Pre-Kindergarten NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
Counting and Cardinality								
Know number names and the count sequence.	NY-PK.CC.1 Count to 20							
	NY-PK.CC.2 Represent a number of objects (0 - 5), with a written numeral 0–5 (with 0 representing a count of no objects).							
Count to tell the number of objects.	NY-PK.CC.3 Understand the relationship between numbers and quantities to 10; connect counting to cardinality. NY-PK.CC.3a When counting objects, say the number names in the standard order, pairing each object with one and only one number name and each number name with one and only one object. (1:1 correspondence) 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. NY-PK.CC.4a **Answer counting questions using as many as 10 objects arranged in a line, a rectangular array, and a circle. Answer counting questions using as many as 5 objects in a scattered configuration.** NY-PK.CC.4b **Given a number from 1–10, count out that many objects.**							
Compare numbers	NY-PK.CC.5 Recognize whether the number of objects in one group is more than, fewer than, or equal to (the same as) the number of objects in another group. Note: Include groups with up to five objects.							
	NY-PK.CC.6 Identify “first” and “last” related to order or position.							
Operations and Algebraic Thinking								
Understand addition as adding to and understand subtraction as taking from.	NY-PK.OA.1 .Explore addition and subtraction by using objects, fingers, and responding to real world situations.							
Understand simple patterns.	NY-PK.OA.2 Duplicate and extend simple patterns using concrete objects.							

Pre-Kindergarten NYS Next Generation Math Standards

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Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
Measurement and Data								
Describe and compare measurable attributes.	NY-PK.MD.1 Identify measurable attributes of objects, such as length or weight, and describe them using appropriate vocabulary.							
Sort objects and count the number of objects in each category.	NY-PK.MD.2 Sort objects and shapes into categories; count the objects in each category. Note: Limit category counts to be less than or equal to 10.							
Geometry								
Identify and describe shapes (squares, circles, triangles, rectangles).	NY-PK.G.1 Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as top, bottom, up, down, above, below, in front of, behind, over, under, and next to.							
	NY-PK.G.2 Name shapes regardless of size.							
Explore and create two- and three-dimensional objects.	NY-PK.G.3 Explore two- and three-dimensional objects and use informal language to describe their similarities, differences, and other attributes.							
	NY-PK.G.4 Create and build shapes from components.							

Kindergarten NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
Counting and Cardinality								
Know number names and the count sequence.	NY-K.CC.1 Count to 100 by ones and by tens.							
	NY-K.CC.2 Count to 100 by ones beginning from any given number (instead of beginning at 1).							
	NY-K.CC.3 Write numbers from 0 to 20. Represent a number of objects with a written numeral 0-20 (with 0 representing a count of no objects).							
Count to tell the number of objects.	NY-K.CC.4 Understand the relationship between numbers and quantities up to 20; connect counting to cardinality. NY-K.CC.4a When counting objects, say the number names in the standard order, pairing each object with one and only one number name and each number name with one and only one object. (1:1 correspondence) NY-K.CC.4b Understand 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. NY-K.CC.4c **Understand the concept** that each successive number name refers to a quantity that is one larger. NY-K.CC.4d **Understand the concept** of ordinal numbers (first through tenth) to describe the relative position and magnitude of whole numbers. NY-K.CC.5a Answer counting questions using as many as 20 objects arranged in a line, a rectangular array, and a circle. Answer counting questions using as many as 10 objects in a scattered configuration. e.g., "How many_____are there?" NY-K.CC.5b Given a number from 1–20, count out that many objects.							

Kindergarten NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
Compare Numbers	NY-K.CC.6 Identify whether the number of objects in one group is greater than **(more than)**, less than **(fewer than)**, or equal to **(the same as)** the number of objects in another group. e.g., using matching and counting strategies. Note: Include groups with up to ten objects.							
	NY-K.CC.7 Compare two numbers between 1 and 10 presented as written numerals. e.g., 6 is greater than 2.							
Operations and Algebraic Thinking								
Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.	NY-K.OA.1 Represent addition and subtraction using objects, fingers, pennies, drawings, sounds, acting out situations, verbal explanations, expressions, equations or **other strategies.** Note: Drawings need not show details, but should show the mathematics in the problem.							
	NY-K.OA.2a Add and subtract within 10.							
	NY-K.OA.2b Solve addition and subtraction word problems within 10. e.g., using objects or drawings to represent the problem.							
	NY-K.OA.3 Decompose numbers less than or equal to 10 into pairs in more than one way. Record each decomposition by a drawing or equation. e.g., using objects or drawings							
	NY-K.OA.4 Find the number that makes 10 when given a number from 1 to 9. Record the answer with a drawing or equation. e.g., using objects or drawings.							
	NY-K.OA.5 Fluently add and subtract within 5. **Note: Fluency involves a mixture of just knowing some answers, knowing some answers from patterns, and knowing some answers from the use of strategies.**							

Kindergarten NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
Understand simple patterns.	**NY-K.OA.6 Duplicate, extend, and create simple patterns using concrete objects.**							
Numbers in Base 10								
Work with numbers 11-19 to gain foundations for place value.	NY-K.NBT.1 Compose and decompose the numbers from 11 to 19 into ten ones and **one, two, three, four, five, six, seven, eight, or nine ones.** e.g., using objects or drawings.							
Measurement and Data								
Describe and compare measurable attributes.	NY-K.MD.1 Describe measurable attributes of an object(s), such as length or weight, **using appropriate vocabulary.** e.g., small, big, short, tall, empty, full, heavy, and light.							
	NY-K.MD.2 Directly compare two objects with a **common** measurable attribute and describe the difference.							
Classify objects and count the number of objects in each category.	NY-K.MD.3 Classify objects into given categories; count the objects in each category and sort the categories by count. Note: Limit category counts to be less than or equal to 10.							
	NY-K.MD.4 Explore coins (pennies, nickels, dimes, and quarters) and begin identifying pennies and dimes.							
Geometry								
Identify and describe shapes (squares, circles, Triangles, rectangles, hexagons, cubes, cones, cylinders and spheres).	NY-K.G.1 Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as above, below, beside, in front of, behind, and next to.							
	NY-K.G.2 Name shapes regardless of their orientation or overall size.							
	NY-K.G.3 Understand the difference between two-dimensional (lying in a plane, "flat") and three-dimensional ("solid") shapes.							

Kindergarten NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
Explore and create two- and three-dimensional objects.	NY-PK.G.3 Explore two- and three-dimensional objects and use informal language to describe their similarities, differences, and other attributes.							
	NY-K.G.2 Name shapes regardless of their orientation or overall size.							
	NY-K.G.3 Understand the difference between two-dimensional (lying in a plane, "flat") and three-dimensional ("solid") shapes.							
Analyze, compare, sort and compose shapes.	NY-K.G.4 Analyze, compare, and sort two- and three dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts, and other attributes. e.g., number of sides and vertices/"corners", or having sides of equal length.							
	NY-K.G.5 Model objects in **their environment** by building and/or drawing shapes. **e.g., using blocks to build a simple representation in the classroom.** **<u>Note on and/or:</u> Students should be taught to model objects by building and drawing shapes; however, when answering a question, students can choose to model the object by building or drawing the shape.**							
	NY-K.G.6 Compose larger shapes from simple shapes e.g., join two triangles to make a rectangle							

First Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
Operations and Algebraic Thinking								
Represent and solve problems involving addition and subtraction.	NY-1.OA.1 Use addition and subtraction within 20 to solve one-step word problems involving situations of adding to, taking from, putting together, taking apart, **and/or** comparing, with unknowns in all positions. Note: Problems should be represented using objects, drawings, and equations with a symbol for the unknown number. Problems should be solved using objects or drawings, and equations.							
	NY-1.OA.2 Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20. e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.							
Understand and apply properties of operations and the relationship between addition and subtraction.	NY-1.OA.3 Apply properties of operations as strategies to add and subtract. e.g., ● If 8 + 3 = 11 is known, then 3 + 8 = 11 is also known. (Commutative property of addition.) ● To add 2 + 6 + 4, the second two numbers can be added to make a ten, so 2 + 6 + 4 = 2 + 10 = 12. (Associative property of addition.) Note: Students need not use formal terms for these properties.							
	NY-1.OA.4 Understand subtraction as an unknown-addend problem **within 20.** e.g., subtract 10 – 8 by finding the number that makes 10 when added to 8.							
Add and subtract within 20.	NY-1.OA.5 Relate counting to addition and subtraction. e.g., by counting on 2 to add 2							
	NY-1.OA.6a Add and subtract within 20. Use strategies such as: ● counting on; ● making ten; ● decomposing a number leading to a ten; ● using the relationship between addition and subtraction; and ● creating equivalent but easier or known sums.							

First Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	NY-1.OA.6b Fluently add and subtract within 10. **Note: Fluency involves a mixture of just knowing some answers, knowing some answers from patterns, and knowing some answers from the use of strategies.**							
Work with addition and subtraction equations	NY-1.OA.7 Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false. e.g., Which of the following equations are true and which are false? 6 = 6 7 = 8 – 1 5 + 2 = 2 + 5 4 + 1 = 5 + 2							
	NY-1.OA.8 Determine the unknown whole number in an addition or subtraction equation **with the unknown in all positions.** e.g., Determine the unknown number that makes the equation true in each of the equations. 8 + ? = 11 __ – 3 = 5 6 + 6 = □							
Number and Operations in Base Ten								
Extend the counting sequence.	NY-1.NBT.1 Count to 120, starting at any number less than 120. In this range, read and write numerals and represent a number of objects with a written numeral.							
Understand place value.	NY-1.NBT.2 Understand that the two digits of a two-digit number represent amounts of tens and ones. NY-1.NBT.2a **Understand** 10 can be thought of as a bundle of ten ones, called a "ten." NY-1.NBT.2b **Understand** that the numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones. NY-1.NBT.2c **Understand** that the numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight or nine tens (and 0 ones).							
	NY-1.NBT.3 Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols >, =, and <.							

First Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
Use place value understanding and properties of operations to add and subtract.	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.**							
	NY-1.NBT.5 Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used.							
	NY-1.NBT.6 Subtract multiples of 10 from multiples of 10 in the range 10-90 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 used to a **written representation** and explain the reasoning. **Notes:** **Students should be taught to use concrete models and drawings; as well as strategies based on place value, properties of operations, & the relationship between addition and subtraction. When solving any problem, students can choose to use a concrete model or a drawing. Their strategy must be based on place value, properties of operations, or the relationship between addition and subtraction.** **A *written representation* is any way of representing a strategy using words, pictures, or numbers.**							

First Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
Measurement and Data								
Measure lengths indirectly and by iterating length units.	NY-1.MD.1 Order three objects by length; compare the lengths of two objects indirectly by using a third object							
	NY-1.MD.2 **Measure** the length of an object using same-size "length units" placed end to end with no gaps or overlaps. Express the length of an object as a whole number of "length units." **Note: "Length units" could include cubes, paper clips, etc.**							
Tell time and money.	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 ¢)**							
Represent and interpret data.	NY-1.MD.4 Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.							
Geometry								
Reason with shapes and their attributes.	NY-1. G.1 Distinguish between defining attributes versus non-defining attributes **for a wide variety of shapes.** Build **and/or** draw shapes to possess defining attributes. e.g., ● A defining attribute may include, but is not limited to: triangles are closed and three-sided. ● Non-defining attributes include, but are not limited to: color, orientation, and overall size. **Note on and/or: Students should be taught to build *and* draw shapes to possess defining attributes; however, when answering questions, students can choose to build *or* draw the shape.**							

First Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	NY-1.G.2 Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape. Note: Students do not need to learn formal names such as “right rectangular prism.”							
	NY-1. G.3 Partition circles and rectangles into two and four equal shares, describe the shares using the words *halves, fourths, and quarters*, and use the phrases *half of, fourth of, and quarter of.* Describe the whole as *two of, or four of* the shares. Understand for these examples that decomposing into more equal shares creates smaller shares.							

Second Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
Operations and Algebraic Thinking								
Represent and solve problems involving addition and subtraction.	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.							
Add and subtract within 20.	NY-2.OA.2a Fluently add and subtract within 20 using mental strategies. Strategies could include: ● counting on; ● making ten; ● decomposing a number leading to a ten; ● using the relationship between addition and subtraction; and ● creating equivalent but easier or known sums. **Note: Fluency involves a mixture of just knowing some answers, knowing some answers from patterns, and knowing some answers from the use of strategies.** NY-2.OA.2b Know from memory all sums within 20 of two one-digit numbers.							
Work with equal groups of objects to gain foundations for multiplication.	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.							
	NY-2.OA.4 Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns. Write an equation to express the total as a sum of equal addends.							

Second Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
Number and Operations in Base Ten								
Understand place value.	NY-2.NBT.1 Understand that the digits of a three-digit number represent amounts of hundreds, tens, and ones. e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. NY-2.NBT.1a **Understand** 100 can be thought of as a bundle of ten tens, called a "hundred." NY-2.NBT.1b **Understand** the numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).							
	NY-2.NBT. 2 Count within 1000; skip-count by 5's, 10's, and 100's.							
	NY-2.NBT. 3 Read and write numbers to 1000 using base-ten numerals, number names, and expanded form. e.g., expanded form: 237 = 200 + 30 + 7							
	NY-2.NBT.4 Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.							
Use place value understanding and properties of operations to add and subtract.	NY-2.NBT.5 Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction. **<u>Notes:</u> 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.** **Fluency involves a mixture of just knowing some answers, knowing some answers from patterns, and knowing some answers from the use of strategies.**							
	NY-2.NBT.6 Add up to four two-digit numbers using strategies based on place value and properties of operations.							

Second Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	NY-2.NBT.7a Add and subtract within 1000, 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 **representation.** **<u>Notes:</u> Students should be taught to use concrete models and drawings; as well as strategies based on place value, properties of operations, and the relationship between addition and subtraction. When solving any problem, students can choose to use a concrete model or a drawing. Their strategy must be based on place value, properties of operations, and/or the relationship between addition and subtraction.** **A *written representation* is any way of representing a strategy using words, pictures, or numbers.** NY-2.NBT.7b Understand that in adding or subtracting up to three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones, and sometimes it is necessary to compose or decompose tens or hundreds.							
	NY-2.NBT.8 Mentally add 10 or 100 to a given number 100-900, and mentally subtract 10 or 100 from a given number 100-900.							
	NY-2.NBT.9 Explain why addition and subtraction strategies work, using place value and the properties of operations. Note: Explanations may be supported by drawings or objects.							
Measurement and Data								
Measure and estimate lengths in standard units.	NY-2.MD.1 Measure the length of an object **to the nearest whole** by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes							
	NY-2.MD.2 Measure the length of an object twice **using different "length units"** for the two measurements; describe how the two measurements relate to the size of the unit chosen.							
	NY-2.MD.3 Estimate lengths using units of inches, feet, centimeters, and meters.							
	NY-2.MD.4 Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard "length unit."							

Second Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
Relate addition and subtraction to length.	NY-2.MD.5 Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units. e.g., using drawings and equations with a symbol for the unknown number to represent the problem.							
	NY-2.MD.6 Represent whole numbers as lengths from 0 on a **number line** with equally spaced points corresponding to the numbers 0, 1, 2, …, and represent whole-number sums and differences within 100 on a **number line.**							
Work with time and money.	NY-2.MD.7 Tell and write time from analog and digital clocks in **five-minute increments**, using a.m. and p.m. **Develop an understanding of common terms, such as, but not limited to, quarter past, half past, and quarter to.**							
	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.** **Note: Students are not introduced to decimals, and therefore the dollar symbol, until Grade 4**.							
Represent and interpret data.	NY-2.MD.9 Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. **Present the measurement data** in a line plot, where the horizontal scale is marked off in whole-number units.							
	NY-2.MD.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a picture graph or a bar graph.							

Second Grade NYS Next Generation Math Standards

Priority Standard o r Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
Geometry								
Reason with shapes and their attributes.	**NY-2.G.1 Classify two-dimensional figures as polygons or non-polygons.**							
	NY-2.G.2 Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.							
	NY-2.G.3 Partition circles and rectangles into two, three, or four equal shares. Describe the shares using the words *halves, thirds, half of, a third of, etc.* Describe the whole as *two halves, three thirds, four fourths.* Recognize that equal shares of identical wholes need not have the same shape.							

Third Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
Operations and Algebraic Thinking								
Represent and solve problems involving multiplication and division.	NY-3.OA.1 Interpret products of whole numbers. e.g., Interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. Describe a context in which a total number of objects can be expressed as 5 × 7.							
	NY-3.OA.2 Interpret whole-number quotients of whole numbers. e.g., Interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. Describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.							
	NY-3.OA.3 Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities. e.g., using drawings and equations with a symbol for the unknown number to represent the problem.							
	NY-3.OA.4 Determine the unknown whole number in a multiplication or division equation relating three whole numbers. e.g., Determine the unknown number that makes the equation true in each of the equations 8 × ? = 48, 5 = ÷ 3, 6 × 6 = ?							
Understand properties of multiplication and the relationship between multiplication and division.	NY-3.OA.5 Apply properties of operations as strategies to multiply and divide. e.g., ● If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication) ● 3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (Associative property of multiplication) ● Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8× 5) + (8 × 2) = 40 + 16 = 56. (Distributive property) Note: Students need not use formal terms for these properties. **Note: A variety of representations can be used when applying the properties of operations, which may or may not include parentheses.**							
	NY-3.OA.6 Understand division as an unknown-factor problem. e.g., Find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8.							

Third Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
Multiply and divide within 100.	NY-3.OA.7a **Fluently solve single-digit multiplication and related divisions**, using strategies such as the relationship between multiplication and division or properties of operations. e.g., Knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8. NY-3.OA.7b Know from memory all products of two one-digit numbers. **Note: Fluency involves a mixture of just knowing some answers, knowing some answers from patterns, and knowing some answers from the use of strategies.**							
Solve problems involving the four operations, and identify and extend patterns in arithmetic.	NY-3.OA.8 Solve two-step word problems **posed with whole numbers and having whole-number answers** using the four operations. NY-3.OA.8a Represent these problems using **equations or expressions** with a letter standing for the unknown quantity. NY-3.OA.8b Assess the reasonableness of answers using mental computation and estimation strategies including rounding. **Note: Two-step problems need not be represented by a single expression or equation.**							
	NY-3.OA.9 **Identify and extend arithmetic patterns** (including patterns in the addition table or multiplication table).							
Number and Operations in Base Ten								
Use place value understanding and properties of operations to perform multi-digit arithmetic.	NY-3.NBT.1 Use place value understanding to round whole numbers to the nearest 10 or 100.							
	NY-3.NBT.2 Fluently add and subtract within 1,000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. **Note: Students should be taught to use strategies and algorithms based on place value, properties of operations, *and* the relationship between addition and subtraction; however, when solving any problem, students can choose any strategy.** **Note: A range of algorithms may be used.**							

Third Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	NY-3.NBT.3 Multiply one-digit whole numbers by multiples of 10 in the range 10-90 using strategies based on place value and properties of operations. e.g., 9 × 80, 5 × 60							
	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.**							
Number and Operations – Fractions								
Develop understanding of fractions as numbers	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.**							
	NY-3.NF.2 Understand a fraction as a number on the number line; represent fractions on a **number line.** **Note: Fractions are limited to those with denominators 2, 3, 4, 6, and 8.** NY-3.NF.2a Represent a fraction $\frac{1}{b}$ on a **number line** by defining the interval from 0 to 1 as the whole and partitioning it into *b* equal parts. Recognize that each part has size $\frac{1}{b}$ and that the endpoint of the part starting at 0 locates the number $\frac{1}{b}$ on the number line. NY-3.NF.2b Represent a fraction $\frac{a}{b}$ **on a number line** by marking off a lengths $\frac{1}{b}$ from 0. Recognize that the resulting interval has size *b* and that its endpoint locates the number $\frac{a}{b}$ on the number line.							

Third Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	NY-3.NF.3 Explain equivalence of fractions and compare fractions by reasoning about their size. **Note: Fractions are limited to those with denominators 2, 3, 4, 6, and 8.** NY-3.NF.3a Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line. NY-3.NF.3b Recognize and generate equivalent fractions. e.g., $\frac{1}{2} = \frac{2}{4}, \frac{4}{6} = \frac{2}{3}$ Explain why the fractions are equivalent. e.g., using a visual fraction model. NY-3.NF.3c Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. e.g., Express 3 in the form 3 = $\frac{3}{1}$, recognize that $\frac{6}{3} = 2$, and locate $\frac{4}{4}$ and 1 at the same point on a number line. NY-3.NF.3d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons rely on the two fractions referring to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions. e.g., using a visual fraction model.							
Measurement and Data								
Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.	NY-3.MD.1 Tell and write time to the nearest minute and measure time intervals in minutes. Solve one-step word problems involving addition and subtraction of time intervals in minutes. e.g., representing the problem on a number line or other visual model. **Note: This includes one-step problems that cross into a new hour.**							

Third Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	NY-3.MD.2a Measure and estimate liquid volumes and masses of objects using grams (g), kilograms (kg), and liters (l). Note: Does not include compound units such as cm3 and finding the geometric volume of a container. NY-3.MD.2b Add, subtract, multiply, or divide to solve one-step word problems involving masses or liquid volumes that are given in the same units. e.g., using drawings (such as a beaker with a measurement scale) to represent the problem. Note: Does not include multiplicative comparison problems involving notions of "times as much."							
Represent and interpret data.	NY-3.MD.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in a scaled picture graph or a scaled bar graph. e.g., Draw a bar graph in which each square in the bar graph might represent 5 pets.							
	NY-3.MD.4 Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters.							
Geometric measurement: understand concepts of area and relate area to multiplication and addition.	NY-3.MD.5 Recognize area as an attribute of plane figures and understand concepts of area measurement. NY-3.MD.5a Recognize a square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area. NY-3.MD.5b Recognize a plane figure which can be covered without gaps or overlaps by *n* unit squares is said to have an area of *n* square units.							
	NY-3.MD.6 Measure areas by counting unit squares. Note: Unit squares include square cm, square m, square in., square ft., and improvised units.							

Third Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	NY-3.MD.7 Relate area to the operations of multiplication and addition. NY-3.MD.7a Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths. NY-3.MD.7b Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning. NY-3.MD.7c Use tiling to show in a concrete case that the area of a rectangle with whole-number side length a and side length b + c is the sum of a × b and a × c. Use area models to represent the distributive property in mathematical reasoning. NY-3.MD.7d Recognize area as additive. Find areas of figures composed of non-overlapping rectangles, and apply this technique to solve real world problems. **Note: Problems include no more than one unknown side length.**							
	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.							
Geometry								

Third Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
Reason with shapes and their attributes.	**NY-3.G.1 Recognize and classify polygons based on the number of sides and vertices (triangles, quadrilaterals, pentagons, and hexagons). Identify shapes that do not belong to one of the given subcategories.** **Note: Include both regular and irregular polygons, however, students need not use formal terms "regular" and "irregular," e.g., students should be able to classify an irregular pentagon as "a pentagon," but do not need to classify it as an "irregular pentagon."**							
	NY-3.G.2 Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. e.g., Partition a shape into 4 parts with equal area, and describe the area of each part as of the $\frac{1}{4}$ area of the shape.							

Fourth Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
Operations and Algebraic Thinking								
Use the four operations with whole numbers to solve problems.	NY-4.OA.1 Interpret a multiplication equation as a comparison. Represent verbal statements of multiplicative comparisons as multiplication equations. e.g., ● Interpret 35 = 5 x 7 as a statement that 35 is 5 times as many as 7 or 7 times as many as 5. ● Represent “Four times as many as eight is thirty-two” as an equation, 4 x 8 = 32							
	NY-4.OA.2 Multiply or divide to solve word problems involving multiplicative comparison, distinguishing multiplicative comparison from additive comparison. Use drawings and equations with a symbol for the unknown number to represent the problem.							
	NY-4.OA.3 Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. NY-4.OA.3a Represent these problems **using equations or expressions** with a letter standing for the unknown quantity. NY-4.OA.3b Assess the reasonableness of answers using mental computation and estimation strategies including rounding. **Note: Multistep problems need not be represented by a single expression or equation.**							
Gain familiarity with factors and multiples.	NY-4.OA.4 Find all factor pairs for a whole number in the range 1-100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1-100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1-100 is prime or composite.							
Generate and analyze patterns.	NY-4.OA.5 Generate a number or shape pattern that follows a given rule. **Identify and informally explain apparent features** of the pattern that were not explicit in the rule itself. e.g., Given the rule “Add 3” and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.							

Fourth Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
Number and Operations in Base Ten								
Generalize place value understanding for multi-digit whole numbers.	NY-4.NBT.1 Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. e.g., Recognize that 70 × 10 = 700 **(and, therefore, 700 ÷ 10 = 70)** by applying concepts of place value, **multiplication**, and division. Note: Grade 4 expectations 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. Note: Grade 4 expectations are limited to whole numbers less than or equal to 1,000,000.							
	NY-4.NBT.3 Use place value understanding to round multi-digit whole numbers to any place. Note: Grade 4 expectations are limited to whole numbers less than or equal to 1,000,000.							
Use place value understanding and properties of operations to perform multi-digit arithmetic.	NY-4.NBT.4 Fluently add and subtract multi-digit whole numbers using a **standard algorithm**. Note: Grade 4 expectations are limited to whole numbers less than or equal to 1,000,000.							
	NY-4.NBT.5 Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. **Note on and/or: Students should be taught to use equations, rectangular arrays, and area models; however, when illustrating and explaining any calculation, students can choose any strategy.** Note: Grade 4 expectations are limited to whole numbers less than or equal to 1,000,000.							

Fourth Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	NY-4.NBT.6 Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. **<u>Notes on and/or:</u> Students should be taught to use strategies based on place value, the properties of operations, and the relationship between multiplication and division; however, when solving any problem, students can choose any strategy. Students should be taught to use equations, rectangular arrays, and area models; however, when illustrating and explaining any calculation, students can choose any strategy.** Note: Grade 4 expectations are limited to whole numbers less than or equal to 1,000,000.							
Number and Operations – Fractions								
Extend understanding of fraction equivalence and ordering.	NY-4.NF.1 Explain why a fraction $\frac{a\overline{a}}{b\,b}$ is equivalent to a fraction $\frac{a\overline{a}\;\overline{x\,x}\;\overline{n\,n}}{b\,b\;x\,x\;n\,n}$ by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions. Note: Grade 4 expectations are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.							
	NY-4.NF.2 Compare two fractions with different numerators and different denominators. Recognize that comparisons are valid only when the two fractions refer to the same whole. e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as $\frac{1}{2}$ Record the results of comparisons with symbols >, =, or <, and justify the conclusions. e.g., using a visual fraction model. Note: Grade 4 expectations are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.							

Fourth Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.	NY-4.NF.3 Understand a fraction $\frac{a}{b}$ with a > 1 as a sum of fractions $\frac{1}{b}$ **Note: $\frac{1}{b}$ refers to the unit fraction for $\frac{a}{b}$** NY-4.NF.3a Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. NY-4.NF.3b Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions. e.g., by using a visual fraction model such as, but not limited to: ● $\frac{3}{8} = \frac{1}{8} + \frac{1}{8} + \frac{1}{8}$ ● $\frac{3}{8} = \frac{1}{8} + \frac{2}{8}$ ● $2\frac{1}{8} = 1 + 1 + \frac{1}{8} = \frac{8}{8} + \frac{8}{8} + \frac{1}{8}$ NY-4.NF.3c Add and subtract mixed numbers with like denominators. e.g., replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction. NY-4.NF.3d Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators. e.g., using visual fraction models and equations to represent the problem. Note: Grade 4 expectations are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.							

Fourth Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	NY-4.NF.4 Apply and extend previous understandings of multiplication to multiply a **whole number by a fraction**. Note: This standard refers to n groups of a fraction (where n is a whole number), e.g., 4 groups of $\frac{1}{3}$; which lends itself to being thought about as repeated addition. In grade 5 (NY-5. NF.4) students will be multiplying a fraction by a whole number, e.g., $\frac{1}{3}$ of 4. NY-4.NF.4a Understand a fraction $\frac{a}{b}$ as a multiple of $\frac{1}{b}$ e.g., Use a visual fraction model to represent $\frac{5}{4}$ as the product 5 × $\frac{1}{4}$, recording the conclusion with the equation $\frac{5}{4}$ = 5 × $\frac{1}{4}$. NY-4.NF.4b Understand a multiple of $\frac{a}{b}$ as a multiple of $\frac{1}{b}$, and use this understanding to **multiply a whole number by a fraction.** e.g., Use a visual fraction model to express 3 $x\frac{2}{5}$ as 6 $x\frac{1}{5}$, recognizing this product as $\frac{6}{5}$, in general, n × $\frac{a}{b}$ = $\frac{(n \times a)}{b}$. NY-4.NF.4c Solve word problems involving **multiplication of a whole number by a fraction.** e.g., using visual fraction models and equations to represent the problem. e.g., If each person at a party will eat $\frac{3}{8}$ of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie? Note: Grade 4 expectations are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.							

Fourth Grade NYS Next Generation Math Standards

Priority Standard o r Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
Understand decimal notation for fractions, and compare decimal fractions.	NY-4.NF.5 Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. e.g., express $\frac{3}{10}$ as $\frac{30}{100}$, and add $\frac{3}{10} + \frac{4}{100} = \frac{34}{100}$. Notes: ● Students who can generate equivalent fractions can develop strategies for adding fractions with unlike denominators in general. But addition and subtraction with unlike denominators in general is not a requirement at this grade. ● Grade 4 expectations are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.							
	NY-4.NF.6 Use decimal notation for fractions with denominators 10 or 100. e.g., ● Rewrite 0.62 as $\frac{62}{100}$ or $\frac{62}{100}$ as 0.62 ● Describe a length as 0.62 meters. ● Locate 0.62 on a number line. Note: Grade 4 expectations are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.							
	NY-4.NF.7 Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions. e.g., using a visual model. Note: Grade 4 expectations are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.							

Fourth Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
Measurement and Data								
Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.	**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 $2\frac{11}{22}$ 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.							
	NY-4.MD.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money. NY-4.MD.2a Solve problems involving **fractions** or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. NY-4.MD.2b Represent measurement quantities using diagrams that feature a measurement scale, such as **number lines.** **Note: Grade 4 expectations are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.**							
	NY-4.MD.3 Apply the area and perimeter formulas for rectangles in real world and mathematical problems. e.g., Find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.							

Fourth Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
Represent and interpret data.	NY-4.MD.4 Make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}, \frac{1}{4}, \frac{1}{8}$). Solve problems involving addition and subtraction of fractions by using information presented in line plots. e.g., **Given measurement data on a line plot,** find and interpret the difference in length between the longest and shortest specimens in an insect collection.							
Geometric measurement: understand concepts of angle and measure angles.	4.MD.5 Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement. 4.MD.5a. **Recognize** an angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through $\frac{1}{360}$ of a circle is called a "one-degree angle," and can be used to measure angles. 4.MD.5b **Recognize** an angle that turns through n one-degree angles is said to have an angle measure of n degrees.							
	NY-4.MD.6 Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.							
	NY-4.MD.7 Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems. e.g., using an equation with a symbol for the unknown angle measure.							
Geometry								
Draw and identify lines and angles, and classify shapes by properties of their lines and angles.	NY-4.G.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.							

Fourth Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	NY-4.G.2a. Identify and name triangles based on angle size (right, obtuse, acute). **NY-4.G.2b Identify and name all quadrilaterals with 2 pairs of parallel sides as parallelograms.** **NY-4.G.2c Identify and name all quadrilaterals with four right angles as rectangles.**							
	NY-4.G.3 Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry							

Fifth Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
Operations and Algebraic Thinking								
Write and interpret Numerical expressions.	NY-5.OA.1 Apply the order of operations to evaluate numerical expressions. e.g., • 6 + 8 ÷ 2 • (6 + 8) ÷ 2 Note: Exponents and nested grouping symbols are not included.							
	NY-5.OA.2 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. e.g., Express the calculation “add 8 and 7, then multiply by 2” as (8 + 7) × 2. Recognize that 3 × (18,932 + 921) is three times as large as 18,932 + 921, without having to calculate the indicated sum or product.							
Analyze patterns and relationships.	NY-5.OA.3 Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. e.g., Given the rule “Add 3” and the starting number 0, and given the rule “Add 6” and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.							
Number and Operations in Base Ten								
Understand the place value system.	NY-5.NBT. 1 Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.							
	NY-5.NBT.2 Use whole-number exponents to denote powers of 10. Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10.							

Fifth Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	NY-5.NBT.3 Read, write, and compare decimals to thousandths. NY-5.NBT.3a Read and write decimals to thousandths using base-ten numerals, number names, and expanded form. e.g., • $47.392 = 4 \times 10 + 7 \times 1 + 3 \times \frac{1}{10} + 9 \times \frac{1}{100} + 2 \times \frac{1}{1000}$ • $47.392 = (4 \times 10) + (7 \times 1) + (3 \times \frac{1}{10}) + (9 \times \frac{1}{100}) + (2 \times \frac{1}{1000})$ • $47.392 = (4 \times 10) + (7 \times 1) + (3 \times 0.1) + (9 \times 0.01) + (2 \times 0.001)$ NY-5.NBT.3b Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.							
	NY-5.NBT.4 Use place value understanding to round decimals to any place.							
Perform operations with multi-digit whole numbers and with decimals to hundredths.	NY-5.NBT.5 Fluently multiply multi-digit whole numbers using a **standard algorithm.**							
	NY-5.NBT.6 Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. **Notes on and/or:** ● **Students should be taught to use strategies based on place value, the properties of operations, and the relationship between multiplication and division; however, when solving any problem, students can choose any strategy.** ● **Students should be taught to use equations, rectangular arrays, and area models; however, when illustrating and explaining any calculation, students can choose any strategy.**							

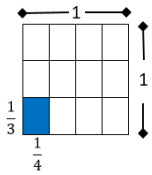
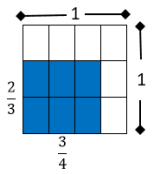
Fifth Grade NYS Next Generation Math Standards

Priority Standard o r Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	NY-5.NBT.7 Using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between operations: ● add and subtract decimals to hundredths; ● multiply and divide decimals to hundredths. Relate the strategy to a written method and explain the reasoning used. Notes on and/or: Students should be taught to use concrete models and drawings; as well as strategies based on place value, properties of operations, and the relationship between operations. When solving any problem, students can choose to use a concrete model or a drawing. Their strategy must be based on place value, properties of operations, or the relationship between operations. Note: Division problems are limited to those that allow for the use of concrete models or drawings, strategies based on properties of operations, and/or the relationship between operations (e.g., 0.25 ÷ 0.05). Problems should not be so complex as to require the use of an algorithm (e.g., 0.37 ÷ 0.05).							
Number and Operations – Fractions								
Use equivalent fractions as a strategy to add and subtract fractions.	NY-5.NF.1 Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. e.g., • $\frac{1}{3} + \frac{2}{9} = \frac{3}{9} + \frac{2}{9} = \frac{5}{9}$ • $\frac{2}{3} + \frac{5}{4} = \frac{8}{12} + \frac{15}{12} = \frac{23}{12}$							
	NY-5.NF.2 Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators. e.g., using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. Recognize an incorrect result $\frac{2}{5} + \frac{1}{2} = \frac{3}{7}$ by observing that $\frac{3}{7} < \frac{1}{2}$							

Fifth Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
Apply and extend previous understandings of multiplications and division to multiply and divide fractions.	NY-5.NF.3 Interpret a fraction as division of the numerator by the denominator ($\frac{a}{b} = a \div b$). e.g., Interpret $\frac{3}{4}$ as the result of dividing 3 by 4, noting that $\frac{3}{4}$ multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size $\frac{3}{4}$. Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers. e.g., using visual fraction models or equations to represent the problem. e.g., If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?							
	NY-5.NF.4 Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. 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 $\frac{2}{3} \times \frac{4}{5} = \frac{8}{15}$. 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.  							
	NY-5.NF.5 Interpret multiplication as scaling (resizing).							

Fifth Grade NYS Next Generation Math Standards

Priority Standard o r Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	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 $\frac{11}{11}$ = 5, 5 is half of 10 and 5 is 10 times** 2 **larger than** $\frac{11}{22}$**.** 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 $\frac{aa}{bb} = \frac{aa}{bb} \times \frac{nn}{nn}$ to the effect of multiplying $\frac{aa}{bb}$ by 1. **e.g.,** **Explain why 4 ×** $\frac{33}{22}$ **is greater than 4.** **Explain why 4 ×** $\frac{11}{22}$ **is less than 4.** $\frac{11}{33}$ **is equivalent to** $\frac{22}{66}$ **because** $\frac{11}{33} \times \frac{22}{22} = \frac{22}{66}$							
	NY-5.NF.6 Solve real world problems involving multiplication of fractions and mixed numbers. e.g., using visual fraction models or equations to represent the problem.							
	NY-5.NF.7 Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. NY-5.NF.7a Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. e.g., Create a story context for $\frac{11}{33} \div 4$ and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that $\frac{11}{33} \div 4 = \frac{11}{1122}$ because $\frac{11}{1122} \times 4 = \frac{11}{33}$. NY-5.NF.7b Interpret division of a whole number by a unit fraction, and compute such quotients. e.g., Create a story context for $4 \div \frac{11}{55}$ and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that $4 \div \frac{11}{55} = 20$ because $20 \times \frac{11}{55} = 4$.							

Fifth Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	NY-5.NF.7c Solve real-world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions. e.g., using visual fraction models and equations to represent the problem. e.g., How much chocolate will each person get if 3 people share 12 lb. of chocolate equally? How many 13-cup servings are in 2 cups of raisins? Note: Students able to multiply fractions in general can develop strategies to divide fractions in general, by reasoning about the relationship between multiplication and division. But division of a fraction by a fraction is not a requirement **until grade 6 (NY-6. NS.1).**							
Measurement and Data								
Convert like measurement units within a given measurement system.	NY-5.MD.1 Convert among different-sized standard measurement units within a given measurement system when the conversion factor is given. Use these conversions in solving multi-step, real world problems. Notes: ● All conversion factors will be given. ● Grade 5 expectations for decimal operations are limited to work with decimals to hundredths.							
Represent and interpret data.	NY-5.MD.2 Make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}, \frac{1}{4}, \frac{1}{8}$). Use operations on fractions for this grade to solve problems involving information presented in line plots. e.g., Given different measurements of liquid in identical beakers, **make a line plot to display the data and find the total amount of liquid in all of the beakers.**							
Geometric measurement: understand concepts of volume and relate volume to multiplication and addition.	NY-5.MD.3 Recognize volume as an attribute of solid figures and understand concepts of volume measurement. NY-5.MD.3a Recognize that a cube with side length 1 unit, called a “unit cube,” is said to have “one cubic unit” of volume, and can be used to measure volume. NY-5.MD.3b **Recognize** that a solid figure which can be packed without gaps or overlaps using *n* unit cubes is said to have a volume of *n* cubic units.							
	NY-5.MD.4 Measure volumes by counting unit cubes, using cubic cm, cubic in., cubic ft., and improvised units.							

Fifth Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	NY-5.MD.5 Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume. NY-5.MD.5a Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. NY-5.MD.5b. Apply the formulas V = l × w × h and V = B × h for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems. NY-5.MD.5c Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.							
Geometry								
Graph points on the coordinate plane to solve real-world and mathematical problems.	NY-5.G.1 Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond. e.g., x-axis and x-coordinate, y-axis and y-coordinate.							
	NY-5.G.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.							
Classify two-dimensional figures into categories based on their properties.	NY-5.G.3 Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. e.g., All rectangles have four right angles and squares are rectangles, so all squares have four right angles. Note: The inclusive definition of a trapezoid will be utilized, which defines a trapezoid as “A quadrilateral with at least one pair of parallel sides.”							
	NY-5.G.4 Classify two-dimensional figures in a hierarchy based on properties.							

Sixth Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
Ratio and Proportional Reasoning								
Understand ratio concepts and use ratio reasoning to solve problems.	NY-6.RP.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. e.g., “The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2wings there was 1 beak.” “For every vote candidate A received, candidate C received three votes.”							
	NY-6.RP.2 Understand the concept of a unit rate aa/bb associated with a ratio $aa:bb$ with $\neq 0$ (b not equal to zero), and use rate language in the context of a ratio relationship. e.g., “This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there are $\frac{3}{4}$ cup of flour for each cup of sugar.” "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger." Note: Expectations for unit rates in this grade are limited to non-complex fractions.							
	NY-6.RP.3 Use ratio and rate reasoning to solve real-world and mathematical problems. Note: Strategies may include but are not limited to the following: tables of equivalent ratios, tape diagrams, double number lines, and equations.							
	NY-6.RP.3a Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, & plot the pairs of values on the coordinate plane. Use tables to compare ratios.							
	NY-6.RP.3b Solve unit rate problems. e.g., If it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed? **What is the unit rate?** Note: Problems may include unit pricing and constant speed.							
	NY-6.RP.3c Find a percent of a quantity as a rate per 100. Solve problems that involve finding the whole given a part and the percent, and **finding a part of a whole given the percent.** e.g., 30% of a quantity means $\frac{30}{100}$ times the quantity.							

Sixth Grade NYS Next Generation Math Standards

Priority Standard o r Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	NY-6.RP.3d Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities. **Note: Conversion of units occur within a given measurement system, not across different measurement systems.**							
The Number System								
Apply and extend previous understandings of multiplication and division to divide fractions by fractions.	NY-6.NS.1 Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions. Note: Strategies may include but are not limited to the following: using visual fraction models, **a standard algorithm,** and equations to represent the problem. e.g., Create a story context for $(\frac{2}{3}) \div (\frac{3}{4})$ and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that $(\frac{2}{3}) \div (\frac{3}{4}) = \frac{8}{9}$ because $\frac{3}{4}$ of $\frac{8}{9}$ is $\frac{2}{3}$. In general, $(\frac{a}{b}) \div (\frac{c}{d}) = \frac{ad}{bc}$. e.g., ● How much chocolate will each person get if 3 people share $\frac{1}{2}$ lb of chocolate equally? ● How many $\frac{3}{4}$ cup servings are in $\frac{2}{3}$ of a cup of yogurt? ● How wide is a rectangular strip of land with length $\frac{3}{4}$ mi and area $\frac{1}{2}$ square mi?							
Compute fluently with multi-digit numbers and find common factors and multiples.	NY-6.NS.2 Fluently divide multi-digit numbers using **a standard algorithm.**							
	NY-6.NS.3 Fluently add, subtract, multiply, and divide multi-digit decimals using **a standard algorithm** for each operation.							
	NY-6.NS.4 Find the greatest common factor of two whole numbers less than or equal to 100. 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 other than 1.** Find the least common multiple of two whole numbers less than or equal to 12. e.g., Express 36 + 8 as 4 (9 + 2).							

Sixth Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
Apply and extend previous understandings of numbers to the system of rational numbers.	NY-6.NS.5 Understand that positive and negative numbers are used together to describe quantities having opposite directions or values. Use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation. e.g., temperature above/below zero, elevation above/below sea level, debits/credits, positive/negative electric charge.							
	NY-6.NS.6 Understand a rational number as a point on the number line. **Use number lines and coordinate axes to represent points on a number line and in the coordinate plane with negative number coordinates.**							
	NY-6.NS.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, and that 0 is its own opposite. e.g., With the number 3, – (–3) = 3							
	NY-6.NS.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.							
	NY-6.NS.6c Find and position integers and other rational numbers on a horizontal or **vertical number line**. Find and position pairs of integers and other rational numbers on a coordinate plane.							
	NY-6.NS.7 Understand ordering and absolute value of rational numbers.							
	NY-6.NS.7a Interpret statements of inequality as statements about the relative position of two numbers on a **number line**. e.g., Interpret –3 > –7 as a statement that –3 is located to the right of –7 on a number line oriented from left to right.							
	NY-6.NS.7b Write, interpret, and explain statements of order for rational numbers in real-world contexts. e.g., Write –3°C > –7°C to express the fact that –3°C is warmer than –7°C.							

Sixth Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	NY-6.NS.7c Understand the absolute value of a rational number as its distance from 0 on the number line. Interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. e.g., For an account balance of –30 dollars, write |–30| = 30 to describe the size of the debt in 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|.**							
	NY-6.NS.8 Solve real-world and mathematical problems by graphing points **on a coordinate plane**. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.							
Expressions and Equations (Inequalities)								
Apply and extend previous understandings of arithmetic to algebraic expressions.	NY-6.EE.1 Write and evaluate numerical expressions involving whole-number exponents.							
	NY-6.EE.2 Write, read, and evaluate expressions in which letters stand for numbers.							
	NY-6.EE.2a Write expressions that record operations with numbers and with letters standing for numbers. e.g., Express the calculation "Subtract y from 5" as 5 – y.							
	NY-6.EE.2b Identify parts of an expression using mathematical terms (term, coefficient, sum, **difference**, product, factor, and quotient); view one or more parts of an expression as a single entity. e.g., 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.							

Sixth Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	NY-6.EE.2c Evaluate expressions given specific values for their variables. Include expressions that arise from formulas in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order (Order of Operations). e.g., Use the formulas $V = s^3$ and $SA = 6\ s^2$ to find the volume and surface area of a cube with sides of length $s = \frac{1}{2}$. **Note: Expressions may or may not include parentheses. Nested grouping symbols are not included.**							
	NY-6.EE.3 Apply the properties of operations to generate equivalent expressions. e.g., 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.							
	NY-6.EE.4 Identify when two expressions are equivalent. e.g., The expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y represents.							
Reason about and solve one-variable equations and inequalities.	NY-6.EE.5 Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.							
	NY-6.EE.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.							

Sixth Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	NY-6.EE.7 Solve real-world and mathematical problems by writing and solving equations of the form $xx + pp = qq$; $\boldsymbol{xx - pp =}$; $ppxx = qq$; and $\boldsymbol{xx/pp = qq}$ for cases **in which p, q and x are all nonnegative rational.** **Note: For the $\boldsymbol{xx/ = qq}$ case, $\boldsymbol{pp \neq 00}$.**							
	NY-6.EE.8 Write an inequality of the form x > c, x ≥ c, x ≤ c or x < c to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of **these forms** have infinitely many solutions; represent solutions of such inequalities on a **number line.**							
Represent and analyze quantitative relationships between dependent and independent variables.	NY-6.EE.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another. **Given a verbal context and an equation, identify the dependent variable, in terms of the other quantity, thought of as the independent variable.** Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. e.g., In a problem involving motion at constant speed, list and graph ordered pairs of distances and times. e.g., **Given the equation** $dd = 65tt$ to represent the relationship between distance and time, identify tt as the independent variable and dd as the dependent variable.							
Geometry								
Solve real-world and mathematical problems involving area, surface area and volume.	NY-6.G.1 Find area of **triangles, trapezoids, and other polygons** by composing into rectangles or **decomposing into triangles and quadrilaterals.** Apply these techniques in the context of solving real-world and mathematical problems. **Note: The inclusive definition of a trapezoid will be utilized, which defines a trapezoid as "A quadrilateral with at least one pair of parallel sides." (This definition includes parallelograms.)**							
	NY-6.G.2 **Find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.**							

Sixth Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	NY-6.G.3 Draw polygons in the coordinate plane given coordinates for the vertices. Use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.							
	NY-6.G.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. **Note: Three-dimensional figures include only right rectangular prisms, right rectangular pyramids, and right triangular prisms. When finding surface areas, all necessary measurements will be given.**							
	NY-6.G.5 **Use area and volume models to explain perfect squares and perfect cubes.**							
Statistics and Probability								
Develop an understanding of statistical variability.	NY-6. SP.1a Recognize that a statistical question is one that anticipates variability in the data related to the question and accounts for it in the answers. e.g., “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.							
	NY-6. SP.1b **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.** **Note: Students need to understand that data are generated with respect to particular contexts or situations and can be used to answer questions about those contexts or situations.**							
	NY-6. SP.1c **Understand that the method and sample size used to collect data for a particular question is intended to reduce the difference between a population and a sample taken from the population so valid inferences can be drawn about the population. Generate multiple samples (or simulated samples) of the same size to recognize the variation in estimates or predictions.**							

Sixth Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	Note: Examples of acceptable methods to obtain a representative sample from a population include, but are not limited to, a simple random sample for a given population or a systematic random sample for an unknown population. Examples of unacceptable methods of sampling include, but are not limited to, online polls and convenience sampling because they introduce bias and are not representative of the population.							
	NY-6. SP.2 Understand that a set of **quantitative** data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape. **Notes:** ● **Students need to determine and justify the most appropriate graph to display a given set of data (histogram, dot plot).** ● **Students extend their knowledge of symmetric shapes, to describe data displayed in dot plots and histograms in terms of symmetry. They identify clusters, peaks and gaps, recognizing common shapes and patterns in these displays of data distributions, and ask why a distribution takes on a particular shape for the context of the variable being considered.**							
	NY-6. SP.3 Recognize that a measure of center for a quantitative 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. **Note: Measures of center are mean, median, and mode. The measure of variation is the range.**							
Summarize and describe distributions.	NY-6. SP.4 Display **quantitative** data in plots on a number line, including dot plots and histograms.							
	NY-6. SP.5 Summarize **quantitative** data sets in relation to their context.							
	NY-6. SP.5a Report the number of observations.							
	NY-6. SP.5b Describe the nature of the attribute under investigation, including how it was measured and its units of measurement.							

Sixth Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	NY-6.SP.5c **Calculate range and measures of center, 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.** **<u>Note:</u> Measures of center are mean, median, and mode. The measure of variation is the range. Role of outliers should be discussed, but no formula required.**							
	NY-6. SP.5d Relate **the range** and the choice of measures of center to the shape of the data distribution and the context in which the data were gathered. **<u>Note:</u> Measures of center are mean, median, and mode. The measure of variation is the range.**							
Investigate chance processes and develop, use and evaluate probability models.	**NY-6. SP.6 Understand that the probability of a chance event is a number between 0 and 1 inclusive, that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around $\frac{11}{22}$ indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.**							
	NY-6. SP.7 Approximate the probability of a simple 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. **e.g., 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.** **Note: Compound events are introduced in grade 7.**							
	NY-6. SP.8 Develop a probability model and use it to find probabilities of simple events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.							

Sixth Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	NY-6. SP.8a Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of simple events. e.g., The probability of rolling a six-sided fair number cube and landing on a 2 is $\frac{1}{66}$. The probability of landing on an even number is $\frac{33}{66}$.							
	NY-6. SP.8b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. e.g., Find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?							

Seventh Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
Ratio and Proportional Reasoning								
Analyze proportional relationships and use them to solve real-world and mathematical problems.	NY-7.RP.1 Compute unit rates associated with ratios of fractions. e.g., If a person walks $\frac{1}{2}$ mile in each $\frac{1}{4}$ hour, compute the rate as the complex fraction $\frac{\frac{1}{2}}{\frac{1}{4}}$ miles per hour, equivalently 2 miles per hour **with 2 being the unit rate.** Note: Problems may include ratios of lengths, areas, and other quantities measured in like or different units, including across measurement systems.							
	NY-7.RP.2 Recognize and represent proportional relationships between quantities.							
	NY-7.RP.2a Decide whether two quantities are in a proportional relationship. Note: **Strategies include but are not limited to** the following: testing for equivalent ratios in a table and/or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.							
	NY-7.RP.2b Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.							
	NY-7.RP.2c Represent a proportional relationship using an equation. e.g., If total cost tt is proportional to the number n of items purchased at a constant price pp, the relationship between the total cost and the number of items can be expressed as $tt = pppp$.							
	NY-7.RP.2d Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate.							
	NY-7.RP.3 Use proportional relationships to solve multistep ratio and percent problems. Note: Examples of percent problems include: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, and percent error.							

Seventh Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
The Number System								
Apply and extend previous understandings of operations with fractions to add, subtract, multiply and divide rational numbers.	NY-7.NS.1 Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers. Represent addition and subtraction on a horizontal or vertical number line.							
	NY-7.NS.1a Describe situations in which opposite quantities combine to make 0.							
	NY-7.NS.1b Understand addition of rational numbers; p + q is 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.							
	NY-7.NS.1c Understand subtraction of rational numbers as adding the additive inverse, $pp - qq = pp + (- qq)$. 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.							
	NY-7.NS.1d Apply properties of operations as strategies to add and subtract rational numbers							
	NY-7.NS.2 Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.							
	NY-7.NS.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.							
	NY-7.NS.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 $-\left(\frac{pp}{qq}\right) = \frac{-pp}{qq} = \frac{pp}{-qq}$ Interpret quotients of rational numbers by describing real-world contexts.							

Seventh Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	NY-7.NS.2c Apply properties of operations as strategies to multiply and divide rational numbers.							
	NY-7.NS.2d Convert a fraction to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.							
	NY-7.NS.3 Solve real-world and mathematical problems involving the four operations with rational numbers. Note: Computations with rational numbers extend the rules for manipulating fractions to **complex fractions limited to $\frac{\frac{aa}{bb}}{}$ where aa, *b*, *c*, and *d* are integers and *b*, *c*, and $dd \neq 00$.**							
Expressions and Equations (Inequalities)								
Use properties of operations to generate equivalent expressions.	NY-7.EE.1 Add, subtract, factor, and expand linear expressions with rational coefficients by applying the properties of operations.							
	NY-7.EE.2 Understand that rewriting an expression in different forms in real-world and mathematical problems can reveal and explain how the quantities are related. e.g., $+ 0.05aa$ and $1.05aa$ are equivalent expressions meaning that “increase by 5%” is the same as “multiply by 1.05.”							
Solve real-life and mathematical problems using numerical and algebraic expressions, equations and inequalities.	NY-7.EE.3 Solve multi-step real-**world** and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate. Assess the reasonableness of answers using mental computation and estimation strategies. e.g., ● If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. ● If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.							

Seventh Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	NY-7.EE.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. Note: Solving equations that contain variables on both sides is not an expectation in grade 7.							
	NY-7.EE.4a Solve word problems leading to equations of the form $pp + qq = rr$ and $pp(pp + qq) = rr$, 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.**							
	NY-7.EE.4b Solve word problems leading to inequalities of the form $pppp + qq > rr$, $\boldsymbol{pppp + qq \geq rr}$, $\boldsymbol{pppp + qq \leq rr}$, or $pppp + qq < rr$, where p, q, and rare rational numbers. Graph the solution set of the inequality **on the number line** and interpret it in the context of the problem. e.g., 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: 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.**							

Seventh Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
Geometry								
Draw, construct and describe geometrical figures and describe the relationships between them.	NY-7.G.1 Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.							
	NY-7.G.2 Draw **triangles when given measures of angles and/or sides**, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle. **Note: Create triangles through the use of freehand drawings, materials (scaffolds may include: pipe cleaners, Legos®, and toothpicks), rulers, protractors, and/or technology**							
	NY-7.G.3 Describe the two-dimensional shapes that result from slicing three-dimensional **solids parallel or perpendicular to the base.** Note: Focus of standard is on plane sections resulting from the slicing of right rectangular prisms and right rectangular pyramids							
Solve real-life and mathematical problems involving angle measure, area, surface area and volume	NY-7.G.4 **Apply** the formulas for the area and circumference of a circle to solve problems. **Note: Students in grade 7 are not expected to calculate the radius of a circle given its area.**							
	NY-7.G.5 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. **Note: Students in grade 7 are limited to solving equations that involve linear expressions on one side of the equation.**							

Seventh Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	NY-7.G.6 Solve real-world and mathematical problems involving area of two-dimensional objects composed of triangles and trapezoids. Solve surface area problems involving right prisms and right pyramids composed of triangles and trapezoids. **Find the volume of right triangular prisms, and solve volume problems involving three-dimensional objects composed of right rectangular prisms.** **Notes: The inclusive definition of a trapezoid will be utilized, which defines a trapezoid as "A quadrilateral with at least one pair of parallel sides." (This definition includes parallelograms and rectangles.) Right prisms include cubes.**							
Statistics and Probability								
Draw informal comparative inferences about two populations.	**NY-7.SP.1 Construct and interpret box-plots, find the interquartile range, and determine if a data point is an outlier. Note: Students in grade 7 are not expected to construct box-plots that include outliers in the data, but students are expected to interpret box-plots that may contain outliers.**							
	NY-7.SP.3 Informally assess the degree of visual overlap of two **quantitative** data distributions.							
	NY-7.SP.4 Use measures of center and measures of variability for **quantitative** data from random samples **or populations** to draw informal comparative inferences about the populations. **Note: Measures of center are mean, median, and mode. The measures of variation include range and the interquartile range.**							
Investigate chance processes and develop, use and evaluate probability models.	NY-7.SP.8 Find probabilities of compound events using organized list, **sample space** tables, tree diagrams, and simulation.							
	NY-7.SP.8a 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.							

Seventh Grade NYS Next Generation Math Standards

Priority Standard o r Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	NY-7.SP.8b Represent sample spaces for compound events using methods such as organized lists, **sample space** tables, and tree diagrams. For an event described in everyday language, identify the outcomes in the sample space which compose the event. e.g., “rolling double sixes”							
	NY-7.SP.8c Design and use a simulation to generate frequencies for compound events. e.g., Use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?							

Eighth Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
The Number System								
Know that there are numbers that are not rational and approximate them by rational numbers.	NY-8.NS.1 Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion eventually repeats. Know that other numbers that are not rational are called irrational.							
	NY-8.NS.2 Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line, and estimate the value of expressions.							
Expressions and Equations (Inequalities)								
Work with radicals and integer exponents.	NY-8.EE.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions. e.g., $3^2 \times 3^{-5} = 3^{-3} = \frac{1}{33} = \frac{1}{27}$.							
	NY-8.EE.2 Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. **Know square roots of perfect squares up to 225 and cube roots of perfect cubes up to 125. Know that the square root of a non-perfect square is irrational.** e.g., The $\sqrt{2}$ is irrational.							
	NY-8.EE.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. e.g., Estimate the population of the United States as 3×10^8 and the population of the world as 7×10^9, and determine that the world population is more than 20 times larger. POST STANDARD							
	NY-8.EE.4 Perform **multiplication and division** with numbers expressed in scientific notation, including problems where both **standard decimal form** and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities. Interpret scientific notation that has been generated by technology.							

Eighth Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
Understand the Connections between proportional relationships, lines and linear equations.	NY-8.EE.5 Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. e.g., Compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.							
	NY-8.EE.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; 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.							
Analyze and solve linear equations and pairs of simultaneous linear equations.	NY-8.EE.7 Solve linear equations in one variable.							
	NY-8.EE.7a **Recognize when** linear equations in one variable have one solution, infinitely many solutions, or no solutions. Give examples and show which of these possibilities is the case by successively transforming the given equation into simpler forms.							
	NY-8.EE.7b Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and combining like terms. **Note: This includes equations that contain variables on both sides of the equation**							
	NY-8.EE.8 Analyze and solve pairs of simultaneous linear equations. POST STANDARD							
	NY-8.EE.8a Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously. **Recognize when the system has one solution, no solution, or infinitely many solutions.**							

Eighth Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	NY-8.EE.8b Solve systems of two linear equations in two variables **with integer coefficients: graphically, numerically using a table, and algebraically.** Solve simple cases by inspection. e.g., 3x + y = 5 and 3x + y = 6 have no solution because 3x + y cannot simultaneously be 5 and 6. **Notes: Solving systems algebraically will be limited to at least one equation containing at least one variable whose coefficient is 1. Algebraic solution methods include elimination and substitution.** **This standard is a fluency expectation for grade 8. For more guidance, see Fluency in the Glossary of Verbs Associated with the New York State Next Generation Mathematics Learning Standards POST STANDARDS**							
	NY-8.EE.8c Solve real-world and mathematical problems **involving systems of two linear equations in two variables with integer coefficients.** **Note: Solving systems algebraically will be limited to at least one equation containing at least one variable whose coefficient is 1. POST STANDARDS**							
Functions								
Define, evaluate and compare functions.	NY-8.F.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. Notes: Function notation is not required in Grade 8. **The terms domain and range may be introduced at this level; however, these terms are formally introduced in Algebra I (AI-F.IF.1).**							
	NY-8.F.2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). e.g., Given a linear function represented by a table of values and a linear function represented by an algebraic equation, determine which function has the greater rate of change. Note: Function notation is not required in Grade 8.							

Eighth Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	NY-8.F.3 Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line. **Recognize** examples of functions that are linear and non-linear. e.g., The function A = s^2 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. Note: Function notation is not required in Grade 8							
Use functions to model relationships between quantities.	NY-8.F.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. Note: Function notation is not required in Grade 8							
	NY-8.F.5 Describe qualitatively the functional relationship between two quantities by analyzing a graph. Sketch a graph that exhibits the qualitative features of a function that has been described **in a real-world context.** e.g., where the function is increasing or decreasing or when the function is linear or non-linear. Note: Function notation is not required in Grade 8							
Geometry								
Understand congruence and similarity using physical models, transparencies or geometry software.	NY-8.G.1 Verify experimentally the properties of rotations, reflections, and translations. **Notes: A translation displaces every point in the plane by the same distance (in the same direction) and can be described using a vector.** **A rotation requires knowing the center/point of rotation and the measure/direction of the angle of rotation. A line reflection requires a line and the knowledge of perpendicular bisectors.**							
	NY-8.G.1a **Verify experimentally** lines are **mapped** to lines, and line segments to line segments of the same length.							

Eighth Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	NY-8.G.1b **Verify experimentally** angles are **mapped** to angles of the same measure.							
	NY-8.G.1c **Verify experimentally** parallel lines are **mapped** to parallel lines							
	NY-8.G.2 **Know** that a two-dimensional figure is congruent to another if the **corresponding angles are congruent and the corresponding sides are congruent. Equivalently, two two dimensional figures are congruent if one is the image of the other after a sequence of rotations, reflections, and translations.** Given two congruent figures, describe a sequence that **maps** the congruence between them **on the coordinate plane.**							
	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.**							
	NY-8.G.4 **Know** that a two-dimensional figure is similar to another if the **corresponding angles are congruent and the corresponding sides are in proportion. Equivalently, two two-dimensional figures are similar if one is the image of the other after a sequence of rotations, reflections, translations, and dilations.** Given two similar two-dimensional figures, describe a sequence that **maps** the similarity between them **on the coordinate plane. Note: With dilation, the center and scale factor must be specified**							
	NY-8.G.5 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. e.g., Arrange three copies of the same triangle so that the three angles appear to form a line, and give an argument in terms of transversals why this is so. **Note: This standard does not include formal geometric proof. Multiple representations may be used to demonstrate understanding.**							

Eighth Grade NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
Understand and apply the Pythagorean Theorem.	NY-8.G.6 **Understand** a proof of the Pythagorean Theorem and its converse							
	NY-8.G.7 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.							
	NY-8.G.8 Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.							
Solve real-world and mathematical problems involving volume of cylinders, cones and spheres.	NY-8.G.9 **Given** the formulas for the volume of cones, cylinders, and spheres, solve mathematical and real-world problems.							
Statistics and Probability								
Investigate patterns of association in bivariate data.	NY-8.SP.1 Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.							
	NY-8.SP.2 **Understand** 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.							
	NY-8.SP.3 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. e.g., 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.							

Algebra I NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
Number and Quantity The Real Number System								
Use properties of rational and irrational numbers.	**AI-N.RN.3 Use properties and operations to understand the different forms of rational and irrational numbers.** **a.) Perform all four arithmetic operations and apply properties to generate equivalent forms of rational numbers and square roots.** **Note: Tasks include rationalizing numerical denominators of the form ⁄√ where a is an integer and b is a natural number.** b.) **Categorize** the sum or product of rational or irrational numbers. ● The sum and product of two rational numbers is rational. ● The sum of a rational number and an irrational number is irrational. ● The product of a nonzero rational number and an irrational number is irrational. ● **The sum and product of two irrational numbers could be either rational or irrational.**							
Number and Quantity Quantities								
Reason quantitatively and use units to solve problems. ★	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.							
	AI-N.Q.3 Choose a level of accuracy appropriate to limitations on measurement and context when reporting quantities							
Algebra Seeing Structure in Expressions								
Interpret the structure of expressions.	AI-A.SSE.1 Interpret expressions that represent a quantity in terms of its context. ★							
	AI-A.SSE.1a Write the standard form of a given polynomial and identify the terms, coefficients, degree, leading coefficient, and constant term.							

Algebra I NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	AI-A.SSE.1b Interpret expressions by viewing one or more of their parts as a single entity. e.g., Interpret $(1 + rr)$^nn as the product of P and a factor not depending on P. **Note: This standard is a fluency expectation for Algebra I. Fluency in transforming expressions and chunking (seeing parts of an expression as a single object) is essential in factoring, completing the square, and other mindful algebraic calculations.**							
	AI-A.SSE.2 **Recognize** and use the structure of an expression to identify ways to rewrite it. (Shared standard with Algebra II) e.g., $xx^3 - xx^2 - xx = xx(xx^2 - xx - 1)$ $53^2 - 47^2 = (53 + 47)(53 - 47)$ $16xx^2 - 36 = (4xx)^2 - (6)^2 = (4xx + 6)(4xx - 6) = 4(2xx + 3)(2xx - 3)$ or $16xx^2 - 36 = 4(4xx^2 - 9) = 4(2xx + 3)(2xx - 3)$ $-2xx^2 + 8xx + 10 = -2(xx^2 - 4xx - 5)$ $= -2(xx - 5)(xx + 1)$ $xx^4 + 6xx^2 - 7 = (xx^2 + 7)(xx^2 - 1)$ $= (xx^2 + 7)(xx + 1)(xx - 1)$ Note: Algebra I expressions are limited to numerical and polynomial expressions in one variable. **Use factoring techniques such as factoring out a greatest common factor, factoring the difference of two perfect squares, factoring trinomials of the form $aaaa^{22} + bbaa + cc$ with a lead coefficient of 1, or a combination of methods to factor completely.** Factoring will not involve factoring by grouping and factoring the sum and difference of cubes.							
Write expressions in equivalent forms to reveal their characteristics. ★	AI-A.SSE.3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. (Shared standard with Algebra II)							

Algebra I NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	AI-A.SSE.3c Use the properties of exponents to rewrite exponential expressions. (Shared standard with Algebra II) $3^{2xx} = (3^2)^2 = 9^{xx}$ $3^{2xx+3} = 3^{2xx} \cdot 3^3 = 9^{xx} \cdot 27$ Note: Exponential expressions will include those with integer exponents, **as well as those whose exponents are linear expressions. Any linear term in those expressions will have an integer coefficient. Rational exponents are an expectation for Algebra II.**							
Algebra **Arithmetic with Polynomials and Rational Expressions**								
Perform arithmetic operations on polynomials.	AI-A.APR.1 Add, subtract, and multiply polynomials and recognize that the result of the operation is also a polynomial. This forms a system analogous to the integers. **Note: This standard is a fluency recommendation for Algebra I. Fluency in adding, subtracting and multiplying polynomials supports students throughout their work in algebra, as well as in their symbolic work with functions.**							
Understand the relationship between zeros and factors of polynomials.	AI-A.APR.3 Identify zeros of polynomial functions when suitable factorizations are available. (Shared standard with Algebra II) Note: Algebra I tasks will focus on identifying the zeros of quadratic and cubic polynomial functions. For tasks that involve finding the zeros of cubic polynomial functions, the linear and quadratic factors of the cubic polynomial function will be given (e.g., find the zeros of $(xx) = (xx - 2)(xx^2 - 9)$).							
Algebra **Creating Equations**								
Create equations that describe numbers or relationships. ★	AI-A.CED.1 Create equations and inequalities in one variable to **represent a real-world context.** (Shared standard with Algebra II) Notes: ● **This is strictly the development of the model (equation/inequality).**							

Algebra I NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	● **Limit equations to linear, quadratic, and exponentials of the form $(aa) = aa(bb)^{aa}$ where $aa > 0$ and $bb > 00\ (bb \neq 11)$.** ● **Work with geometric sequences may involve an exponential equation/formula of the form $aa_{nn} = aaaa^{nn-11}$, where a is the first term and r is the common ratio.** ● **Inequalities are limited to linear inequalities.** ● Algebra I tasks do not involve compound inequalities.							
	AI-A.CED.2 Create equations and linear inequalities in two variables to represent a **real-world context.** Notes: ● **This is strictly the development of the model (equation/inequality).** ● **Limit equations to linear, quadratic, and exponentials of the form $(aa) = aa(bb)^{aa}$ where $aa > 0$ and $bb > 00\ (bb \neq 11)$.**							
	AI-A.CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. e.g., Represent inequalities describing nutritional and cost constraints on combinations of different foods.							
	AI-A.CED.4 Rewrite formulas to highlight a quantity of interest, using the same reasoning as in solving equations. e.g., Rearrange Ohm's law V = IR to highlight resistance R.							
Algebra **Reasoning with Equations and Inequalities**								
Solve equations and inequalities in one variable.	AI-A.REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. **<u>Note:</u> Algebra I tasks do not involve solving compound inequalities.**							
	AI-A.REI.4 Solve quadratic equations in one variable. <u>Note:</u> Solutions may include simplifying radicals.							

Algebra I NYS Next Generation Math Standards
Priority Standard or **Support Standard**

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	AI-A.REI.4a Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(xx - pp)^2 = qq$ that has the same solutions. **Understand** that the quadratic formula is a derivative of this process. **Note: When utilizing the method of completing the square, the quadratic's leading coefficient will be 1 and the coefficient of the linear term will be limited to even (after the possible factoring out of a GCF). Students in Algebra I should be able to complete the square in which manipulating the given quadratic equation yields an integer value for q.**							
	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 $xxxx$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.**							
Solve systems of equations.	STANDARD REMOVED							
	AI-A.REI.6a Solve systems of linear equations in two variables **both algebraically and graphically.** **Note: Algebraic methods include both elimination and substitution.**							
	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)**							

Algebra I NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
Represent and solve equations and inequalities graphically.	AI-A.REI.10 Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane. **Note: Graphing linear equations is a fluency recommendation for Algebra I. Students become fluent in solving characteristic problems involving the analytic geometry of lines, such as writing down the equation of a line given a point and a slope. Such fluency can support them in solving less routine mathematical problems involving linearity; as well as modeling linear phenomena.**							
	AI-A.REI.11 Given the equations $yy = ff(xx)$ & $yy = gg(xx)$: i) **recognize** that each x-coordinate of the intersection(s) is the solution to the equation $ff(xx) = gg(xx)$; ii)find the solutions approximately using technology to graph the functions or make tables of values; and iii) **interpret the solution in context. ★** (Shared standard with Algebra II) **Notes: Algebra I tasks are limited to cases where f(x) and g(x) are linear, polynomial, absolute value, and exponential functions of the form $(aa) = aa(bb)^{aa}$ where $aa > 0$ and $bb > 00$ $(bb \neq 11)$.** **Students should be taught to find the solutions approximately by using technology to graph the functions *and* by making tables of values. When solving any problem, students can choose either strategy.**							
	AI-A.REI.12 Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes. **Note: Graphing linear equations is a fluency recommendation for Algebra I. Students become fluent in solving characteristic problems involving the analytic geometry of lines, such as writing down the equation of a line given a point and a slope. Such fluency can support them in solving less routine mathematical problems involving linearity; as well as modeling linear phenomena (including modeling using systems of linear inequalities in two variables).**							

Algebra I NYS Next Generation Math Standards

Priority Standard or **Support Standard**

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
Functions Interpreting Functions								
Understand the concept of a function and use function notation.	AI-F.IF.1 Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then (xx) denotes the output of ff corresponding to the input xx. The graph of f is the graph of the equation $= ff(xx)$. **Note: Domain and range can be expressed using inequalities, set builder notation, verbal description, and interval notations for functions of subsets of real numbers to the real numbers.**							
	AI-F.IF.2 Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.							
	AI-F.IF.3 Recognize that a sequence is a function whose domain is a subset of the integers. (Shared standard with Algebra II) Notes: ● **Sequences (arithmetic and geometric) will be written explicitly and only in subscript notation.** ● **Work with geometric sequences may involve an exponential equation/formula of the form $aa_{nn} = aaaa^{nn-11}$, where aa is the first term and aa is the common ratio.**							
Interpret functions that arise in applications in terms of the context. ★	AI-F.IF.4 For a function that models a relationship between two quantities: i) interpret key features of graphs and tables in terms of the quantities; and ii) sketch graphs showing key features given a verbal description of the relationship. (Shared standard with Algebra II) Notes: ● Algebra I key features include the following: intercepts, **zeros;** intervals where the function is increasing, decreasing, positive, or negative; maxima, minima; and symmetries. ● Tasks have a real-world context and are limited to the following functions: linear, quadratic, square root, piece-wise defined (including step and absolute value), and **exponential functions of the form $(aa) = aa(bb)^{aa}$ where $aa > 0$ and $bb > 00$ $(bb \neq 11)$.**							

Algebra I NYS Next Generation Math Standards

Priority Standard or Support Standard

Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	AI-F.IF.5 **Determine** the domain of a function from its graph and, where applicable, **identify** the appropriate domain for a function in context.							
	AI-F.IF.6 Calculate and interpret the average rate of change of a function over a specified interval. (Shared standard with Algebra II) Notes: ● Functions may be presented by function notation, a table of values, or graphically. ● Algebra I tasks have a real-world context and are limited to the following functions: linear, quadratic, square root, piece-wise defined (including step and absolute value), and exponential functions of the **form** $(aa) = aa(bb)^{aa}$ **where** $aa > 0$ **and** $bb > 00$ $(bb \neq 11)$**.**							
Analyze functions using different representations.	AI-F.IF.7 Graph functions and show key features of the graph by hand and by using technology where appropriate. ★ (Shared standard with Algebra II)							
	AI-F.IF.7a Graph linear, quadratic, and **exponential** functions and show key features. Notes: ● Algebra I key features include the following: intercepts, **zeros; intervals where the function is increasing, decreasing, positive, or negative; maxima, minima; and symmetries.** **● Exponential functions are of the form** $ff(aa) = (bb)^{aa}$ **where** $aa > 0$ **and** $bb > 00$ $(bb \neq 11)$**.** ● **Graphing linear functions is a fluency recommendation for Algebra I. Students become fluent in solving characteristic problems involving the analytic geometry of lines, such as writing down the equation of a line given a point and a slope. Such fluency can support them in solving less routine mathematical problems involving linearity; as well as modeling linear phenomena.**							
	AI-F.IF.7b Graph square root, and piecewise-defined functions, including step functions and absolute value functions and **show key features.** **<u>Note:</u> Algebra I key features include the following: intercepts, zeros; intervals where the function is increasing, decreasing, positive, or negative; maxima, minima; and symmetries.**							

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Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	AI-F.IF.8 Write a function in different but equivalent forms to reveal and explain different properties of the function. (Shared standard with Algebra II)							
	AI-F.IF.8a **For a quadratic function, use an algebraic process** to find zeros, maxima, minima, and symmetry of the graph, and interpret these in terms of context. **Note: Algebraic processes include but not limited to factoring, completing the square, use of the quadratic formula, and the use of the axis of symmetry.**							
	AI-F.IF.9 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). (Shared standard with Algebra II) Note: Algebra I tasks are limited to the following functions: linear, quadratic, square root, piecewise defined (including step and absolute value), and **exponential functions of the form** $(aa) = aa(bb)^{aa}$ **where** $aa > 0$ **and** $bb > 00$ $(bb \neq 11)$**.**							
Functions Building Functions								
Build a function that models a relationship between two quantities.	AI-F.BF.1 Write a function that describes a relationship between two quantities. ★ (Shared standard with Algebra II)							
	AI-F.BF.1a **Determine a function from context. Define a sequence explicitly or steps for calculation from a context.** (Shared standard with Algebra II) Notes: ● Algebra I tasks are limited to linear, quadratic **and exponential functions of the form** $(aa) = aa(bb)^{aa}$ **where** $aa > 0$ **and** $bb > 00$ $(bb \neq 11)$**).** ● **Work with geometric sequences may involve an exponential equation/formula of the form** $aa_{nn} = aaaa^{nn-11}$**, where a is the first term and r is the common ratio.** ● Sequences will be written explicitly and only in subscript notation.							

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Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
Build new functions from existing functions.	AI-F.BF.3a Using $ff(xx) + kk$, $kk\,ff(xx)$, and $ff(xx + kk)$: i) identify the effect on the graph when replacing $ff(xx)$ by $ff(xx) + kk$, $kk\,ff(xx)$, and $ff(xx + kk)$ for specific values of k (both positive and negative); ii) find the value of k given the graphs; iii) **write a new function using the value of k;** and iv) use technology to experiment with cases and explore the effects on the graph. (Shared standard with Algebra II) **Note: Tasks are limited to linear, quadratic, square root, and absolute value functions; and exponential functions are of the form $ff(aa) = aa(bb)^{aa}$ where $aa > 0$ and $bb > 00$ $(bb \neq 11)$.**							
Functions Linear, Quadratic and Exponential Models								
Construct and compare linear, quadratic and exponential models and solve problems	AI-F.LE.1 Distinguish between situations that can be modeled with linear functions and with exponential functions.							
	AI-F.LE.1a **Justify** that a function is linear because it grows by equal differences over equal intervals, and that a function is exponential because it grows by equal factors over equal intervals.							
	AI-.F.LE.1b Recognize situations in which one quantity changes at a constant rate per unit interval relative to another, **and therefore can be modeled linearly.** **e.g., A flower grows two inches per day.**							
	AI-F.LE.1c Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another, **and therefore can be modeled exponentially.** **e.g., A flower doubles in size after each day.**							
	AI-F.LE.2 Construct a linear or exponential function **symbolically** given: i) a graph; ii) a description of the relationship; iii) two input-output pairs (include reading these from a table). (Shared standard with Algebra II) Note: Tasks are limited to constructing linear and exponential functions in simple context (not multi- step).							

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Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	AI-F.LE.3 Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.							
Interpret expressions for functions in terms of the situation they model.	AI-F.LE.5 Interpret the parameters in a linear or exponential function in terms of a context. (Shared standard with Algebra II) Note: Tasks have a real-world context. **Exponential functions are limited to those with domains in the integers and are of the form $ff(aa) = aa(bb)^{aa}$ where > 0 and $bb > 00\ (bb \neq 11)$.**							
Statistics and Probability Interpreting Categorical and Quantitative Data								
Summarize, represent, and interpret data on a single count or measurement variable.	AI-S.ID.1 Represent data with plots on the real number line (dot plots, histograms, and box plots).							
	AI-S.ID.2 Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (inter-quartile range, sample standard deviation) of two or more different data sets. **Note: Values in the given data sets will represent samples of larger populations. The calculation of standard deviation will be based on the sample standard deviation formula.** $ss = \sqrt{\frac{\Sigma(xx - xx)^2}{nn - 1}}$ **The sample standard deviation calculation will be used to make a statement about the population standard deviation from which the sample was drawn.**							
	AI-S.ID.3 Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).							

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Summarize, represent, and interpret data on two categorical and quantitative variables.	AI-S.ID.5 Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.							
	AI-S.ID.6 Represent bivariate data on a scatter plot, and describe how the variables' values are related. **<u>Note:</u> It's important to keep in mind that the data must be linked to the same "subjects," not just two unrelated quantitative variables; being careful not to assume a relationship between the actual variables (correlation/ causation issue).**							
	AI-S.ID.6a Fit a function to real-world data; use functions fitted to data to solve problems in the context of the data. (Shared standard with Algebra II) Note: **Algebra I emphasis is on linear models** and includes the regression capabilities of the calculator.							
Interpret linear models.	AI-S.ID.7 Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.							
	AI-S.ID.8 Calculate (using technology) and interpret the correlation coefficient of a linear fit.							
	AI-S.ID.9 Distinguish between correlation and causation.							

Geometry NYS Next Generation Math Standards

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Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	Geometry Congruence							
Experiment with transformations in the plane.	GEO-G.CO.1 Know precise definitions of angle, circle, perpendicular lines, parallel lines, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc **as these exist within a plane**.							
	GEO-G.CO.2 Represent transformations **as geometric functions** that take points in the plane as inputs and give points as outputs. Compare transformations that preserve distance and angle **measure** to those that do not. Note: Instructional strategies may include drawing tools, graph paper, transparencies and software programs.							
	GEO-G.CO.3 Given a **regular or irregular polygon**, describe the rotations and reflections (**symmetries**) that **map the polygon** onto itself. Note: The inclusive definition of a trapezoid will be utilized, which defines a trapezoid as “A quadrilateral with at least one pair of parallel sides.”							
	GEO-G.CO.4 Develop definitions of rotations, reflections, and translations in terms of **points** , angles, circles, perpendicular lines, parallel lines, and line segments. **Notes: Includes point reflections.** **A translation displaces every point in the plane by the same distance (in the same direction) and can be described using a vector.** **A rotation requires knowing the center (point) and the measure/direction of the angle of rotation.** **A line reflection requires a line and the knowledge of perpendicular bisectors.**							
	GEO-G.CO.5 Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure. Specify a sequence of transformations that will carry a given figure onto another. Notes: Instructional strategies may include graph paper, tracing paper, and geometry software. **Includes point reflections.** **A translation displaces every point in the plane by the same distance (in the same direction) and can be described using a vector.**							

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Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	A rotation requires knowing the center (point) and the measure/direction of the angle of rotation. A line reflection requires a line and the knowledge of perpendicular bisectors. Singular transformations that are equivalent to a sequence of transformations may be utilized, such as a glide reflection. However, glide reflections are not an expectation of the course.							
Understand congruence in terms of rigid motions	GEO-G.CO.6 Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure. Given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent. Notes: **A translation displaces every point in the plane by the same distance (in the same direction) and can be described using a vector. A rotation requires knowing the center (point) and the measure/direction of the angle of rotation. A line reflection requires a line and the knowledge of perpendicular bisectors.**							
	GEO-G.CO.7 Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.							
	GEO-G.CO.8 Explain how the criteria for triangle congruence (ASA, SAS, SSS, **AAS and HL (Hypotenuse Leg))** follow from the definition of congruence in terms of rigid motions.							
Prove Geometric Theorems	GEO-G.CO.9 Prove and **apply** theorems about lines and angles. **Note: Include multi-step proofs and algebraic problems built upon these concepts. Examples** of theorems **include but are not limited to:** ● Vertical angles are congruent. ● If two parallel lines are cut by a transversal, then the alternate interior angles are congruent. ● The points on a perpendicular bisector are equidistant from the endpoints of the line segment.							

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Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	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							
	GEO-G.CO.11 Prove and **apply** theorems about parallelograms. **Notes: Include multi-step proofs and algebraic problems built upon these concepts.** **The inclusive definition of a trapezoid will be utilized, which defines a trapezoid as "A quadrilateral with at least one pair of parallel sides."** **Examples** of theorems **include but are not limited to:** ● A diagonal divides a parallelogram into two congruent triangles. ● Opposite sides/angles of a parallelogram are congruent. ● The diagonals of parallelogram bisect each other. ● If the diagonals of quadrilateral bisect each other, then quadrilateral is a parallelogram. ● If the diagonals of a parallelogram are congruent then the parallelogram is a rectangle. **Additional theorems covered allow for proving that a given quadrilateral is a particular parallelogram (rhombus, rectangle, square) based on given properties.**							

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Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
Make Geometric Constructions	GEO-G.CO.12 Make, **justify and apply formal** geometric constructions. Notes: **Examples** of constructions **include but are not limited to:** ● Copy segments and angles. ● Bisect segments and angles. ● Construct perpendicular lines including through a point on or off a given line. ● Construct a line parallel to a given line through a point not on the line. ● Construct a triangle with given lengths. ● **Construct points of concurrency of a triangle (centroid, circumcenter, incenter, and orthocenter).** ● **Construct the inscribed circle of a triangle.** ● **Construct the circumscribed circle of a triangle.** ● **Constructions of transformations. (see GEO-G.CO.5)** **This standard is a fluency recommendation for Geometry. Fluency with the use of construction tools, physical and computational, helps students draft a model of a geometric phenomenon and can lead to conjectures and proofs.**							
	GEO-G.CO.13 Make and **justify** the constructions for inscribing an equilateral triangle, a square and a regular hexagon in a circle.							
Geometry Similarity, Right Triangles and Trigonometry								
Understand similarity in terms of similarity transformations.	GEO-G.SRT.1 Verify experimentally the properties of dilations given by a center and a scale factor.							
	GEO-G.SRT.1a **Verify experimentally** that dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged.							
	GEO-G.SRT.1b **Verify experimentally** that the dilation of a line segment is longer or shorter in the ratio given by the scale factor.							

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Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	GEO-G.SRT.2 Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar. Explain using similarity transformations that similar triangles have equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides. **Notes:** **The center and scale factor of the dilation must always be specified with dilation.** **A translation displaces every point in the plane by the same distance (in the same direction) and can be described using a vector.** **A rotation requires knowing the center (point) and the measure/direction of the angle of rotation.** **A line reflection requires a line and the knowledge of perpendicular bisectors.**							
	GEO-G.SRT.3 Use the properties of similarity transformations to establish the AA~, **SSS~, and SAS~** criterion for two triangles to be similar.							
Prove theorems Involving similarity.	GEO-G.SRT.4 Prove and **apply similarity theorems** about triangles. **<u>Notes:</u> Include multi-step proofs and algebraic problems built upon these concepts.** **Examples** of theorems **include but are not limited to:** ● If a line parallel to one side of a triangle intersects the other two sides of the triangle, then the line divides these two sides proportionally (and conversely). ● The length of the altitude drawn from the vertex of the right angle of a right triangle to its hypotenuse is the geometric mean between the lengths of the two segments of the hypotenuse. ● The centroid of the triangle divides each median in the ratio 2:1.							

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Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	GEO-G.SRT.5 Use congruence and similarity criteria for triangles to: GEO-G.SRT.5a Solve problems **algebraically and geometrically.** GEO-G.SRT.5b Prove relationships in geometric figures. Notes: ASA, SAS, SSS, AAS, and Hypotenuse-Leg (HL) theorems are valid criteria for triangle congruence. AA~, SAS~, and SSS~ are valid criteria for triangle similarity. **This standard is a fluency recommendation for Geometry. Fluency with the triangle congruence and similarity criteria will help students throughout their investigations of triangles, quadrilaterals, circles, parallelism, and trigonometric ratios. These criteria are necessary tools in many geometric modeling tasks.**							
Define trigonometric ratios and solve problems involving right triangles.	GEO-G.SRT.6 Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of **sine, cosine and tangent** ratios for acute angles.							
	GEO-G.SRT.7 Explain and use the relationship between the sine and cosine of complementary angles							
	GEO-G.SRT.8 Use **sine, cosine, tangent,** the Pythagorean Theorem and **properties of special right triangles** to solve right triangles in applied problems. ★ **Note: Special right triangles refer to the 30-60-90 and 45-45-90 triangles.**							
Apply trigonometry to general triangles.	**GEO-G.SRT.9 Justify and apply the formula $AA = \frac{1}{2}aaaa\ ssssss(CC)$ to find the area of any triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.**							

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Geometry Circles								
Understand and apply theorems about circles.	GEO-G.C.1 Prove that all circles are similar.							
	GEO-G.C.2a Identify, describe **and apply relationships between the angles and their intercepted arcs** of a circle. GEO-G.C.2b. Identify, describe and **apply relationships among radii, chords, tangents, and secants** of a circle. **Note: These relationships that pertain to the circle may be utilized to prove other relationships in geometric figures, e.g., the opposite angles in any quadrilateral inscribed in a circle are supplements of each other.** **Also includes algebraic problems built upon these concepts.**							
	STANDARD REMOVED **Constructing the incenter and circumcenter of a circle has been embedded in standard GEO-G.CO.12. The properties of the angles for a quadrilateral inscribed in a circle is now embedded in standard GEO-G.C.2a**							
Find arc lengths and area of sectors of circles.	**GEO-G.C.5 Using proportionality, find one of the following given two others; the central angle, arc length, radius or area of sector.** **<u>Note:</u> Angle measure is in degrees.**							
Geometry Expressing Geometric Properties with Equations								
Translate between the geometric description and the equation of a conic section.	GEO-G.GPE.1a Derive the equation of a circle of given center and radius using the Pythagorean Theorem. Find the center and radius of a circle, given the equation of the circle. **<u>Notes:</u>** • **Finding the center and radius may involve completing the square. The completing the square expectation for Geometry follows Algebra I: leading coefficients will be 1 (after possible removal of GCF) and the coefficients of the linear terms will be even.**							

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	● **Completing the square may yield a fractional radius** **GEO-G.GPE.1b Graph circles given their equation.** **<u>Note:</u> For circles being graphed, the center will be an ordered pair of integers and the radius a positive integer.**							
Use coordinates to prove simple geometric theorems algebraically.	GEO-G.GPE.4 On the coordinate plane, algebraically prove geometric theorems **and properties.** <u>Notes:</u> **Examples include but not limited to:** ● Given points and/or characteristics, prove or disprove a polygon is a specified quadrilateral or triangle based on its properties. ● Given a point that lies on a circle with a given center, prove or disprove that a specified point lies on the same circle. **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.**							
	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.**							
	GEO-G.GPE.6 Find the point on a directed line segment between two given points that partitions the segment in a given ratio. **<u>Note:</u> Midpoint formula is a derivative of this standard.**							

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Cluster	New York State Next Generation Math Standards	R	E	A	L	Total	Data	Vert
	GEO-G.GPE.7 Use coordinates to compute perimeters of polygons and areas of triangles and rectangles. ★ **Note: 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.**							
Geometry Geometric Measurement and Dimension								
Explain volume formulas and use them to solve problems.	GEO-G.GMD.1 **Provide** informal arguments for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone.							
	GEO-G.GMD.3 Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. ★							
Visualize relationships between two dimensional and three-dimensional objects.	GEO-G.GMD.4 Identify the shapes of **plane sections** of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects. **Note: Plane sections are not limited to being parallel or perpendicular to the base.**							
Geometry Modeling with Geometry								
Understand solving equations as a process of reasoning and explain the reasoning.	GEO-G.MG.1 Use geometric shapes, their measures, and their properties to describe objects. ★							
	GEO-G.MG.2 Apply concepts of density based on area and volume of geometric figures in modeling situations. ★							
	GEO-G.MG.3 Apply geometric methods to solve design problems. ★ **Note: Applications may include designing an object or structure to satisfy constraints such as area, volume, mass and cost.**							

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Number and Quantity The Real Number System								
Extend the properties of exponents to rational exponents.	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 $(5^{\frac{1}{3}})^3 = 5^{\frac{1}{3}\cdot 3}$ to hold, so $(5^{\frac{1}{3}})^3 = 5^{\frac{1}{3}\cdot 3}$ must equal 5.							
	AII-N.RN.2 Convert between radical expressions and expressions with rational exponents using the properties of exponents. **Note: All radical expressions involving variables assume the variables are representing positive numbers. Includes expressions with variable factors, such as $\sqrt[33]{222222^{55}yy^{33}}$, being equivalent to $(222222^{55}yy^{33})^{\frac{1}{33}}$ which equals $3322_{33}yy$.**							
Number and Quantity The Complex Number System								
Perform arithmetic operations with complex numbers.	AII-N.CN.1 Know there is a complex number ii such that $ii2 = -1$, and every complex number has the form $aa + bbii$ with aa and bb real.							
	AII-N.CN.2 Use the relation $ii2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers. **Note: Tasks include simplifying powers of ii.**							
Use complex numbers in polynomial identities and equations.	STANDARD REMOVED							
Algebra Seeing Structure in Expressions								
Interpret the structure of expressions.	AII-A.SSE.2 **Recognize** and use the structure of an expression to identify ways to rewrite it. (Shared standard with Algebra I) e.g., • **$881122^{44} - 1111yy^{44}$ is equivalent to $(9922^{22})^{22} - (44yy^{22})^{22}$ or $(9922^{22} - 44yy^{22})(9922^{22} + 44yy^{22})$ or $(3322 + 22yy)(3322 - 22yy)(9922^{22} + 44yy^{22})$**							

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	• $\frac{22^{22}+44}{22^{22}+33}$ **is equivalent to** $\frac{(22^{22}+33)+11}{22^{22}+33} = \frac{22^{22}+33}{22^{22}+33} + \frac{11}{22^{22}+33} = 11 + \frac{11}{22^{22}+33}$ • $3322^{33} - 5522^{22} - 448822 + 8888$ **is equivalent to** $3322(22^{22} - 1111) - 55(22^{22} - 1111)$**, which when factored completely is** $(3322 - 55)(22 + 44)(22 - 44)$ Notes: ● Includes factoring by grouping and **factoring the sum and difference of cubes.** ● Tasks are limited to polynomial, rational, or exponential expressions. **Quadratic expressions include leading coefficients other than 1.** ● **This standard is a fluency expectation for Algebra II. The ability to see structure in expressions and to use this structure to rewrite expressions is a key skill in everything from advanced factoring (e.g., grouping) to summing series, to rewriting of rational expressions, to examining the end behavior of the corresponding rational function.**							
Write expressions in equivalent forms to reveal their characteristics. ★	AII-A.SSE.3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. (Shared standard with Algebra II)							
	AII-A.SSE.3a Factor a quadratic expression to reveal the zeros of the function it defines.							
	AII-A.SSE.3c Use the properties of exponents to **rewrite** exponential expressions. (Shared standard with Algebra I) Note: Tasks include rewriting exponential expressions with rational coefficients in the exponent.							
Algebra **Arithmetic with Polynomials and Rational Expressions**								
Understand the relationship between zeros and factors of polynomials.	AII-A.APR.2 Apply the Remainder Theorem: For a polynomial $pp(xx)$ and a number a, the remainder on division by $xx - aa$ is $pp(aa)$, so $pp(aa) = 0$ if and only if $(xx - aa)$ is a factor of $pp(xx)$							
	AII-A.APR.3 Identify zeros of polynomial functions when suitable factorizations are available. (Shared standard with Algebra I)							

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Rewrite rational expressions	AII-A.APR.6 Rewrite simple rational expressions in different forms; write $(aa(xx))\ /\ (bb(xx))$ in the form $\overline{qq}(xx) + \frac{rr(xx)}{bb(xx)}$ where $aa(xx)$, $bb(xx)$, $qq(xx)$, and $rr(xx)$ are polynomials with the $rr(xx)$ less than the degree of $bb(xx)$. **Note: This standard is a fluency expectation for Algebra II. This standard sets an expectation that students will divide polynomials with remainders by inspection in simple cases. For example, one can view the rational expression $\frac{22+44}{(22+33)+11}$ as $\frac{22+33}{22+33}$ which is $+\frac{11}{22+33}$.**							
Algebra Creating Equations								
Create equations that describe numbers or relationships. ★	AII-A.CED.1 Create equations and inequalities in one variable to represent a real-world context. (Shared standard with Algebra I) **Note: This is strictly the development of the model (equation/inequality). Tasks include linear, quadratic, rational, and exponential functions.**							
Algebra Reasoning with Equations and Inequalities								
Understand solving equations as a process of reasoning and explain the reasoning.	AII-A.REI.1b Explain each step **when solving rational or radical equations** as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.							
	AII-A.REI.2 Solve rational and radical equations in one variable, identify extraneous solutions, and explain how they arise. **Note: Radical equations may include but are not limited to those of the form $\sqrt[33]{22_{55}} = 88$ *and* $\sqrt[33]{3322_{44}} + 55 = 8811$**							
Solve equations and inequalities in one variable.	AII-A.REI.4 Solve quadratic equations in one variable. **Note: Solutions may include simplifying radicals.**							
	AII-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.** Write complex solutions in $aa + bbii$ form. (Shared standard with Algebra I)							

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	Notes: ● **An example for inspection would be $22^{22} = -8811$, where a student should know that the solutions would include $\pm 99ii$.** ● **An example where students need to factor out a leading coefficient while completing the square would be $4422^{22} + 8822 - 99 = 88$.**							
Solve systems of equations.	AII-A.REI.7b Solve a system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. **(Shared standard with Algebra I)** **Note: Conics are limited to parabolas and circles**							
Represent and solve equations and inequalities graphically.	AII-A.REI.11 Given the equations $yy = ff(xx)$ and $yy = gg(xx)$: i) **recognize** that each x-coordinate of the intersection(s) is the solution to the equation $ff(xx) = gg(xx)$; ii) find the solutions approximately using technology to graph the functions or make tables of values; and **iii) find the solution of $ff(22) < gg(22)$ or f$(22) \leq gg(22)$ graphically; and** **iv) interpret the solution in context. ★** (Shared standard with Algebra I) Note: Tasks include cases where (xx) and/or $gg(xx)$ are linear, polynomial, absolute value, **square root, cube root, trigonometric**, exponential, and logarithmic functions.							
Functions Interpreting Functions								
Understand the concept of a function and use function notation.	AII-F.IF.3 Recognize that a sequence is a function whose domain is a subset of the integers. (Shared standard with Algebra I) Notes: ● In Algebra II, sequences will be defined/written recursively and explicitly **in subscript notation**. ● **This standard is a fluency expectation for Algebra II. Fluency in translating between recursive definitions and closed forms is helpful when dealing with many problems involving sequences and series, with applications ranging from fitting functions to tables to problems in finance.**							

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Interpret functions that arise in applications in terms of the context. ★	AII-F.IF.4 For a function that models a relationship between two quantities: i) interpret key features of graphs and tables in terms of the quantities; and ii) sketch graphs showing key features given a verbal description of the relationship. (Shared standard with Algebra I) <u>Notes:</u> ● Algebra II key features include: intercepts, **zeros;** intervals where the function is increasing, decreasing, positive, or negative; relative maxima and minima; symmetries; end behavior; and periodicity. ● Tasks may involve real-world context and may include polynomial, **square root, cube root,** exponential, logarithmic, and trigonometric functions.							
	AII-F.IF.6 Calculate and interpret the average rate of change of a function over a specified interval. (Shared standard with Algebra I) <u>Notes:</u> ● Functions may be presented by **function notation,** a table of values, or graphically. ● Algebra II tasks have a real-world context and may involve polynomial, **square root, cube root,** exponential, logarithmic, and trigonometric functions.							
Analyze functions using different representations	AII-F.IF.7 Graph functions and show key features of the graph by hand and by using technology where appropriate. ★ (Shared standard with Algebra I)							
	AII-F.IF.7c Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.							
	AII-F.IF.7e Graph **cube root,** exponential and logarithmic functions, showing intercepts and end behavior; and trigonometric functions, showing period, midline, and amplitude. <u>Note:</u> Trigonometric functions include sin(x), cos(x) and tan(x)							

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	AII-F.IF.8 Write a function in different but equivalent forms to reveal and explain different properties of the function. (Shared standard with Algebra I)							
	AII-F.IF.8b Use the properties of exponents to interpret exponential functions, and classify them as representing exponential growth or decay. **Note: Tasks also include real world problems that involve compounding growth/decay** $(AA = (1 + (rr/nn))^{nnnn})$ **and continuous compounding growth/ decay** $(\boldsymbol{AA} = PP\ ee^{rrrr})$**.**							
	AII-F.IF.9 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). (Shared standard with Algebra I) Note: Tasks may involve polynomial, **square root, cube root,** exponential, logarithmic, and trigonometric functions.							
Functions Building Functions								
Build a function that models a relationship between two quantities.	AII-F.BF.1 Write a function that describes a relationship between two quantities. (Shared standard with Algebra I)							
	AII-F.BF.1a **Determine a function from context.** Determine an explicit expression, a recursive process, or steps for calculation from a context. (Shared standard with Algebra I) Notes: ● Tasks may involve linear functions, quadratic functions, and exponential functions. ● In Algebra II, sequences will be defined/written recursively and explicitly **in subscript notation**							
	AII-F.BF.1b Combine standard function types using arithmetic operations. e.g., Build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.							

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	AII-F.BF.2 Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms. Note: In Algebra II, sequences will be defined/written recursively and explicitly **in subscript notation.**							
Build new functions from existing functions.	AII-F.BF.3a Using $ff(xx) + kk$, $kk\,ff(xx)$, and $ff(xx + kk)$: i) identify the effect on the graph when replacing $ff(xx)$ by $ff(xx) + kk$, $kk\,ff(xx)$, and $ff(xx + kk)$ for specific values of k (both positive and negative); ii) find the value of k given the graphs; **iii) write a new function using the value of k;** and iv) use technology to experiment with cases and explore the effects on the graph. (Shared standard with Algebra I) Note: Algebra II tasks may involve polynomial, **square root, cube root,** exponential, logarithmic, and trigonometric functions.							
	AII-F.BF.4a Find the inverse of a one-to-one function both algebraically and **graphically**							
	AII-F.BF.5a Understand inverse relationships between exponents and logarithms algebraically and graphically.							
	AII-F.BF.6 Represent and evaluate the sum of a finite arithmetic or finite geometric series, using summation (sigma) notation.							
	AII-F.BF.7 Explore the derivation of the formulas for finite arithmetic and finite geometric series. Use the formulas to solve problems. ★							
Functions Linear, Quadratic and Exponential Models								
Construct and compare linear, quadratic and exponential models and solve problems.	AII-F.LE.2 Construct a linear or exponential function symbolically given: i) a graph; ii) a description of the relationship; iii) two input-output pairs (include reading these from a table). (Shared standard with Algebra I)							
	AII-F.LE.4 Use logarithms to solve exponential equations, such as $aabb^{ccrr} = dd$ (where a, b, c, and d are real numbers and $bb > 0$) and evaluate the logarithm using technology							

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Interpret expressions for functions in terms of the situation they model.	AII-F.LE.5 Interpret the parameters in a linear or exponential function in terms of a context. (Shared standard with Algebra I) Note: Algebra II tasks have a real-world context and exponential functions are not limited to integer domains.							
Functions Trigonometric Functions								
Extend the domain of trigonometric functions using the unit circle.	AII-F.TF.1 Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.							
	AII-F.TF.2 Apply concepts of the unit circle in the coordinate plane to calculate the values of the six trigonometric functions given angles in radian measure.							
	AII-F.TF.4 Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions. **Note: Focus of this standard is on cos(x), sin(x) and tan(x)**							
Model periodic phenomena with trigonometric functions.	AII-F.TF.5 Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, horizontal shift, and midline.							
Prove and apply trigonometric identities.	AII-F.TF.8 Prove the Pythagorean identity $ssiinn^2(\theta\theta) + ccccss^2(\theta\theta) = 1$. **Find the value of any of the six trigonometric functions given any other trigonometric function value and when necessary find the quadrant of the angle.**							
Statistics and Probability Interpreting Categorical and Quantitative Data								
Summarize, represent, and interpret data on a single count or measurement variable	**AII-S.ID.4a. Recognize whether or not a normal curve is appropriate for a given data set.** **AII-S.ID.4b If appropriate, determine population percentages using a graphing calculator for an appropriate normal curve.**							

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Summarize, represent, and interpret data on two categorical and quantitative variables.	AI-S.ID.6 Represent **bivariate data** on a scatter plot, and describe how the variables' values are related. **Note: It is important to keep in mind that the data must be linked to the same "subjects," not just two unrelated quantitative variables. Do not assume that an association between two variables implies that one causes another to change.**							
	AII-S.ID.6a Fit a function to real-world data; use functions fitted to data to solve problems in the context of the data. (Shared standard with Algebra I) **Note: Algebra II emphasis is on quadratic, exponential, and power models, including the regression capabilities of the calculator.**							
Statistics and Probability Making Inferences and Justifying Conclusions								
Understand and evaluate random processes underlying statistical experiments.	**AII-S.IC.2 Determine if a value for a sample proportion or sample mean is likely to occur based on a given simulation.** **<u>Note:</u> For the purposes of this course, if the statistic falls within two standard deviations of the mean (95% interval centered on the population parameter), then the statistic is considered likely (plausible, usual).**							
Make inferences and justify conclusions from sample surveys, experiments and observational studies.	AII-S.IC.3 Recognize the purposes of and differences among surveys, experiments, and observational studies. Explain how randomization relates to each.							
	AII-S.IC.4 Given a simulation model based on a sample proportion or mean, construct the 95% interval centered on the statistic (+/- two standard deviations) and determine if a suggested parameter is plausible.							
	AII-S.IC.6a Use the tools of statistics to draw conclusions from numerical summaries.							
	AII-S.IC.6b Use the language of statistics to critique claims from informational texts. For example, causation vs. correlation, bias, measures of center and spread.							

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Understand independence and conditional probability and use them to interpret data.	AII-S.CP.1 Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events (“or,” “and,” “not”).							
	AII-S.CP.4 Interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and calculate conditional probabilities.							
Use the rules of probability to compute probabilities of compound events in a uniform probability model.	AII-S.CP.7 Apply the Addition Rule, P(A or B) = P(A) + P(B) - P(A and B), and interpret the answer in terms of the model.							