applies the Laws of Exponents to generate equivalent algebraic expressions, limited to integer exponents and monomial bases using laws of exponents and **provides justification**.

MA.8.AR.1.2 (Context: Mathematical)			
Apply properties of operations to multiply two linear expressions with rational coefficients. *Example*: The product of (1.1 + x) and (−2.3x) can be expressed as −2.53x−2.3x^2 or −2.3x^2 −2.53x.			
Benchmark Clarifications			
Clarification 1: Problems are limited to products where at least one of the factors is a monomial. *Clarification 2*: Refer to Properties of Operations, Equality and Inequality (Appendix D) .			
Assessment Limits			
No Assessment Limits			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
applies properties of operations to multiply two linear expressions with **integer coefficients** where **both** factors are monomials**.**	applies properties of operations to multiply two linear expressions with **rational coefficients** where **both** factors are monomials.	applies properties of operations to multiply two linear expressions with rational coefficients where **one** factor is a monomial.	(intentionally left blank)

MA.8.AR.1.3 (Context: Mathematical)			
Rewrite the sum of two algebraic expressions having a common monomial factor as a common factor multiplied by the sum of two algebraic expressions. *Example*: The expression $99x-11x^3$ can be rewritten as $11x(9-x^2)$ or as $-11x(-9+x^2)$.			
Benchmark Clarifications			
No Benchmark Clarifications			
Assessment Limits			
Algebraic expressions must be given. Items are limited to the use of no more than two different variables.			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
identifies a common monomial factor in the sum of two algebraic expressions.	**given** a sum of two algebraic expressions, **identifies the equivalent expression** having a common monomial factor as a common factor multiplied by the sum of two algebraic expressions.	**rewrites** the sum of two algebraic expressions having a common monomial factor with a common factor multiplied by the sum of two algebraic expressions.	rewrites the sum of two algebraic expressions having a common monomial factor **in different ways (including factoring out the GCF)** with a common factor multiplied by the sum of two algebraic expressions.

MA.8.AR.2.1 (Context: Mathematical)			
Solve multi-step linear equations in one variable, with rational number coefficients. Include equations with variables on both sides.			
Benchmark Clarifications			
Clarification 1: Problem types include examples of one-variable linear equations that generate one solution, infinitely many solutions or no solution.			
Assessment Limits			
Items including one equation must give the equation and include more than two procedural steps to solve. Items including multiple equations must give the equations and at least one of the given equations will include more than two procedural steps to solve. Items may require the student to state whether there is one solution, no solution, or infinite solutions.			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
solves multi-step linear equations in one variable, with **variables on one side** of the equation and rational number coefficients that **generate one solution.**	solves multi-step linear equations in one variable, with **variables on both sides** of the equation and rational number coefficients that generate one solution.	solves multi-step linear equations in one variable, with rational number coefficients that **generate one solution, no solution, or infinitely many solutions.**	solves multi-step linear equations in one variable, with rational number coefficients that generate one solution, no solution, or infinitely many solutions **and interprets the solution in the context of the situation.**

MA.8.AR.2.2 (Context: Mathematical)			
Solve two-step linear inequalities in one variable and represent solutions algebraically and graphically.			
Benchmark Clarifications			
Clarification 1: Instruction includes inequalities in the forms $px \pm q > r$ and $p(x \pm q) > r$, where p, q and r are specific rational numbers and where any inequality symbol can be represented. *Clarification 2*: Problems include inequalities where the variable may be on either side of the inequality.			
Assessment Limits			
Inequalities must be given, will be presented in the forms $px \pm q > r$ or $p(x \pm q) > r$, and will use the relational symbols >, ≥, <, or ≤.			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
solves two-step linear inequalities in one variable with **whole number coefficients** and represents solutions **algebraically**.	solves two-step linear inequalities in one variable with **positive rational coefficients** and represents solutions **algebraically or graphically**.	solves two-step linear inequalities in one variable and represents solutions algebraically and graphically.	solves two-step linear inequalities in one variable and represents solutions algebraically and graphically and **interprets the solution in context of the situation.**

MA.8.AR.2.3 (Context: Mathematical)			
Given an equation in the form of $x^2 = p$ and $x^3 = q$, where p is a whole number and q is an integer, determine the real solutions.			
Benchmark Clarifications			
Clarification 1: Instruction focuses on understanding that when solving $x^2 = p$, there is both a positive and negative solution. *Clarification 2:* Within this benchmark, the expectation is to calculate square roots of perfect squares up to 225 and cube roots of perfect cubes from -125 to 125.			
Assessment Limits			
Items will not require the student to simplify square roots of nonperfect squares, simplify cube roots of nonperfect cubes, or approximate roots. Items are limited to one procedural step to isolate the variable. Items may require the student to give both the positive and negative solutions for the form $x^2 = p$.			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
given an equation in the form of $\boldsymbol{x^2 = p}$, where $\boldsymbol{p}$ **is a perfect square between 0 and 225**, determines a **positive** solution.	given an equation in the form of $x^2 = p$ **and** $\boldsymbol{x^3 = q}$, where p is perfect square between 0 and 225 and $\boldsymbol{q}$ **is a perfect cube between 0 and 125**, determines a positive solution.	given an equation in the form of $x^2 = p$ and $x^3 = q$, where p is perfect square between 0 and 225 and q is a **perfect cube between -125 and 225**, determines **positive and negative** solutions.	given an equation in the form of $x^2 = p$ and $x^3 = q$, where p is perfect square between 0 and 225 and q is a perfect cube between -125 and 225, determines positive and negative solutions and **explains why both are valid**.

MA.8.AR.3.1 (Context: Mathematical & Real-World)			
Determine if a linear relationship is also a proportional relationship.			
Benchmark Clarifications			
Clarification 1: Instruction focuses on the understanding that proportional relationships are linear relationships whose graph passes through the origin. *Clarification 2:* Instruction includes the representation of relationships using tables, graphs, equations and written descriptions.			
Assessment Limits			
Items will present a relationship as a table, a graph, an equation, or a written description. Items presented as a written description must state that the relationship is linear and will require the student to identify whether it is proportional.			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
determines whether a linear relationship is also a proportional relationship **from a graph**.	determines whether a linear relationship is also a proportional relationship **using tables and equations**.	determines whether a linear relationship is also a proportional relationship **using written descriptions.**	(intentionally left blank)

MA.8.AR.3.2 (Context: Mathematical)			
Given a table, graph or written description of a linear relationship, determine the slope.			
Benchmark Clarifications			
Clarification 1: Problem types include cases where two points are given to determine the slope. *Clarification 2*: Instruction includes making connections of slope to the constant of proportionality and to similar triangles represented on the coordinate plane.			
Assessment Limits			
All values for x-and y-coordinates used to determine slope must be integers.			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
given a **graph** of a linear relationship involving **integer values**, determines the slope.	given a **table** of a linear relationship involving integer values, determines the slope.	given a **table, graph, or written description** of a linear relationship involving **rational values**, determines the slope.	given a table, graph, or written description of a linear relationship involving rational values, determines the slope, and **explains the connection between slope and the constant of proportionality or explains the connection between slope and similar triangles on the coordinate plane.**

MA.8.AR.3.3 (Context: Mathematical)			
Given a table, graph or written description of a linear relationship, write an equation in slope-intercept form.			
Benchmark Clarifications			
No Benchmark Clarifications			
Assessment Limits			
Items must state that the given table, graph, or written description represents a linear relationship. Tables must include at least two points. Graphs may include at least two exact points marked on the line and may be labeled with coordinates. Graphs must have integral y-intercepts. All values for x- and y-coordinates used to determine slope must be integers.			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
given a **graph** of a linear relationship, **identifies the equivalent** equation in slope-intercept form.	given a **table (including the y-intercept)**, graph, **or written description (including ordered pairs where one is the y-intercept)** of a linear relationship involving **integer values**, **writes** the equation in slope-intercept form.	given a table, graph, or written description of a linear relationship, writes the equation in slope-intercept form.	(intentionally left blank)

MA.8.AR.3.4 (Context: Mathematical)			
Given a mathematical or real-world context, graph a two-variable linear equation from a written description, a table, or an equation in slope-intercept form.			
Benchmark Clarifications			
No Benchmark Clarifications			
Assessment Limits			
Items must use integral values for y-intercepts. Coordinate points within tables and written descriptions must be integers.			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
given a two-variable linear equation in **slope-intercept form**, **identifies** the graph that represents the given linear equation.	given a **mathematical context**, **graphs** a two-variable linear equation from a **table, or an equation** in slope-intercept form.	given a mathematical **or real-world context**, graphs a two-variable linear equation from a **written description**, a table, or an equation in slope-intercept form.	(intentionally left blank)

MA.8.AR.3.5 (Context: Real-World)			
Given a real-world context, determine and interpret the slope and y-intercept of a two-variable linear equation from a written description, a table, a graph or an equation in slope-intercept form. *Example:* Raul bought a palm tree to plant at his house. He records the growth over many months and creates the equation $h = 0.21m + 4.9$, where h is the height of the palm tree in feet and m is the number of months. Interpret the slope and y-intercept from his equation.			
Benchmark Clarifications			
Clarification 1: Problems include conversions with temperature and equations of lines of fit in scatter plots.			
Assessment Limits			
Items will require the student to find and interpret the slope, the y-intercept, or both. Items will not require the student to write an equation or graph a line on a given coordinate plane. Variables must be defined in context.			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
given a real-world context, determines the slope and y-intercept of a two-variable linear equation **from an equation** in slope-intercept form.	given a real-world context involving **integer values**, determines and **interprets** the slope and y-intercept of a two-variable linear equation **from a written description, a table, a graph,** or an equation in slope-intercept form.	given a real-world context involving **rational values**, determines and interprets the slope and y-intercept of a two-variable linear equation from a written description, a table, a graph, or an equation in slope-intercept form.	(intentionally left blank)

MA.8.AR.4.1 (Context: Mathematical)			
Given a system of two linear equations and a specified set of possible solutions, determine which ordered pairs satisfy the system of linear equations.			
Benchmark Clarifications			
Clarification 1: Instruction focuses on the understanding that a solution to a system of equations satisfies both linear equations simultaneously.			
Assessment Limits			
Items must present the system of equations, and equations must be in slope-intercept form. Items must present possible solutions as integral ordered pairs.			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
recognizes that a solution to a system of equations **can be represented as an ordered pair**.	given a system of two linear equations that has **one solution with integer values** and a specified set of possible solutions, determines the **ordered pair** that satisfies the system of linear equations.	given a system of two linear equations and a specified set of possible solutions, determines the **ordered pairs** that satisfy the system of linear equations.	given a system of two linear equations and a specified set of possible solutions, determines the ordered pairs that satisfy the system of linear equations **and interprets the solution in the context of the situation.**

MA.8.AR.4.2 (Context: Mathematical)			
Given a system of two linear equations represented graphically on the same coordinate plane, determine whether there is one solution, no solution or infinitely many solutions.			
Benchmark Clarifications			
No Benchmark Clarifications			
Assessment Limits			
Items may present the system of equations using slope-intercept form.			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
when given a system of two linear equations represented graphically, identifies **the solution**.	given a system of two linear equations represented graphically **on the same coordinate plane**, **determines whether** there is **one solution**.	given a system of two linear equations represented graphically on the same coordinate plane, determines whether there is **no solution** or **infinitely many solutions.**	given a system of two linear equations represented graphically on the same coordinate plane, determines and **provides a justification** as to whether there is **one solution**, no solution, or infinitely many solutions.

MA.8.AR.4.3 (Context: Mathematical & Real-World)			
Given a mathematical or real-world context, solve systems of two linear equations by graphing.			
Benchmark Clarifications			
No Benchmark Clarifications			
Assessment Limits			
When equations are given, the equations must be in slope-intercept form with integral y-intercepts. Items that require the student to graph and find the point of intersection will have the coordinates of the solution as integers. Given a system of equations, items may require the student to approximate the non-integer solution.			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
(intentionally left blank)	given a mathematical or real-world context, solves systems of two linear equations by graphing; **solutions are integers.**	given a mathematical or real-world context, solves systems of two linear equations by graphing; **solutions can be rational numbers.**	given a real-world context, solves systems of two linear equations by graphing, and **interprets the solution in the context of the situation.**

MA.8.F.1.1 (Context: Mathematical)			
Given a set of ordered pairs, a table, a graph or mapping diagram, determine whether the relationship is a function. Identify the domain and range of the relation.			
Benchmark Clarifications			
Clarification 1: Instruction includes referring to the input as the independent variable and the output as the dependent variable. *Clarification 2:* Within this benchmark, it is the expectation to represent domain and range as a list of numbers or as an inequality.			
Assessment Limits			
Items will present the domain and range as a list of values in braces or as an inequality. Items may refer to input as the independent variable or domain, and to output as the dependent variable or range.			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
given a **graph or mapping diagram**, determines whether the relationship is a function.	given a **set of ordered pairs**, **a table**, a graph, or mapping diagram, determines whether the relationship is a function, and given a set of ordered pairs, a table, or mapping diagram, **identifies the domain and range of the relation as a list of numbers.**	given a set of ordered pairs, a table, a graph, or mapping diagram, determines whether the relationship is a function and **determines** the domain and range of the relation as a list of numbers **or as a simple inequality (e.g. x ≥ 1).**	given a set of ordered pairs, a table, a graph, or mapping diagram, determines whether the relationship is a function, **determines the independent and dependent variables**, and identifies the domain and range of the relation as a list of numbers or as a simple inequality (e.g. x ≥ 1) **and interprets the domain constraints in terms of the context.**

MA.8.F.1.2 (Context: Mathematical & Real-World)			
Given a function defined by a graph or an equation, determine whether the function is a linear function. Given an input-output table, determine whether it could represent a linear function.			
Benchmark Clarifications			
Clarification 1: Instruction includes recognizing that a table may not determine a function.			
Assessment Limits			
Items will present a relationship as a table, a graph, an equation, or a written description.			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
given a function defined by a **graph**, determines whether the function is a linear function.	given a function defined by an **equation**, determines whether the function is a linear function.	given a function defined by an **input-output table**, determines whether the **table could represent** a linear function.	(intentionally left blank)

MA.8.F.1.3 (Context: Real-World)			
Analyze a real-world written description or graphical representation of a functional relationship between two quantities and identify where the function is increasing, decreasing or constant.			
Benchmark Clarifications			
Clarification 1: Problem types are limited to continuous functions. *Clarification 2:* Analysis includes writing a description of a graphical representation or sketching a graph from a written description.			
Assessment Limits			
Items may require the student to identify increasing, decreasing, or constant intervals from a graph. Intervals will not be expressed in inequality or interval notation.			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
given a specific section of a graph that represents a function, analyzes the **specific section** as increasing or decreasing.	analyzes a **graphical representation** of a functional relationship between two quantities and identifies where the function is increasing, decreasing, or **constant**.	analyzes a **real-world written description** or graphical representation of a functional relationship between two quantities and identifies where the function is increasing, decreasing, or constant.	analyzes a **real-world written description** of a functional relationship between two quantities and **draws a graph** to identify where the function is increasing, decreasing, or constant.

MA.8.GR.1.1 (Context: Mathematical & Real-World)			
Apply the Pythagorean Theorem to solve mathematical and real-world problems involving unknown side lengths in right triangles.			
Benchmark Clarifications			
Clarification 1: Instruction includes exploring right triangles with natural-number side lengths to illustrate the Pythagorean Theorem. *Clarification 2:* Within this benchmark, the expectation is to memorize the Pythagorean Theorem. *Clarification 3:* Radicands are limited to whole numbers up to 225.			
Assessment Limits			
Items will not present triangles on a coordinate plane. Items will not require the student to simplify square roots of nonperfect squares. Nonperfect square roots may be represented in radical form or as an approximation.			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
applies the Pythagorean Theorem in a **mathematical** problem to **find the hypotenuse** of a right triangle **resulting in a whole number.**	applies the Pythagorean Theorem to solve mathematical problems involving **unknown side lengths** in right triangles.	applies the Pythagorean Theorem to solve **real-world** problems involving unknown side lengths in right triangles.	applies the Pythagorean Theorem **more than once** to solve **mathematical and real-world** problems involving unknown side lengths in right triangles.

MA.8.GR.1.2 (Context: Mathematical & Real-World)			
Apply the Pythagorean Theorem to solve mathematical and real-world problems involving the distance between two points in a coordinate plane. *Example:* The distance between (−2,7) and (0, 6) can be found by creating a right triangle with the vertex of the right angle at the point (−2, 6). This gives a height of the right triangle as 1 unit and a base of 2 units. Then using the Pythagorean Theorem, the distance can be determined from the equation $1^2 + 2^2 = c^2$, which is equivalent to 5 =c^2. So, the distance is $\sqrt{5}$ units.			
Benchmark Clarifications			
Clarification 1: Instruction includes exploring right triangles with natural-number side lengths to illustrate the Pythagorean Theorem. *Clarification 2:* Within this benchmark, the expectation is to memorize the Pythagorean Theorem. *Clarification 3:* Radicands are limited to whole numbers up to 225.			
Assessment Limits			
Items will not require the student to simplify square roots of nonperfect squares. Nonperfect square roots may be represented in radical form or as an approximation.			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
applies the Pythagorean Theorem to solve **mathematical** problems involving the distance between two points in the **first quadrant** of a coordinate plane **when the two points are shown as part of a right triangle.**	applies the Pythagorean Theorem to solve mathematical problems involving the distance between two points **in a coordinate plane** when the two points are shown as part of a right triangle.	applies the Pythagorean Theorem to solve mathematical **and real-world** problems involving the distance between two points with a **given coordinate plane**.	applies the Pythagorean Theorem to solve mathematical and real-world problems involving the distance between two points in a coordinate plane **without the coordinate plane given.**

MA.8.GR.1.3 (Context: Mathematical & Real-World)			
Use the Triangle Inequality Theorem to determine if a triangle can be formed from a given set of sides. Use the converse of the Pythagorean Theorem to determine if a right triangle can be formed from a given set of sides.			
Benchmark Clarifications			
No Benchmark Clarifications			
Assessment Limits			
Limit real-world context to simple situations when using the converse of the Pythagorean Theorem.			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
(intentionally left blank)	uses the Triangle Inequality Theorem to determine whether a triangle can be formed from a given set of sides.	uses the Triangle Inequality Theorem to determine whether a triangle can be formed from a given set of sides **and uses the converse of the Pythagorean Theorem to determine whether the resulting triangle is a right triangle.**	**given three side lengths that do not make a triangle, determine which side should be changed to form a triangle**, and uses the converse of the Pythagorean Theorem to determine whether a given triangle is a right triangle.

MA.8.GR.1.4 (Context: Mathematical)			
Solve mathematical problems involving the relationships between supplementary, complementary, vertical or adjacent angles.			
Benchmark Clarifications			
No Benchmark Clarifications			
Assessment Limits			
Angle measures may be expressed as numerical values or algebraic expressions. Items including an algebraic expression that represents an unknown angle must determine the unknown angle measure.			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
identifies the relationship between supplementary, complementary, vertical, or adjacent angles **with numerical angle measures.**	**solves mathematical problems** with **one** relationship between supplementary, complementary, vertical, or adjacent angles with numerical angle measures.	solves mathematical problems involving **multiple** relationships between supplementary, complementary, vertical, or adjacent angles with numerical angle measures.	solves mathematical problems involving the relationships between supplementary, complementary, vertical, or adjacent angles with at **least one angle measures given as an algebraic expression.**

MA.8.GR.1.5 (Context: Mathematical)			
Solve problems involving the relationships of interior and exterior angles of a triangle.			
Benchmark Clarifications			
Clarification 1: Problems include using the Triangle Sum Theorem and representing angle measures as algebraic expressions.			
Assessment Limits			
Angle measures may be expressed as numerical values or algebraic expressions. Items including an algebraic expression that represents an unknown angle must determine the unknown angle measure.			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
(intentionally left blank)	solves problems involving the relationships of **interior** angles of a triangle.	solves problems involving the relationships of interior **and exterior** angles of a triangle **when one angle measure is given as an algebraic expression.**	solves problems involving the relationships of interior and exterior angles of a triangle when **multiple** angle measures are given as algebraic expressions.

MA.8.GR.1.6 (Context: Mathematical)			
Develop and use formulas for the sums of the interior angles of regular polygons by decomposing them into triangles.			
Benchmark Clarifications			
Clarification 1: Problems include representing angle measures as algebraic expressions.			
Assessment Limits			
Angle measures may be expressed as numerical values or algebraic expressions. Items including an algebraic expression that represents an unknown angle must determine the unknown angle measure.			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
given a triangle including two interior numerical angle measures, identifies the corresponding equation to solve for the third unknown interior angle measure.	**develops** formulas for the sums of interior angles of regular polygons by decomposing them into triangles.	develops and **uses** formulas for the sums of interior angles of regular polygons by decomposing them into triangles.	develops and uses formulas for the sums of the interior angles of regular polygons by decomposing them into triangles; includes **finding a missing angle measure** and includes **representing angle measures as algebraic expressions.**

MA.8.GR.2.1 (Context: Mathematical)			
Given a preimage and image generated by a single transformation, identify the transformation that describes the relationship.			
Benchmark Clarifications			
Clarification 1: Within this benchmark, transformations are limited to reflections, translations, or rotations of images. *Clarification 2:* Instruction focuses on the preservation of congruence so that a figure maps onto a copy of itself.			
Assessment Limits			
Items will not use the coordinate plane.			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
given a preimage and image generated by a **translation**, identifies the transformation that describes the relationship.	given a preimage and image generated by a **reflection**, identifies the transformation that describes the relationship.	given a preimage and image generated by a **rotation**, identifies the transformation that describes the relationship.	given a preimage and image generated by a **single transformation**, **analyzes** the transformation that describes the relationship and **recognizes that translations, rotations, and reflections preserve congruence.**

MA.8.GR.2.2 (Context: Mathematical)			
Given a preimage and image generated by a single dilation, identify the scale factor that describes the relationship.			
Benchmark Clarifications			
Clarification 1: Instruction includes the connection to scale drawings and proportions. *Clarification 2:* Instruction focuses on the preservation of similarity and the lack of preservation of congruence when a figure maps onto a scaled copy of itself unless the scaling factor is 1.			
Assessment Limits			
Items will not ask the student to find the lengths of missing sides using a scale factor. Items will not use the coordinate plane.			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
given a preimage and image generated by a single dilation, identifies the scale factor of the dilation **as less than 1 or greater than 1.**	**given a scale factor for generating** a single dilation, identifies the **corresponding preimage and image** generated by the given scale factor and single dilation.	given a preimage and image generated by a single dilation, identifies the scale factor of the dilation.	given a preimage and image generated by a single dilation, identifies the scale factor that describes the relationship, and **recognizes and explains that dilations do not preserve congruence unless the scale factor is 1.**

MA.8.GR.2.3 (Context: Mathematical)			
Describe and apply the effect of a single transformation on two-dimensional figures using coordinates and the coordinate plane.			
Benchmark Clarifications			
Clarification 1: Within this benchmark, transformations are limited to reflections, translations, rotations or dilations of images. *Clarification 2:* Lines of reflection are limited to the x-axis, y-axis or lines parallel to the axes. *Clarification 3:* Rotations must be about the origin and are limited to 90°, 180°, 270° or 360°. *Clarification 4*: Dilations must be centered at the origin.			
Assessment Limits			
Rotations must include the direction of rotation with the angle of rotation. Transformations will not be given as ordered pair rules.			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
identifies the two-dimensional figure resulting from a single translation.	**applies** a single transformation, **either a reflection over the x- or y-axis or translation**, on two-dimensional figures using the coordinate plane.	**describes** and applies a single transformation, either **a rotation about the origin or a dilation centered at the origin** on two-dimensional figures **using coordinates** and the coordinate plane.	(intentionally left blank)

MA.8.GR.2.4 (Context: Mathematical & Real -World)			
Solve mathematical and real-world problems involving proportional relationships between similar triangles. *Example:* During a Tampa Bay Lightning game one player, Johnson, passes the puck to his teammate, Stamkos, by bouncing the puck off the wall of the rink. The path of the puck creates two line segments that form hypotenuses for each of two similar right triangles, with the height of each triangle the distance from one of the players to the wall of the rink. If Johnson is 12 feet from the wall and Stamkos is 3 feet from the wall. How far did the puck travel from the wall of the rink to Stamkos if the distance traveled from Johnson to the wall was 16 feet?			
Benchmark Clarifications			
No Benchmark Clarifications			
Assessment Limits			
Given dimensions of figures in items must be the same unit.			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
solves **mathematical** problems involving proportional relationships between similar triangles where **a diagram and the scale factor are provided** and the **scale factor is a whole number.**	solves mathematical problems involving proportional relationships between similar triangles where a diagram is provided and the scale factor is a whole **or rational number.**	solves mathematical **or real-world** problems involving proportional relationships between similar triangles with or **without a diagram** where the scale factor is a whole or rational number.	solves mathematical or real-world problems involving proportional relationships between similar triangles**, having at least one side represented as an algebraic expression**, where a diagram is **not provided** and the scale factor is a **rational number.**

MA.8.DP.1.1 (Context: Real-World)			
Given a set of real-world bivariate numerical data, construct a scatter plot or a line graph as appropriate for the context. *Example:* Jaylyn is collecting data about the relationship between grades in English and grades in mathematics. He represents the data using a scatter plot because he is interested if there is an association between the two variables without thinking of either one as an independent or dependent variable. *Example:* Samantha is collecting data on her weekly quiz grade in her social studies class. She represents the data using a line graph with time as the independent variable.			
Benchmark Clarifications			
Clarification 1: Instruction includes recognizing similarities and differences between scatter plots and line graphs, and on determining which is more appropriate as a representation of the data based on the context. *Clarification 2:* Sets of data are limited to 20 points.			
Assessment Limits			
Data sets will include between 5 and 20 points, inclusive. Items will state whether a scatter plot or line graph is to be constructed based on the intent of the given context.			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
given a set of real-world bivariate numerical data, **identifies** the corresponding scatter plot or line graph.	given a set of real-world bivariate numerical data, **constructs** either a scatter plot or a line graph **as directed**.	given a set of real-world bivariate numerical data, constructs a scatter plot or a line graph **as appropriate for the context.**	given a set of real-world bivariate numerical data, **justifies** whether the construction of a scatter plot or a line graph is appropriate for the context.

MA.8.DP.1.2 (Context: Real-World)			
Given a scatter plot within a real-world context, describe patterns of association.			
Benchmark Clarifications			
Clarification 1: Descriptions include outliers; positive or negative association; linear or nonlinear association; strong or weak association.			
Assessment Limits			
Items will not require the student to determine strong vs. weak association. Items will use wording of association exclusively when describing as linear, nonlinear, positive, or negative.			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
given a scatter plot, identifies a **positive** or **negative** association and any **outliers**.	given a scatter plot, identifies a positive or negative association and **whether it is strong or weak** and has any outliers.	given a scatter plot within a **real-world context**, **describes patterns of association**, including **linear** or **nonlinear** and any outliers.	(intentionally left blank)

MA.8.DP.1.3 (Context: Mathematical & Real-World)			
Given a scatter plot with a linear association, informally fit a straight line.			
Benchmark Clarifications			
Clarification 1: Instruction focuses on the connection to linear functions. *Clarification 2:* Instruction includes using a variety of tools, including a ruler, to draw a line with approximately the same number of points above and below the line.			
Assessment Limits			
Items will not require the student to write or determine the equation of a line of fit.			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
(intentionally left blank)	given a scatter plot with a linear association, **identifies** a straight line that appropriately fits the data.	given a scatter plot with a linear association, **informally fits** a straight line.	given a scatter plot with a linear association, informally fits a straight line and **uses the number of points above and below to justify.**

MA.8.DP.2.1 (Context: Real-World)			
Determine the sample space for a repeated experiment.			
Benchmark Clarifications			
Clarification 1: Instruction includes recording sample spaces for repeated experiments using organized lists, tables or tree diagrams. *Clarification 2:* Experiments to be repeated are limited to tossing a fair coin, rolling a fair die, picking a card randomly from a deck with replacement, picking marbles randomly from a bag with replacement and spinning a fair spinner. *Clarification 3:* Repetition of experiments is limited to two times except for tossing a coin.			
Assessment Limits			
Items may present sample spaces as an organized list, a table, or a tree diagram. Items including a deck of cards are not limited to a standard 52-card deck, and may include, but are not limited to, cards containing names, letters of the alphabet, a variety of colors, or the like. Items including a fair die are not limited to a standard 6-sided die and may include a variety of sides. Items including a fair die are not limited to including consecutive sequential numbers and may include repeated or not repeated, colors, shapes, words, numbers, or the like.			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
determines the sample space for a repeated experiment, that is **repeated two times, involving a coin.**	determines the sample space for a repeated experiment involving a coin, **a die**, or a given **fair spinner**.	determines the sample space for a repeated experiment including experiments **that involve replacement (marbles in a bag and cards from a deck).**	**analyzes an error and justifies a reasoning** in a sample space for a corresponding repeated experiment.

MA.8.DP.2.2 (Context: Real-World)			
Find the theoretical probability of an event related to a repeated experiment.			
Benchmark Clarifications			
Clarification 1: Instruction includes representing probability as a fraction, percentage, or decimal. *Clarification 2:* Experiments to be repeated are limited to tossing a fair coin, rolling a fair die, picking a card randomly from a deck with replacement, picking marbles randomly from a bag with replacement and spinning a fair spinner. *Clarification 3:* Repetition of experiments is limited to two times except for tossing a coin.			
Assessment Limits			
Probability will be represented using a fraction, percent, or decimal. Items including a deck of cards are not limited to a standard 52-card deck, and can include, but are not limited to, cards containing names, letters of the alphabet, a variety of colors, or the like. Items including a fair die are not limited to a standard 6-sided die and can include a variety of sides. Items including a fair die are not limited to including consecutive sequential numbers and can include repeated or not repeated, colors, shapes, words, numbers, or the like. Descriptions representing an experiment are not limited to the repetition of two trials.			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
finds the theoretical probability of an event related to a repeated experiment, which include **tossing a fair coin or rolling a fair die,** and expresses that probability as a fraction.	finds the theoretical probability of an event related to a repeated experiment, which include tossing a fair coin, rolling a fair die**, picking a card randomly from a deck with replacement, picking marbles randomly from a bag with replacement, and spinning a fair spinner**, and expresses that probability as a fraction.	finds the theoretical probability of an event related to a repeated experiment, which include tossing a fair coin, rolling a fair die, picking a card randomly from a deck with replacement, picking marbles randomly from a bag with replacement, and spinning a fair spinner, and expresses **that probability as a percentage and/or as a decimal.**	**analyzes an error in** finding the theoretical probability of an event related to a repeated experiment and **justifies the reasoning**

MA.8.DP.2.3 (Context: Real-World)			
Solve real-world problems involving probabilities related to single or repeated experiments, including making predictions based on theoretical probability. *Example:* If Gabriella rolls a fair die 300 times, she can predict that she will roll a 3 approximately 50 times since the theoretical probability is $\frac{1}{6}$. *Example*: Sandra performs an experiment where she flips a coin three times. She finds the theoretical probability of landing on exactly one head as $\frac{3}{8}$. If she performs this experiment 50 times (for a total of 150 flips), predict the number of repetitions of the experiment that will result in exactly one of the three flips landing on heads.			
Benchmark Clarifications			
Clarification 1: Instruction includes making connections to proportional relationships and representing probability as a fraction, percentage, or decimal. *Clarification 2:* Experiments to be repeated are limited to tossing a fair coin, rolling a fair die, picking a card randomly from a deck with replacement, picking marbles randomly from a bag with replacement and spinning a fair spinner. *Clarification 3:* Repetition of experiments is limited to two times except for tossing a coin.			
Assessment Limits			
Probability will be represented using a fraction, percent, or decimal. Items including a deck of cards are not limited to a standard 52-card deck, and can include, but are not limited to, cards containing names, letters of the alphabet, a variety of colors, or the like. Items including a fair die are not limited to a standard 6-sided die and can include a variety of sides. Items including a fair die are not limited to including consecutive sequential numbers and can include repeated or not repeated, colors, shapes, words, numbers, or the like. Descriptions representing an experiment are not limited to the repetition of two trials.			
Achievement Level Descriptors			
Level 2	**Level 3**	**Level 4**	**Level 5**
solves real-world problems involving probabilities related to **single experiments** involving coins, dice, or a given fair spinner.	solves real-world problems involving probabilities related to single **or repeated experiments** involving coins, dice, or a given fair spinner, **including making predictions based on theoretical probability**.	solves real-world problems involving probabilities related to single or repeated experiments, including experiments **that involve replacement,** including making predictions based on theoretical probability	(intentionally left blank)