NYS P-12 CCLS	NYS Next Generation Learning Standard
PK.CC.3 b. ~~Understand~~ that the last number name said tells the number of objects counted. The number of objects is the same regardless of their arrangement or the order in which they were counted.	**NY-PK.CC.3b Explore and develop the concept** that the last number name said tells the number of objects counted, **(cardinality)**. The number of objects is the same regardless of their arrangement or the order in which they were counted.

NYS P-12 CCLS	NYS Next Generation Learning Standard
PK.OA.1 ~~Demonstrate~~ an understanding of addition and subtraction by using objects, fingers, and responding to practical situations (e.g., If we have 3 apples and add two more, how many apples do we have all together?).	**NY-PK.OA.1 Explore addition and subtraction** by using objects, fingers, and responding **to real world situations**. e.g., If we have 3 apples and add two more, how many apples do we have all together?

NYS P-12 CCLS	NYS Next Generation Learning Standard
K.OA.5 Fluently add and subtract within 5.	**NY-K.OA.5** Fluently add and subtract within 5. **<u>Note</u>: Fluency involves a mixture of just knowing some answers, knowing some answers from patterns, and knowing some answers from the use of strategies.**

NYS P-12 CCLS	NYS Next Generation Learning Standard
	NY-K.OA.6 Duplicate, extend, and create simple patterns using concrete objects.

NYS P-12 CCLS	NYS Next Generation Learning Standard
	NY-K.MD.4 Explore coins (pennies, nickels, dimes, and quarters) and begin identifying pennies and dimes.

NYS P-12 CCLS	NYS Next Generation Learning Standard
1.NBT.4 Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written ~~method~~ and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten.	**NY-1.NBT.4** Add within 100, including: • a two-digit number and a one-digit number; • a two-digit number and a multiple of 10. Use concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones, and sometimes it is necessary to compose a ten. Relate the strategy to a **written representation** and explain the reasoning used. **Notes:** **Students should be taught to use strategies based on place value, properties of operations, *and* the relationship between addition and subtraction; however, when solving any problem, students can choose any strategy.** **A *written representation* is any way of representing a strategy using words, pictures, or numbers.**

NYS P-12 CCLS	NYS Next Generation Learning Standard
1.MD.3 Tell and write time in hours and half-hours using analog and digital clocks. Recognize and identify coins, their names, and their value.	**NY-1.MD.3a** Tell and write time in hours and half-hours using analog and digital clocks. **Develop an understanding of common terms, such as, but not limited to, o'clock and half past**. **NY-1.MD.3b** Recognize and identify coins (penny, nickel, dime, and quarter) and their value and **use the cent symbol (¢) appropriately.** **NY-1.MD.3c Count a mixed collection of dimes and pennies and determine the cent value (total not to exceed 100 cents).** **e.g. 3 dimes and 4 pennies is the same as 3 tens and 4 ones, which is 34 cents (34 ¢)**

NYS P-12 CCLS	NYS Next Generation Learning Standard
2.OA.1 Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., ~~by~~ using drawings and equations with a symbol for the unknown number to represent the problem.	**NY-2.OA.1a** Use addition and subtraction within 100 to solve one-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions. e.g., using drawings and equations with a symbol for the unknown number to represent the problem. **NY-2.OA.1b** Use addition and subtraction within 100 to develop an understanding of solving two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions. e.g., using drawings and equations with a symbol for the unknown number to represent the problem.

NYS P-12 CCLS	NYS Next Generation Learning Standard
2.OA.3 Determine whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by 2's; write an equation to express an even number as a sum of two equal addends.	**NY-2.OA.3a** Determine whether a group of objects (up to 20) has an odd or even number of members. e.g., by pairing objects or counting them by 2's. **NY-2.OA.3b** Write an equation to express an even number as a sum of two equal addends.

NYS P-12 CCLS	NYS Next Generation Learning Standard
2.MD.8 Solve word problems involving ~~dollar bills~~, quarters, dimes, nickels, and pennies, using ~~$ and~~ ¢ symbols appropriately. Example: If you have 2 dimes and 3 pennies, how many cents do you have?	**NY-2.MD.8a Count a mixed collection of coins whose sum is less than or equal to one dollar.** e.g., If you have 2 quarters, 2 dimes and 3 pennies, how many cents do you have? **NY-2.MD.8b** Solve real world and mathematical problems **within one dollar involving quarters, dimes, nickels, and pennies, using the ¢ (cent) symbol appropriately**. **<u>Note</u>: Students are not introduced to decimals, and therefore the dollar symbol, until Grade 4.**

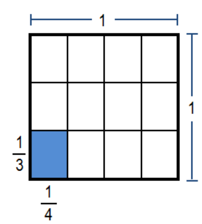
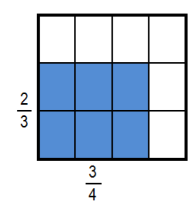
NYS P-12 CCLS	NYS Next Generation Learning Standard
	NY-3.NBT.4a Understand that the digits of a four-digit number represent amounts of thousands, hundreds, tens, and ones. **e.g., 3,245 equals 3 thousands, 2 hundreds, 4 tens, and 5 ones.** **NY-3.NBT.4b Read and write four-digit numbers using base-ten numerals, number names, and expanded form.** **e.g., The number 3,245 in expanded form can be written as 3,245= 3,000 + 200 + 40 + 5.**

NYS P-12 CCLS	NYS Next Generation Learning Standard
3.NF.1 Understand a fraction *1/b* as the quantity formed by 1 part when *a* whole is partitioned into *b* equal parts; understand a fraction *a/b* as the quantity formed by *a* parts of size *1/b*.	**NY-3.NF.1** Understand a **unit fraction**, $\frac{1}{b}$, is the quantity formed by 1 part when a whole is partitioned into *b* equal parts. Understand a fraction $\frac{a}{b}$ is the quantity formed by *a* parts of size $\frac{1}{b}$. **Note: Fractions are limited to those with denominators 2, 3, 4, 6, and 8.**

NYS P-12 CCLS	NYS Next Generation Learning Standard
3.MD.8 Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and ~~exhibiting~~ rectangles with the same perimeter and different areas or with the same area and different perimeters.	**NY-3.MD.8a** Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths or finding one unknown side length given the perimeter and other side lengths. **NY-3.MD.8b Identify** rectangles with the same perimeter and different areas or with the same area and different perimeters.

NYS P-12 CCLS	NYS Next Generation Learning Standard
4.NBT.2 Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons. <u>Note</u>: Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000.	**NY-4.NBT.2a**. Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. e.g., 50,327 = 50,000 + 300 + 20 + 7 **NY-4.NBT.2b** Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons. <u>Note</u>: Grade 4 expectations are limited to whole numbers less than or equal to 1,000,000.

NYS P-12 CCLS	NYS Next Generation Learning Standard
4.MD.1 Know relative sizes of measurement units ~~within one system of units including~~ km, m, cm; ~~kg, g; lb, oz.; l, ml~~; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. *For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches ~~listing the number pairs (1, 12), (2, 24), (3, 36), ...~~*	**NY-4.MD.1 Know relative sizes of measurement units: ft., in.; km, m, cm** **e.g.,** **An inch is about the distance from the tip of your thumb to your first knuckle.** **A foot is the length of two-dollar bills.** **A meter is about the height of a kitchen counter.** **A kilometer is 2 ½ laps around most tracks.** **Know the conversion factor and use it to convert** measurements in a larger unit in terms of a smaller unit**: ft., in.; km, m, cm; hr., min., sec.** e.g., Know that 1 ft. is 12 times as long as 1 in. and express the length of a 4 ft. snake as 48 in. **Given the conversion factor, convert all other measurements within a single system of measurement from a larger unit to a smaller unit.** **e.g., Given the conversion factors, convert kilograms to grams, pounds to ounces, or liters to milliliters.** Record measurement equivalents in a two-column table. e.g., Generate a conversion table for feet and inches.

NYS P-12 CCLS	NYS Next Generation Learning Standard
5.NF.4 Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.	**NY-5.NF.4** Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.
a. Interpret the product *(a/b)* × *q* as *a* parts of a partition of *q* into *b* equal parts; equivalently, as the result of a sequence of operations *a* × *q* ÷ *b*. *For example, use a visual fraction model to show (2/3) × 4 = 8/3, and create a story context for this equation. Do the same with (2/3) × (4/5) = 8/15. (In general, (a/b) × (c/d) = ac/bd.)*	**NY-5.NF.4a** Interpret the product $\frac{a}{b} \times q$ as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$. e.g., Use a visual fraction model to show $\frac{2}{3} \times 4 = \frac{8}{3}$, and create a story context for this equation. Do the same with $\frac{2}{3} \times \frac{4}{5} = \frac{8}{15}$.
b. Find the area of a rectangle with fractional side lengths by tiling it with ~~unit squares~~ of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.	**NY-5.NF.4b** Find the area of a rectangle with fractional side lengths by tiling it with **rectangles** of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas. **e.g.,** The shaded portion shows the rectangle with the appropriate unit fraction side lengths.  The area of a $\frac{2}{3} \times \frac{3}{4}$ rectangle is $\frac{6}{12}$ because the whole is partitioned into 12 parts with 6 of them shaded. 

NYS P-12 CCLS	NYS Next Generation Learning Standard
5.NF.5 Interpret multiplication as scaling (resizing), ~~by~~:	**NY-5.NF.5** Interpret multiplication as scaling (resizing).
a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.	**NY-5.NF.5a** Compare the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication. **e.g., In the case of 10 x $\frac{1}{2}$ = 5, 5 is half of 10 and 5 is 10 times larger than $\frac{1}{2}$.**
b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1.	**NY-5.NF.5b** Explain why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case). Explain why multiplying a given number by a fraction less than 1 results in a product smaller than the given number. Relate the principle of fraction equivalence $\frac{a}{b} = \frac{a}{b} \times \frac{n}{n}$ to the effect of multiplying $\frac{a}{b}$ by 1. **e.g.,** **Explain why 4 × $\frac{3}{2}$ is greater than 4.** **Explain why 4 × $\frac{1}{2}$ is less than 4.** **$\frac{1}{3}$ is equivalent to $\frac{2}{6}$ because $\frac{1}{3} \times \frac{2}{2} = \frac{2}{6}$.**

NYS P-12 CCLS	NYS Next Generation Learning Standard
6.RP.3d Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.	**NY-6.RP.3d** Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities. **<u>Note</u>: Conversion of units occur within a given measurement system, not across different measurement systems.**

NYS P-12 CCLS	NYS Next Generation Learning Standard
6.NS.7d Distinguish comparisons of absolute value from statements about order. ~~*For example, recognize that an account balance less than –30 dollars represents a debt greater than 30 dollars.*~~	**NY-6.NS.7d** Distinguish comparisons of absolute value from statements about order. **e.g., Someone with a balance of $100 in their bank account has more money than someone with a balance of –$1000, because 100 > –1000. But, the second person's debt balance is much greater than the first person's credit balance because |–1000| > |100|.**

NYS P-12 CCLS	NYS Next Generation Learning Standard
	NY-6.G.5 Use area and volume models to explain perfect squares and perfect cubes.

NYS P-12 CCLS	NYS Next Generation Learning Standard
7.EE.4a Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are ~~specific~~ rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. *For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?*	**NY-7.EE.4a** Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are 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. e.g., The perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width? **Notes: The words *leading to* in the standard may require students to simplify or combine like terms on the same side of the equation before it is in the form stated in the standard.** **This standard is a fluency expectation for grade 7. For more guidance, see Fluency in the Glossary of Verbs Associated with the New York State Next Generation Mathematics Learning Standards.**

NYS P-12 CCLS	NYS Next Generation Learning Standard
7.SP.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.	**STANDARD REMOVED**

NYS P-12 CCLS	NYS Next Generation Learning Standard
7.SP.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.*	**STANDARD REMOVED**

NYS P-12 CCLS	NYS Next Generation Learning Standard
8.G.3 Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.	**NY-8.G.3** Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. **Note: Lines of reflection are limited to both axes and lines of the form y=k and x=k, where k is a constant. Rotations are limited to 90 and 180 degrees about the origin. Unless otherwise specified, rotations are assumed to be counterclockwise.**

NYS P-12 CCLS	NYS Next Generation Learning Standard
8.SP.4 Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. *For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?*	**STANDARD REMOVED**

NYS P-12 CCLS	NYS Next Generation Learning Standard
N-Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.	**AI-N.Q.1** Select quantities and use units as a way to: i) interpret and guide the solution of multi-step problems; ii) choose and interpret units consistently in formulas; and iii) choose and interpret the scale and the origin in graphs and data displays.

NYS P-12 CCLS	NYS Next Generation Learning Standard
A-REI.4b Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. ~~Recognize when the quadratic formula gives complex solutions and write them as *a + bi*, *a - bi* for real numbers *a* and *b*.~~ PARCC: Tasks do not require students to write solutions for quadratic equations that have roots with non-zero imaginary parts. However, tasks can require the student to recognize cases in which a quadratic equation has no real solutions.	**AI-A.REI.4b** Solve quadratic equations by: i) inspection, ii) taking square roots, iii) factoring, iv) completing the square, v) the quadratic formula, and **vi) graphing.** **Recognize when the process yields no real solutions.** (Shared standard with Algebra II) Notes: • **Solutions may include simplifying radicals or writing solutions in simplest radical form.** • An example for inspection would be $x^2 = 49$, where a student should know that the solutions would include 7 and -7. • **When utilizing the quadratic formula, there are no coefficient limits.** • **The discriminant is a sufficient way to recognize when the process yields no real solutions.**

NYS P-12 CCLS	NYS Next Generation Learning Standard
	AI-A.REI.7a Solve a system, with rational solutions, consisting of a linear equation and a quadratic equation (parabolas only) in two variables both algebraically and graphically. **(Shared standard with Algebra II)**

NYS P-12 CCLS	NYS Next Generation Learning Standard
G-CO.10 Prove theorems about triangles. *Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.* Note: Theorems include but are not limited to the listed theorems. Example: an exterior angle of a triangle is equal to the sum of the two non-adjacent interior angles of the triangle.	**GEO-G.CO.10** Prove and **apply** theorems about triangles. **Note: Include multi-step proofs and algebraic problems built upon these concepts.** **Examples** of theorems **include but are not limited to**: Angle Relationships: • The sum of the interior angles of a triangle is 180 degrees. • The measure of an exterior angle of a triangle is equal to the sum of the two non-adjacent interior angles of the triangle. Side Relationships: • The length of one side of a triangle is less than the sum of the lengths of the other two sides. • In a triangle, the segment joining the midpoints of any two sides will be parallel to the third side and half its length. Isosceles Triangles • Base angles of an isosceles triangle are congruent.

NYS P-12 CCLS	NYS Next Generation Learning Standard
	GEO-G.SRT.9 Justify and apply the formula A= $\frac{1}{2}$ab sin (C) to find the area of any triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.

NYS P-12 CCLS	NYS Next Generation Learning Standard
G-GPE.5 ~~Prove~~ the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).	**GEO-G.GPE.5** On the coordinate plane: **GEO-G.GPE.5a Explore the proof** for the relationship between slopes of parallel and perpendicular lines; **GEO-G.GPE.5b Determine if lines are parallel, perpendicular, or neither, based on their slopes**; and **GEO-G.GPE.5c** Apply properties of parallel and perpendicular lines to solve geometric problems. **<u>Note</u>: This standard is a fluency recommendation for Geometry. Fluency with the use of coordinates to establish geometric results and the use of geometric representations as a modeling tool are some of the most valuable tools in mathematics and related fields.**

NYS P-12 CCLS	NYS Next Generation Learning Standard
N-RN.1 ~~Explain~~ how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. *For example, we define* $5^{\frac{1}{3}}$ *to be the cube root of 5 because we want* $(5^{\frac{1}{3}})^3 = 5^{\left(\frac{1}{3}\right)3}$ *to hold, so* $(5^{\frac{1}{3}})^3$ *must equal 5.*	**AII-N.RN.1 Explore** how the meaning of rational exponents follows from extending the properties of integer exponents. e.g., We define $5^{\frac{1}{3}}$ to be the cube root of 5 because we want $(5^{\frac{1}{3}})^3 = 5^{\left(\frac{1}{3}\right)3}$ to hold, so $(5^{\frac{1}{3}})^3$ must equal 5.

NYS P-12 CCLS	NYS Next Generation Learning Standard
	AII-F.BF.7 Explore the derivation of the formulas for finite arithmetic and finite geometric series. Use the formulas to solve problems. ★

NYS P-12 CCLS	NYS Next Generation Learning Standard
F-LE.2 Construct linear and exponential functions, ~~including arithmetic and geometric sequences~~, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table). PARCC: Tasks will include solving multi-step problems by constructing linear and exponential functions.	**AII-F.LE.2** Construct a linear or exponential function symbolically given: i) a graph; ii) a description of the relationship; and iii) two input-output pairs (include reading these from a table). (Shared standard with Algebra I)

NYS P-12 CCLS	NYS Next Generation Learning Standard
G-GPE.2 Derive the equation of a parabola given a focus and directrix.	**STANDARD REMOVED**