

# COMMON CORE RESOURCE FOR GRADE 7

## RATIOS AND PROPORTIONAL RELATIONSHIPS

CCSS	Math Concept	Standards and References
7.RP.	<b>Definitions: Ratios, Unit Rates and Proportions</b>	
	Ratio	A ratio is a comparison of two numbers usually expressed as a fraction. For example in a class that has 14 boys and 11 girls the ratio of boys to girls is 14/11. A ratio is never expressed as a mixed number. If the numerator is bigger than the denominator it is shown as an improper fraction. Ratios can also be written using a colon - the ratio of boys to girls is 14:11. It may also be stated in words - the ratio of boys to girls is 14 to 11.
	Unit Rate	A Unit Rate is a ratio where the denominator is set to 1. It is used to show the amount of one item that occurs when the is exactly one unit of an other item being compared. For example: miles/gal; cost/item; miles / hour.
	Proportion	A proportion states that two ratios are equal. For example the ratio 3 to 4 (3/4) is proportional to the ratio 30 to 40 (30/40). The second can be created from the first by multiplying the numerator and denominator by 10. If the denominator is divided into the numerator both ratios will yield the number .75.
7.RP.1.	<b>Unit Rates Associated with the Ratio of Fractions</b>	<b>7.RP.1.</b> Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2 / 1/4 miles per hour, equivalently 2miles per hour.
	<b>A unit rate is a ratio a/b where there is one unit of b. Unit rates can be part to part or part to total</b>	
	Finding unit rates	<a href="http://www.khanacademy.org/math/arithmetic/rates-and-ratios/rates_tutorial/v/finding-unit-rates">http://www.khanacademy.org/math/arithmetic/rates-and-ratios/rates_tutorial/v/finding-unit-rates</a>
	Finding unit prices	<a href="http://www.khanacademy.org/math/arithmetic/rates-and-ratios/rates_tutorial/v/finding-unit-prices">http://www.khanacademy.org/math/arithmetic/rates-and-ratios/rates_tutorial/v/finding-unit-prices</a>
	Finding unit rates in situations involving fractions	<a href="http://learnzillion.com/lessons/867-find-unit-rates-in-situations-involving-fractions">http://learnzillion.com/lessons/867-find-unit-rates-in-situations-involving-fractions</a>
	Using unit rates to interpret scale maps and scale models	<a href="http://learnzillion.com/lessons/646-using-unit-rates-to-interpret-scale-maps-and-scale-models">http://learnzillion.com/lessons/646-using-unit-rates-to-interpret-scale-maps-and-scale-models</a>
Scale recipes by applying unit rates	<a href="http://learnzillion.com/lessons/647-scale-recipes-by-applying-unit-rates">http://learnzillion.com/lessons/647-scale-recipes-by-applying-unit-rates</a>	

<b>7.RP.2.a.</b>	<b>Verifying a Proportional Relationship</b>	<b>7.RP.2.a.</b> Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.
1	<b>Create a proportional relationship</b>	
	Create proportional relationships by expanding ratios	<a href="http://learnzillion.com/lessons/1864-create-proportional-relationships-by-expanding-ratios">http://learnzillion.com/lessons/1864-create-proportional-relationships-by-expanding-ratios</a>
2	<b>Decide whether two quantities are in a proportional relationship by testing equivalent ratios</b>	
	Determine whether two ratios are equivalent	<a href="http://learnzillion.com/lessons/316-determine-whether-two-ratios-are-equivalent">http://learnzillion.com/lessons/316-determine-whether-two-ratios-are-equivalent</a>
	Use a table to find out if two quantities are in a proportional relationship	<a href="http://learnzillion.com/lessons/1865-analyze-a-table-to-determine-find-proportional-relationships">http://learnzillion.com/lessons/1865-analyze-a-table-to-determine-find-proportional-relationships</a>
	Analyze a graph to find proportional relationships	<a href="http://learnzillion.com/lessons/1867-analyze-a-graph-to-find-proportional-relationships">http://learnzillion.com/lessons/1867-analyze-a-graph-to-find-proportional-relationships</a>
<b>7.RP.2.b.</b>	<b>The Constant of Proportionality (Unit Rate)</b>	<b>7.RP.2.b.</b> Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
1	<b>Identify the constant of proportionality (Unit Rate) using tables, graphs, equations, diagrams</b>	
	Identify unit rates in tables	<a href="http://learnzillion.com/lessons/1871-identify-unit-rates-in-tables">http://learnzillion.com/lessons/1871-identify-unit-rates-in-tables</a>
	Identify unit rates in graphs	<a href="http://learnzillion.com/lessons/1873-identify-unit-rates-in-graphs">http://learnzillion.com/lessons/1873-identify-unit-rates-in-graphs</a>
	Identify unit rates from verbal descriptions	<a href="http://learnzillion.com/lessons/1869-identify-rates-from-verbal-descriptions">http://learnzillion.com/lessons/1869-identify-rates-from-verbal-descriptions</a>
	Identify unit rates using equations	<a href="http://learnzillion.com/lessons/1870-identify-unit-rates-using-equations">http://learnzillion.com/lessons/1870-identify-unit-rates-using-equations</a>
2	<b>Represent Proportional Relationships with Equations</b>	
	Determine the best deal by comparing proportional relationship equations	<a href="http://learnzillion.com/lessons/1534-determine-the-best-deal-by-comparing-equations">http://learnzillion.com/lessons/1534-determine-the-best-deal-by-comparing-equations</a>
	Compare rates of speed by comparing equations that represent the relationship between distance and time	<a href="http://learnzillion.com/lessons/1536-compare-rates-of-speed-by-comparing-equations-that-represent-the-relationship-between-distance-and-time">http://learnzillion.com/lessons/1536-compare-rates-of-speed-by-comparing-equations-that-represent-the-relationship-between-distance-and-time</a>
<b>7.RP.2.c</b>	<b>Represent proportional relationships by equations</b>	<b>7.RP.2.c</b> Represent proportional relationships by equations. For example, if total cost $t$ is proportional to the number $n$ of items purchased at a constant price $p$ , the relationship between the total cost and the number of items can be expressed as $t = pn$ .
	Write an equation that represents a proportional relationship between total cost and number of items	<a href="http://learnzillion.com/lessons/1533-write-an-equation-that-represents-a-proportional-relationship-between-total-cost-and-number-of-items">http://learnzillion.com/lessons/1533-write-an-equation-that-represents-a-proportional-relationship-between-total-cost-and-number-of-items</a>
	Write an equation that expresses the relationship between distance and time	<a href="http://learnzillion.com/lessons/1535-write-an-equation-that-expresses-the-relationship-between-distance-and-time">http://learnzillion.com/lessons/1535-write-an-equation-that-expresses-the-relationship-between-distance-and-time</a>
	Determine the best deal by comparing equations	<a href="http://learnzillion.com/lessons/1534-determine-the-best-deal-by-comparing-equations">http://learnzillion.com/lessons/1534-determine-the-best-deal-by-comparing-equations</a>
	Write equations to represent the proportional relationship between amount of change and final amount	<a href="http://learnzillion.com/lessons/1537-write-equations-to-represent-the-proportional-relationship-between-amount-of-change-and-final-amount">http://learnzillion.com/lessons/1537-write-equations-to-represent-the-proportional-relationship-between-amount-of-change-and-final-amount</a>
	Calculate simple interest using the simple interest equation	<a href="http://learnzillion.com/lessons/1538-calculate-simple-interest-using-the-simple-interest-equation">http://learnzillion.com/lessons/1538-calculate-simple-interest-using-the-simple-interest-equation</a>

<b>7.RP.2.d.</b>	<b>Graphically Represent Proportional Relationships</b>	<b>7.RP.2.d.</b> 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.
	<b>Use a Graph to Represent Proportional Relationships</b>	
	Analyze a graph to find proportional relationships	<a href="http://learnzillion.com/lessons/1867-analyze-a-graph-to-find-proportional-relationships">http://learnzillion.com/lessons/1867-analyze-a-graph-to-find-proportional-relationships</a>
	Display all possibilities in a proportional relationship by graphing	<a href="http://learnzillion.com/lessons/1195-display-all-possibilities-in-a-proportional-relationship-by-graphing">http://learnzillion.com/lessons/1195-display-all-possibilities-in-a-proportional-relationship-by-graphing</a>
	Find a unit rate using a graph	<a href="http://learnzillion.com/lessons/1196-find-a-unit-rate-using-a-graph">http://learnzillion.com/lessons/1196-find-a-unit-rate-using-a-graph</a>
<b>7.RP.3.</b>	<b>Applications of Proportional Relationships</b>	<b>7.RP.3.</b> Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.
<b>1</b>	<b>Percent of the whole.</b>	
	Solve multistep percent problems using proportions and equations	<a href="http://learnzillion.com/lessons/878-solve-multistep-percent-problems-using-proportions-and-equations">http://learnzillion.com/lessons/878-solve-multistep-percent-problems-using-proportions-and-equations</a>
<b>2</b>	<b>Percent Increase or Decrease Problems</b>	
	Find the percent of decrease: using a proportion	<a href="http://learnzillion.com/lessons/365-find-the-percent-of-decrease-using-a-proportion">http://learnzillion.com/lessons/365-find-the-percent-of-decrease-using-a-proportion</a>
	Find the percent of increase: using a proportion	<a href="http://learnzillion.com/lessons/366-find-the-percent-of-increase-using-a-proportion">http://learnzillion.com/lessons/366-find-the-percent-of-increase-using-a-proportion</a>
	Find the original amount and the amount of change, given the percent change and final amount	<a href="http://learnzillion.com/lessons/880-find-the-amount-of-change-and-the-final-amount-given-the-percent-of-change-and-the-original-amount">http://learnzillion.com/lessons/880-find-the-amount-of-change-and-the-final-amount-given-the-percent-of-change-and-the-original-amount</a>
	Find the percent of change and what percent the final amount is of the original amount	<a href="http://learnzillion.com/lessons/881-find-the-percent-of-change-and-what-percent-the-final-amount-is-of-the-original-amount">http://learnzillion.com/lessons/881-find-the-percent-of-change-and-what-percent-the-final-amount-is-of-the-original-amount</a>
	Find the original amount and the amount of change, given the percent change and final amount	<a href="http://learnzillion.com/lessons/879-compute-successive-percentages-using-proportions-and-equations">http://learnzillion.com/lessons/879-compute-successive-percentages-using-proportions-and-equations</a>
<b>3</b>	<b>Successive Percentage Problems (e.g., 8% tax on an item that is discounted 20%)</b>	
	Compute successive percentages using proportions and equations	<a href="http://learnzillion.com/lessons/879-compute-successive-percentages-using-proportions-and-equations">http://learnzillion.com/lessons/879-compute-successive-percentages-using-proportions-and-equations</a>
<b>4</b>	<b>Tax</b>	
	Solve problems with taxes: using proportions	<a href="http://learnzillion.com/lessons/327-solve-problems-with-taxes-using-proportions">http://learnzillion.com/lessons/327-solve-problems-with-taxes-using-proportions</a>
<b>5</b>	<b>Tips</b>	
	Solve problems with tips: using proportions	<a href="http://learnzillion.com/lessons/328-solve-problems-with-tips-using-proportions">http://learnzillion.com/lessons/328-solve-problems-with-tips-using-proportions</a>

6	<b>7.NS.1.d. CONTINUED</b>	
	<b>Other Proportion Problems</b>	
	Many of other examples of using proportions to solve problems, including: unit conversion of size, weight, capacity, and rate; similar figures; odds;	<a href="https://www.purplemath.com/modules/ratio4.htm">https://www.purplemath.com/modules/ratio4.htm</a>

**7.NS. THE NUMBER SYSTEM**

**Apply and Extend Previous Understandings of Operations with Fractions to Add, Subtract, Multiply, and Divide Rational Numbers.**

<b>7.NS.</b>	<b>Definitions: Rational Numbers; Irrational Numbers; Additive Inverse</b>	
	Rational Number	Any real number of the form $a/b$ , where $a$ and $b$ are integers and $b$ is not zero. Rational numbers may be positive or negative. A rational number can always be written as a fraction. Rational numbers may be in the form of: a fraction (see basic definition); an integer ( $5 = 5/1$ ), a fixed decimal ( $.25 = 1/4$ ; $1.25 = 5/4$ ; $.0001 = 1/1000$ ); or a repeating decimal ( $.33333... = 1/3$ ).
	Irrational Number	Any real number (integer or decimal) that cannot be written as a fraction and goes on forever without repeating. Examples are $\pi$ ( $\pi$ ), and the square root of any non-perfect square (e.g. $\sqrt{2}$ , $\sqrt{24}$ )
	Additive Inverse	The additive inverse of a number $a$ is the number that, when added to $a$ , yields zero

<b>7.NS.1.a.</b>	<b>Describe situations in which opposite quantities combine to make 0</b>	<b>7.NS.1.a. Describe situations in which opposite quantities combine to make 0. For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.</b>
1	Combine opposite quantities to make zero using a number line	<a href="http://learnzillion.com/lessons/1697-combine-opposite-quantities-to-make-zero-using-a-number-line">http://learnzillion.com/lessons/1697-combine-opposite-quantities-to-make-zero-using-a-number-line</a>
	Add positive and negative integers using a number line	<a href="http://learnzillion.com/lessons/1699-add-positive-and-negative-integers-using-a-number-line">http://learnzillion.com/lessons/1699-add-positive-and-negative-integers-using-a-number-line</a>
	Understand the additive inverse	<a href="http://learnzillion.com/lessons/1021-understand-the-additive-inverse">http://learnzillion.com/lessons/1021-understand-the-additive-inverse</a>
	Add integers with the same sign	<a href="http://learnzillion.com/lessons/1024-add-integers-with-the-same-sign">http://learnzillion.com/lessons/1024-add-integers-with-the-same-sign</a>
	Add integers with different signs	<a href="http://learnzillion.com/lessons/1025-add-integers-with-different-signs">http://learnzillion.com/lessons/1025-add-integers-with-different-signs</a>

<b>7.NS.1.b.</b>	<b>Adding Positive and Negative Rational Numbers</b>	<b>7.NS.1.b.</b> Understand $p + q$ as the number located a distance $ q $ from $p$ , in the positive or negative direction depending on whether $q$ is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.
1	<b>Understand <math>p + q</math> as the number located a distance <math> q </math> from <math>p</math>, in the positive or negative direction depending on whether <math>q</math> is positive or negative.</b>	
	Add positive and negative integers using a number line	<a href="http://learnzillion.com/lessons/1699-add-positive-and-negative-integers-using-a-number-line">http://learnzillion.com/lessons/1699-add-positive-and-negative-integers-using-a-number-line</a>
	Add integers with the same sign	<a href="http://learnzillion.com/lessons/1024-add-integers-with-the-same-sign">http://learnzillion.com/lessons/1024-add-integers-with-the-same-sign</a>
	Add integers with different signs	<a href="http://learnzillion.com/lessons/1025-add-integers-with-different-signs">http://learnzillion.com/lessons/1025-add-integers-with-different-signs</a>
2	<b>Show that a number and its opposite have a sum of 0 (are additive inverses).</b>	
	Understand the additive inverse	<a href="http://learnzillion.com/lessons/1021-understand-the-additive-inverse">http://learnzillion.com/lessons/1021-understand-the-additive-inverse</a>
<b>7.NS.1.c.</b>	<b>Subtracting Positive and Negative Numbers</b>	<b>7.NS.1.c.</b> Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$ . Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.
1	<b>Understand subtraction of rational numbers as adding the additive inverse, <math>p - q = p + (-q)</math>.</b>	
	Subtract integers by adding the additive inverse	<a href="http://learnzillion.com/lessons/1029-subtract-integers-by-adding-the-additive-inverse">http://learnzillion.com/lessons/1029-subtract-integers-by-adding-the-additive-inverse</a>
	Subtract integers using the "take away" definition of subtraction on a number line	<a href="http://learnzillion.com/lessons/676-subtract-integers-using-the-take-away-definition-of-subtraction-on-a-number-line">http://learnzillion.com/lessons/676-subtract-integers-using-the-take-away-definition-of-subtraction-on-a-number-line</a>
2	<b>Show that the distance between two rational numbers on the number line is the absolute value of their difference.</b>	
	Find the distance between two points using absolute value	<a href="http://learnzillion.com/lessons/1030-find-the-distance-between-two-points-using-absolute-value">http://learnzillion.com/lessons/1030-find-the-distance-between-two-points-using-absolute-value</a>
3	<b>Show the subtraction of positive and negative numbers in a real-world context.</b>	
	Subtract rational numbers in real-world contexts	<a href="http://learnzillion.com/lessons/1031-subtract-rational-numbers-in-realworld-contexts">http://learnzillion.com/lessons/1031-subtract-rational-numbers-in-realworld-contexts</a>
<b>7.NS.1.d.</b>	<b>Using Properties of Operations to Add and Subtract</b>	<b>7.NS.1.d.</b> Apply properties of operations as strategies to add and subtract rational numbers.
1	<b>Add and Subtract Using a Number Line</b>	
	Adding positive and negative integers on a number line	<a href="http://learnzillion.com/lessons/673-adding-positive-and-negative-integers-on-a-number-line">http://learnzillion.com/lessons/673-adding-positive-and-negative-integers-on-a-number-line</a>
	Demonstrate the Commutative Property of Addition with a Number Line	<a href="http://learnzillion.com/lessons/674-demonstrate-the-commutative-property-of-addition-with-a-number-line">http://learnzillion.com/lessons/674-demonstrate-the-commutative-property-of-addition-with-a-number-line</a>
	Determine the distance between integers by examining absolute value and number lines	<a href="http://learnzillion.com/lessons/677-determine-the-distance-between-integers-by-examining-absolute-value-and-number-lines">http://learnzillion.com/lessons/677-determine-the-distance-between-integers-by-examining-absolute-value-and-number-lines</a>

2	<b>7.NS.1.d CONTINUED</b>	
	<b>Subtract by adding the additive inverse, <math>p - q = p + (-q)</math>.</b>	
	Subtract integers by adding the additive inverse	<a href="http://learnzillion.com/lessons/1029-subtract-integers-by-adding-the-additive-inverse">http://learnzillion.com/lessons/1029-subtract-integers-by-adding-the-additive-inverse</a>
3	<b>Subtract using the difference definition of subtraction</b>	
	Subtract integers using the difference definition of subtraction on a number line	<a href="http://learnzillion.com/lessons/678-subtract-integers-using-the-difference-definition-of-subtraction-on-a-number-line">http://learnzillion.com/lessons/678-subtract-integers-using-the-difference-definition-of-subtraction-on-a-number-line</a>
4	<b>Add and Subtract Fractions</b>	
	Add mixed fractions: regrouping	<a href="http://learnzillion.com/lessons/218-add-mixed-fractions-regrouping">http://learnzillion.com/lessons/218-add-mixed-fractions-regrouping</a>
	Subtract mixed fractions: regrouping	<a href="http://learnzillion.com/lessons/345-subtract-mixed-fractions-regrouping">http://learnzillion.com/lessons/345-subtract-mixed-fractions-regrouping</a>
	Add mixed fractions: using improper fractions	<a href="http://learnzillion.com/lessons/346-add-mixed-fractions-using-improper-fractions">http://learnzillion.com/lessons/346-add-mixed-fractions-using-improper-fractions</a>
<b>7.NS.2.a</b>	<b>Using Properties of Multiplication</b>	<b>7.NS.2.a.</b> 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.
1	<b>Multiply Positive and Negative Numbers Using the Distributive Property</b>	
	Multiply positive and negative integers using the distributive property	<a href="http://learnzillion.com/lessons/705-multiply-positive-and-negative-integers-using-the-distributive-property">http://learnzillion.com/lessons/705-multiply-positive-and-negative-integers-using-the-distributive-property</a>
	Multiply a negative by a negative using the distributive property	<a href="http://learnzillion.com/lessons/706-multiply-a-negative-by-a-negative-using-the-distributive-property">http://learnzillion.com/lessons/706-multiply-a-negative-by-a-negative-using-the-distributive-property</a>
	Multiply rational numbers other than integers	<a href="http://learnzillion.com/lessons/707-multiply-rational-numbers-other-than-integers">http://learnzillion.com/lessons/707-multiply-rational-numbers-other-than-integers</a>
2	<b>Multiply Positive and Negative Integers on a Number Line Using the Commutative Property</b>	
	Multiply positive and negative integers on a number line	<a href="http://learnzillion.com/lessons/480-understand-negative-numbers-using-a-number-line">http://learnzillion.com/lessons/480-understand-negative-numbers-using-a-number-line</a>
	Multiply two positive or two negative integers on a number line	<a href="http://learnzillion.com/lessons/1279-multiply-two-positive-or-two-negative-integers-on-a-number-line">http://learnzillion.com/lessons/1279-multiply-two-positive-or-two-negative-integers-on-a-number-line</a>
3	<b>Multiply Positive and Negative Integers Using an Equal Groups Model</b>	
	Multiply a positive integer by a negative integer by thinking about equal groups	<a href="http://learnzillion.com/lessons/1645-multiply-a-positive-integer-by-a-negative-integer-by-thinking-about-equal-groups">http://learnzillion.com/lessons/1645-multiply-a-positive-integer-by-a-negative-integer-by-thinking-about-equal-groups</a>
	Multiply a negative integer by a positive integer by thinking about equal groups	<a href="http://learnzillion.com/lessons/1646-multiply-a-negative-integer-by-a-positive-integer-by-thinking-about-equal-groups">http://learnzillion.com/lessons/1646-multiply-a-negative-integer-by-a-positive-integer-by-thinking-about-equal-groups</a>
	Multiply a negative integer by a negative integer by thinking about equal groups	<a href="http://learnzillion.com/lessons/1647-multiply-a-negative-integer-by-a-negative-integer-by-thinking-about-equal-groups">http://learnzillion.com/lessons/1647-multiply-a-negative-integer-by-a-negative-integer-by-thinking-about-equal-groups</a>

<b>7.NS.2.b.</b>	<b>Rational Numbers from the Division of Integers</b>	<b>7.NS.2.b.</b> 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 $\frac{p}{q} = (\frac{p}{1})/q = p/(\frac{1}{q})$ . Interpret quotients of rational numbers by describing real world contexts.
1	<b>Division of Integers Using Patterns and the Inverse Relationship</b>	
	Divide positive and negative integers by observing patterns	<a href="http://learnzillion.com/lessons/708-divide-positive-and-negative-integers-by-observing-patterns">http://learnzillion.com/lessons/708-divide-positive-and-negative-integers-by-observing-patterns</a>
	Use inverse relationship of multiplication and division to divide positive and negative integers	<a href="http://learnzillion.com/lessons/709-use-inverse-relationship-of-multiplication-and-division-to-divide-positive-and-negative-integers">http://learnzillion.com/lessons/709-use-inverse-relationship-of-multiplication-and-division-to-divide-positive-and-negative-integers</a>
2	<b>The Division of Integers Always Results in a Rational Number</b>	
	Understand rational quotients	<a href="http://learnzillion.com/lessons/710-understand-rational-quotients">http://learnzillion.com/lessons/710-understand-rational-quotients</a>
<b>7.NS.2.c.</b>	<b>Use Properties of Operations to Multiply and Divide</b>	<b>7.NS.2.c.</b> Apply properties of operations as strategies to multiply and divide rational numbers.
1	<b>Multiplication Problems</b>	
	Rewrite multiplication problems using the commutative property	<a href="http://learnzillion.com/lessons/1397-rewrite-multiplication-problems-using-the-commutative-property">http://learnzillion.com/lessons/1397-rewrite-multiplication-problems-using-the-commutative-property</a>
	Rewrite multiplication problems with rational numbers using the associative property	<a href="http://learnzillion.com/lessons/1410-rewrite-multiplication-problems-with-rational-numbers-using-the-associative-property">http://learnzillion.com/lessons/1410-rewrite-multiplication-problems-with-rational-numbers-using-the-associative-property</a>
	Rewrite multiplication problems with rational numbers using the commutative and associative properties	<a href="http://learnzillion.com/lessons/1419-rewrite-multiplication-problems-with-rational-numbers-using-the-commutative-and-associative-properties">http://learnzillion.com/lessons/1419-rewrite-multiplication-problems-with-rational-numbers-using-the-commutative-and-associative-properties</a>
	Solve multiplication problems using the associative property	<a href="http://learnzillion.com/lessons/700-solve-multiplication-problems-using-the-associative-property">http://learnzillion.com/lessons/700-solve-multiplication-problems-using-the-associative-property</a>
	Solve multiplication problems using the commutative and associative properties	<a href="http://learnzillion.com/lessons/701-solve-multiplication-problems-using-the-commutative-and-associative-properties">http://learnzillion.com/lessons/701-solve-multiplication-problems-using-the-commutative-and-associative-properties</a>
	Solve multiplication problems by using the distributive property	<a href="http://learnzillion.com/lessons/702-solve-multiplication-problems-by-using-the-distributive-property">http://learnzillion.com/lessons/702-solve-multiplication-problems-by-using-the-distributive-property</a>
2	<b>Division Problems</b>	
	Rewrite division problems using the commutative property	<a href="http://learnzillion.com/lessons/1409-rewrite-division-problems-using-the-commutative-property">http://learnzillion.com/lessons/1409-rewrite-division-problems-using-the-commutative-property</a>
	Use the commutative property to solve division problems	<a href="http://learnzillion.com/lessons/703-use-the-commutative-property-to-solve-division-problems">http://learnzillion.com/lessons/703-use-the-commutative-property-to-solve-division-problems</a>
3	<b>Multiplication and Division Problems</b>	
	Rewrite problems with rational numbers using different properties of multiplication and division	<a href="http://learnzillion.com/lessons/1420-rewrite-problems-with-rational-numbers-using-different-properties-of-multiplication-and-division">http://learnzillion.com/lessons/1420-rewrite-problems-with-rational-numbers-using-different-properties-of-multiplication-and-division</a>

<b>7.NS.2.d.</b>	<b>Convert a rational number to a decimal using long division</b>	<b>7.NS.2.d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.</b>
	Rewrite fractions as decimals (terminating)	<a href="http://learnzillion.com/lessons/713-rewrite-fractions-as-decimals-terminating">http://learnzillion.com/lessons/713-rewrite-fractions-as-decimals-terminating</a>
	Rewrite fraction as decimals (repeating)	<a href="http://learnzillion.com/lessons/714-rewrite-fraction-as-decimals-repeating">http://learnzillion.com/lessons/714-rewrite-fraction-as-decimals-repeating</a>
	Rewrite mixed numbers and improper fractions to decimals	<a href="http://learnzillion.com/lessons/494-rewrite-mixed-numbers-and-improper-fractions-to-decimals">http://learnzillion.com/lessons/494-rewrite-mixed-numbers-and-improper-fractions-to-decimals</a>
	Understand relationship between fractions and decimals using multiplication	<a href="http://learnzillion.com/lessons/495-understand-relationship-between-fractions-and-decimals-using-multiplication">http://learnzillion.com/lessons/495-understand-relationship-between-fractions-and-decimals-using-multiplication</a>
	Determine if the fraction repeats or terminates using Prime Factorization	<a href="http://learnzillion.com/lessons/496-determine-if-the-fraction-repeats-or-terminates-using-prime-factorization">http://learnzillion.com/lessons/496-determine-if-the-fraction-repeats-or-terminates-using-prime-factorization</a>

<b>7.NS.3.</b>	<b>Solve Real World Problems Using Rational Numbers</b>	<b>7.NS.3. Solve real-world and mathematical problems involving the four operations with rational numbers.</b>
	Use addition and subtraction to solve real-world problems involving decimals	<a href="http://learnzillion.com/lessons/1150-use-addition-and-subtraction-to-solve-realworld-problems-involving-decimals">http://learnzillion.com/lessons/1150-use-addition-and-subtraction-to-solve-realworld-problems-involving-decimals</a>
	Use addition and subtraction to solve real-world problems involving fractions	<a href="http://learnzillion.com/lessons/1151-use-addition-and-subtraction-to-solve-realworld-problems-involving-fractions">http://learnzillion.com/lessons/1151-use-addition-and-subtraction-to-solve-realworld-problems-involving-fractions</a>
	Use addition and multiplication to solve real-world problems with rational numbers	<a href="http://learnzillion.com/lessons/1152-use-addition-and-multiplication-to-solve-realworld-problems-with-rational-numbers">http://learnzillion.com/lessons/1152-use-addition-and-multiplication-to-solve-realworld-problems-with-rational-numbers</a>
	Use addition and division to solve real-world problems with rational numbers	<a href="http://learnzillion.com/lessons/1153-use-addition-and-division-to-solve-realworld-problems-with-rational-numbers">http://learnzillion.com/lessons/1153-use-addition-and-division-to-solve-realworld-problems-with-rational-numbers</a>
	Simplify expressions with order of operations	<a href="http://learnzillion.com/lessons/359-simplify-expressions-with-order-of-operations">http://learnzillion.com/lessons/359-simplify-expressions-with-order-of-operations</a>

**7.EE. EXPRESSIONS AND EQUATIONS**

**• Use Properties of Operations to Generate Equivalent Expressions.**  
**Solve real-life and mathematical problems using numerical and algebraic expressions and equations.**

<b>7.EE.1</b>	<b>Applying Properties of Operations to Write Equivalent Expressions</b>	<b>7.EE.1. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.</b>
1	<b>Simplify an Expression.</b>	
	Simplify expressions using distribution and combining like terms	<a href="http://learnzillion.com/lessons/810-simplify-expressions-using-distribution-and-combining-like-terms">http://learnzillion.com/lessons/810-simplify-expressions-using-distribution-and-combining-like-terms</a>
	Simplify an expression with a fraction using the distributive property	<a href="http://learnzillion.com/lessons/811-simplify-an-expression-with-a-fraction-using-the-distributive-property">http://learnzillion.com/lessons/811-simplify-an-expression-with-a-fraction-using-the-distributive-property</a>



2	<b>7.EE.1 CONTINUED</b>	
	Simplify an expression with a fraction by adding or subtracting terms with fractions	<a href="http://learnzillion.com/lessons/812-simplify-an-expression-with-a-fraction-by-adding-or-subtracting-terms-with-fractions">http://learnzillion.com/lessons/812-simplify-an-expression-with-a-fraction-by-adding-or-subtracting-terms-with-fractions</a>
2	<b>Add Expressions</b>	
	Add linear expressions by combining like terms	<a href="http://learnzillion.com/lessons/1125-add-linear-expressions-by-combining-like-terms">http://learnzillion.com/lessons/1125-add-linear-expressions-by-combining-like-terms</a>
3	<b>Factor Linear Expressions</b>	
	Factor an Expression	<a href="http://learnzillion.com/lessons/809-factor-an-expression">http://learnzillion.com/lessons/809-factor-an-expression</a>
	Factor linear Expressions	<a href="http://learnzillion.com/lessons/1128-factor-linear-expressions">http://learnzillion.com/lessons/1128-factor-linear-expressions</a>
4	<b>Expand an Expression</b>	
	Expand linear expressions using the distributive property	<a href="http://learnzillion.com/lessons/1126-expand-linear-expressions-using-the-distributive-property">http://learnzillion.com/lessons/1126-expand-linear-expressions-using-the-distributive-property</a>
	Expand linear expressions with fractions using the distributive property	<a href="http://learnzillion.com/lessons/1127-expand-linear-expressions-with-fractions-using-the-distributive-property">http://learnzillion.com/lessons/1127-expand-linear-expressions-with-fractions-using-the-distributive-property</a>
<b>7.EE.2</b>	<b>Using Equivalent Expressions</b>	<b>7.EE.2.</b> Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. For example, $a + 0.05a = 1.05a$ means that an increase by 5% is the same as multiply by 1.05.
1	<b>Percent Increase and Decrease as a Product of the Original Amount</b>	
	Write a percent increase problem as a product of the original amount	<a href="http://learnzillion.com/lessons/813-write-a-percent-increase-problem-as-a-product-of-the-original-amount">http://learnzillion.com/lessons/813-write-a-percent-increase-problem-as-a-product-of-the-original-amount</a>
	Write a percent decrease problem as a product of the original amount	<a href="http://learnzillion.com/lessons/814-write-a-percent-decrease-problem-as-a-product-of-the-original-amount">http://learnzillion.com/lessons/814-write-a-percent-decrease-problem-as-a-product-of-the-original-amount</a>
2	<b>Rewrite an Expression by Expanding it.</b>	
	Rewrite an expression by expanding it	<a href="http://learnzillion.com/lessons/815-rewrite-an-expression-by-expanding-it">http://learnzillion.com/lessons/815-rewrite-an-expression-by-expanding-it</a>
3	<b>Identify Equivalent Expressions</b>	
	Identify equivalent expressions using substitution	<a href="http://learnzillion.com/lessons/816-identify-equivalent-expressions-using-substitution">http://learnzillion.com/lessons/816-identify-equivalent-expressions-using-substitution</a>

7.EE.3.	<b>Solve Real-Life and Mathematical Problems Using Numerical and Algebraic Expressions and Equations</b>	<b>7.EE.3.</b> Solve multi-step real-life 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; and assess the reasonableness of answers using mental computation and estimation strategies. For example: 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 $9\frac{3}{4}$ inches long in the center of a door that is $27\frac{1}{2}$ 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.
<b>Solve multi-step real-life and mathematical problems</b>		
Solve multi-step problems using order of operations		<a href="http://learnzillion.com/lessons/990-solve-multistep-problems-using-order-of-operations">http://learnzillion.com/lessons/990-solve-multistep-problems-using-order-of-operations</a>
Use order of operations to solve multi-step problems		<a href="http://learnzillion.com/lessons/1696-use-order-of-operations-to-solve-multistep-problems">http://learnzillion.com/lessons/1696-use-order-of-operations-to-solve-multistep-problems</a>
Solve multi-step problems by creating diagrams		<a href="http://learnzillion.com/lessons/991-solve-multistep-problems-by-creating-diagrams">http://learnzillion.com/lessons/991-solve-multistep-problems-by-creating-diagrams</a>
Solve multi-step problems with positive and negative fractions		<a href="http://learnzillion.com/lessons/1232-solve-multistep-problems-with-positive-and-negative-fractions">http://learnzillion.com/lessons/1232-solve-multistep-problems-with-positive-and-negative-fractions</a>
Solve word problems with positive and negative fractions		<a href="http://learnzillion.com/lessons/1234-solve-word-problems-with-positive-and-negative-fractions">http://learnzillion.com/lessons/1234-solve-word-problems-with-positive-and-negative-fractions</a>
Solve multi-step problems with positive and negative decimals using order of operations		<a href="http://learnzillion.com/lessons/1577-solve-multistep-problems-with-positive-and-negative-decimals-using-order-of-operations">http://learnzillion.com/lessons/1577-solve-multistep-problems-with-positive-and-negative-decimals-using-order-of-operations</a>
Solve multi-step problems with positive and negative decimals using mathematical reasoning		<a href="http://learnzillion.com/lessons/1578-solve-multistep-problems-with-positive-and-negative-decimals-using-mathematical-reasoning">http://learnzillion.com/lessons/1578-solve-multistep-problems-with-positive-and-negative-decimals-using-mathematical-reasoning</a>
7.EE.4.	<b>Writing Linear Equations and Inequalities</b>	<b>7.EE.4.</b> Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.
7.EE.4.a.	<b>Using Linear Equations to Solve Algebraic Word Problems</b>	<b>7.EE.4.a.</b> Solve word problems leading to equations of the form $px+q=r$ and $p(x+q)=r$ , where $p$ , $q$ , and $r$ are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?
<b>Solve Word Problems Leading to Equality Equations of the Form <math>px+q=r</math> and <math>p(x+q)=r</math>.</b>		
Use a bar model to write and solve equations		<a href="http://learnzillion.com/lessons/1509-use-a-bar-model-to-write-and-solve-equations">http://learnzillion.com/lessons/1509-use-a-bar-model-to-write-and-solve-equations</a>
Solving an equation using inverse operations		<a href="http://learnzillion.com/lessons/1510-solving-an-equation-using-inverse-operations">http://learnzillion.com/lessons/1510-solving-an-equation-using-inverse-operations</a>

7.EE.4.b.	<b>Using Linear Inequalities to Solve Algebraic Word Problems</b>	<b>7.EE.4.b.</b> Solve word problems leading to inequalities of the form $px+q>r$ or $px+q < r$ , where $p$ , $q$ , and $r$ are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. For example: As a salesperson, you are paid \$50 per week plus \$3 per sale. This week you want your pay to be at least \$100. Write an inequality for the number of sales you need to make, and describe the solutions.
<b>Solve Word Problems Leading to Inequalities of the Form <math>px+q&gt;r</math> and <math>px+q&lt;r</math>.</b>		
Write an inequality from a word problem		<a href="http://learnzillion.com/lessons/1660-write-an-inequality-from-a-word-problem">http://learnzillion.com/lessons/1660-write-an-inequality-from-a-word-problem</a>
Solve inequalities with inverse operations		<a href="http://learnzillion.com/lessons/1661-solve-inequalities-with-inverse-operations">http://learnzillion.com/lessons/1661-solve-inequalities-with-inverse-operations</a>
Represent an inequality solution set on a number line		<a href="http://learnzillion.com/lessons/1662-represent-an-inequality-solution-set-on-a-number-line">http://learnzillion.com/lessons/1662-represent-an-inequality-solution-set-on-a-number-line</a>
<p><b>7.G. GEOMETRY</b></p> <ul style="list-style-type: none"> <li><b>Draw, Construct, and Describe Geometrical Figures and Describe the Relationships Between Them.</b> Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.</li> </ul>		
7.G.1.	<b>Scale Drawings</b>	<b>7.G.1.</b> Solve problems involving scale drawings of geometric figures, such as computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.
<b>Solve Problems Involving Scale Drawings</b>		
Determine a scale factor by applying ratios		<a href="http://learnzillion.com/lessons/1129-determine-a-scale-factor-by-applying-ratios">http://learnzillion.com/lessons/1129-determine-a-scale-factor-by-applying-ratios</a>
Find a length by using a scale factor and a proportion		<a href="http://learnzillion.com/lessons/1130-find-a-length-by-using-a-scale-factor-and-a-proportion">http://learnzillion.com/lessons/1130-find-a-length-by-using-a-scale-factor-and-a-proportion</a>
Find a perimeter by using a scale factor and a proportion		<a href="http://learnzillion.com/lessons/1131-find-a-perimeter-by-using-a-scale-factor-and-a-proportion">http://learnzillion.com/lessons/1131-find-a-perimeter-by-using-a-scale-factor-and-a-proportion</a>
Find an area by using a scale factor and a proportion		<a href="http://learnzillion.com/lessons/1132-find-an-area-by-using-a-scale-factor-and-a-proportion">http://learnzillion.com/lessons/1132-find-an-area-by-using-a-scale-factor-and-a-proportion</a>
Make a new scale drawing from a given one		<a href="http://learnzillion.com/lessons/1133-make-a-new-scale-drawing-from-a-given-one">http://learnzillion.com/lessons/1133-make-a-new-scale-drawing-from-a-given-one</a>
7.G.2.	<b>Constructing Geometric Figures</b>	<b>7.G.2.</b> Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.
1	<b>Construct a Triangle from Three Measures of Sides.</b>	
Draw geometric shapes given the length of sides		<a href="http://learnzillion.com/lessons/1069-draw-geometric-shapes-given-the-length-of-sides">http://learnzillion.com/lessons/1069-draw-geometric-shapes-given-the-length-of-sides</a>
2	<b>Construct a Triangle from Three Measures of Angles.</b>	
Draw triangles using given angles		<a href="http://learnzillion.com/lessons/1070-draw-triangles-using-given-angles">http://learnzillion.com/lessons/1070-draw-triangles-using-given-angles</a>

3	<b>7.G.2 CONTINUED</b>	
	<b>Determine the Shape of a Figure</b>	
	Determine if given measurements will allow you to create the appropriate shape	<a href="http://learnzillion.com/lessons/1071-determine-if-given-measurements-will-allow-you-to-create-the-appropriate-shape">http://learnzillion.com/lessons/1071-determine-if-given-measurements-will-allow-you-to-create-the-appropriate-shape</a>
	Draw a polygon given more than one fact about the polygon	<a href="http://learnzillion.com/lessons/1072-draw-a-polygon-using-more-than-one-condition">http://learnzillion.com/lessons/1072-draw-a-polygon-using-more-than-one-condition</a>
<b>7.G.3.</b>	<b>Cross-Sections of Three-Dimensional Objects</b>	<b>7.G.3.</b> Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.
	<b>Describe the two-dimensional figures that result from slicing three-dimensional figures.</b>	
	Describe 2-dimensional cross sections of right rectangular prisms	<a href="http://learnzillion.com/lessons/1134-describe-2dimensional-cross-sections-of-right-rectangular-prisms">http://learnzillion.com/lessons/1134-describe-2dimensional-cross-sections-of-right-rectangular-prisms</a>
	Describe 2-dimensional cross sections of right rectangular pyramids	<a href="http://learnzillion.com/lessons/1135-describe-2dimensional-cross-sections-of-right-rectangular-pyramids">http://learnzillion.com/lessons/1135-describe-2dimensional-cross-sections-of-right-rectangular-pyramids</a>
<b>7.G.4.</b>	<b>Circles</b>	<b>7.G.4.</b> Know the formulas for the area and circumference of a circle and solve problems; give an informal derivation of the relationship between the circumference and area of a circle.
1	<b>Solve Problem using the Formulas for the Circumference and Area of a Circle</b>	
	Find the circumference of a circle	<a href="http://learnzillion.com/lessons/818-find-the-circumference-of-a-circle">http://learnzillion.com/lessons/818-find-the-circumference-of-a-circle</a>
	Find the area of a circle	<a href="http://learnzillion.com/lessons/819-find-the-area-of-a-circle">http://learnzillion.com/lessons/819-find-the-area-of-a-circle</a>
	Use area of a circle to solve for circumference	<a href="http://learnzillion.com/lessons/821-use-area-of-a-circle-to-solve-for-circumference">http://learnzillion.com/lessons/821-use-area-of-a-circle-to-solve-for-circumference</a>
2	<b>Provide an Informal Derivation of the Relationship Between the Circumference and Area of a Circle.</b>	
	Informal Derivation of $\pi$	<a href="http://www.mathsisfun.com/activity/pi-approximation.html">http://www.mathsisfun.com/activity/pi-approximation.html</a>
	Approximation of Formula for the Circumference and Area of a Circle	<a href="http://www.education2000.com/demo/demo/bothtml/areacirc.htm">http://www.education2000.com/demo/demo/bothtml/areacirc.htm</a>
<b>7.G.5.</b>	<b>Angle Relationships</b>	<b>7.G.5.</b> 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.
	<b>Use facts about Supplementary, Complementary, Vertical, and Adjacent Angles to Solve Simple Equations for an Unknown Angle</b>	
	Use supplementary angles to find an unknown angle	<a href="http://learnzillion.com/lessons/822-use-supplementary-angles-to-find-an-unknown-angle">http://learnzillion.com/lessons/822-use-supplementary-angles-to-find-an-unknown-angle</a>
	Use complementary angles to find an unknown angle	<a href="http://learnzillion.com/lessons/823-use-complementary-angles-to-find-an-unknown-angle">http://learnzillion.com/lessons/823-use-complementary-angles-to-find-an-unknown-angle</a>

	<b>7.G.5 CONTINUED</b>	
	Use vertical and adjacent angles to find unknown angles	<a href="http://learnzillion.com/lessons/824-use-vertical-and-adjacent-angles-to-find-unknown-angles">http://learnzillion.com/lessons/824-use-vertical-and-adjacent-angles-to-find-unknown-angles</a>
	Use interior and exterior angles to find unknown angles	<a href="http://learnzillion.com/lessons/825-use-interior-and-exterior-angles-to-find-unknown-angles">http://learnzillion.com/lessons/825-use-interior-and-exterior-angles-to-find-unknown-angles</a>
	Use consecutive interior angles to find unknown angles	<a href="http://learnzillion.com/lessons/826-use-consecutive-interior-angles-to-find-unknown-angles">http://learnzillion.com/lessons/826-use-consecutive-interior-angles-to-find-unknown-angles</a>
	Use interior angles of triangles to find unknown angles	<a href="http://learnzillion.com/lessons/827-use-interior-angles-of-triangles-to-find-unknown-angles">http://learnzillion.com/lessons/827-use-interior-angles-of-triangles-to-find-unknown-angles</a>

<b>7.G.6.</b>	<b>Surface Areas and Volumes of Objects</b>	<b>7.G.6.</b> Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.
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	<b>Solve Real-World and Mathematical Problems Involving Area, Volume and Surface Area of Two- and Three-Dimensional Bbjects</b>	
	Extensive Tutorial on Surface and Area (link to new topic at the end of each topic; some sections are interactive).	<a href="http://www.learner.org/interactives/geometry/index.html">http://www.learner.org/interactives/geometry/index.html</a>
	Area and volume applications	<a href="http://www.slideshare.net/joannahstevens/040810-applications-of-volume-and-surface-area">http://www.slideshare.net/joannahstevens/040810-applications-of-volume-and-surface-area</a>

**STATISTICS AND PROBABILITY**

- Use Random Sampling to Draw Inferences About a Population.
- Draw Informal Comparative Inferences About Two Populations.
- Investigate Chance Processes and Develop, Use, and Evaluate Probability Models.

<b>7.SP.1.</b>	<b>Sampling a Population</b>	<b>7.SP.1.</b> Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.
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1	<b>Sampling a Population</b>	
	<a href="#">Identify a random sample</a>	<a href="http://learnzillion.com/lessons/1844-identify-a-random-sample">http://learnzillion.com/lessons/1844-identify-a-random-sample</a>

2	<b>Representative Samples</b>	
	<a href="#">Identify a representative sample</a>	<a href="http://learnzillion.com/lessons/1845-identify-a-representative-sample">http://learnzillion.com/lessons/1845-identify-a-representative-sample</a>
	<a href="#">Generate a representative sample</a>	<a href="http://learnzillion.com/lessons/1846-generate-a-representative-sample">http://learnzillion.com/lessons/1846-generate-a-representative-sample</a>

3	<b>Biased Samples</b>	
	<a href="#">Understanding biased samples</a>	<a href="http://learnzillion.com/lessons/1847-understanding-biased-samples">http://learnzillion.com/lessons/1847-understanding-biased-samples</a>

7.SP.2.	<b>Differences Between Two Samples or Populations Relative to a Measure of Variability</b>	<b>7.SP.2.</b> Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.
<b>Inferences about a population from sample data</b>		
Make inferences about a population by analyzing random samples		<a href="http://learnzillion.com/lessons/1848-make-inferences-about-a-population-by-analyzing-random-samples">http://learnzillion.com/lessons/1848-make-inferences-about-a-population-by-analyzing-random-samples</a>
Use proportional reasoning to make estimates about a population		<a href="http://learnzillion.com/lessons/1849-use-proportional-reasoning-to-make-estimates-about-a-population">http://learnzillion.com/lessons/1849-use-proportional-reasoning-to-make-estimates-about-a-population</a>
Assess whether an inference is valid by analyzing data		<a href="http://learnzillion.com/lessons/1850-assess-whether-an-inference-is-valid-by-analyzing-data">http://learnzillion.com/lessons/1850-assess-whether-an-inference-is-valid-by-analyzing-data</a>
Make estimates about a population using the mean of multiple samples		<a href="http://learnzillion.com/lessons/1851-make-estimates-about-a-population-using-the-mean-of-multiple-samples">http://learnzillion.com/lessons/1851-make-estimates-about-a-population-using-the-mean-of-multiple-samples</a>
7.SP.3.	<b>Differences Between Two Samples or Populations Relative to a Measure of Variability</b>	<b>7.SP.3.</b> Informally assess the degree of visual overlap of two numerical data distributions with similar variability, measuring the difference between the centers by expressing it as a multiple of a measure of variability. For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.
<b>Compare two distributions with similar variability.</b>		
Compare two populations using their variability		<a href="http://www.opusmath.com/common-core-standards/7.sp.3-informally-assess-the-degree-of-visual-overlap-of-two-numerical-data">http://www.opusmath.com/common-core-standards/7.sp.3-informally-assess-the-degree-of-visual-overlap-of-two-numerical-data</a>
7.SP.4.	<b>Making Inferences about two Populations Using Measures of Center and Variability</b>	<b>7.SP.4.</b> Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.
1	<b>Using measures of center</b>	
Compare inferences using the mean		<a href="http://learnzillion.com/lessons/1445-compare-inferences-using-the-mean">http://learnzillion.com/lessons/1445-compare-inferences-using-the-mean</a>
Compare two populations using the median		<a href="http://learnzillion.com/lessons/1450-compare-two-populations-using-the-median">http://learnzillion.com/lessons/1450-compare-two-populations-using-the-median</a>
2	<b>Using measures of variability</b>	
Compare two populations using range and interquartile range		<a href="http://learnzillion.com/lessons/1453-compare-two-populations-using-range-and-interquartile-range">http://learnzillion.com/lessons/1453-compare-two-populations-using-range-and-interquartile-range</a>
Make comparative inferences using the MAD		<a href="http://learnzillion.com/lessons/1462-make-comparative-inferences-using-the-mad">http://learnzillion.com/lessons/1462-make-comparative-inferences-using-the-mad</a>

<b>7.SP.5.</b>	<b>Probability</b>	<b>7.SP.5.</b> Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around $\frac{1}{2}$ indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.
	The probability of a chance event expresses the likelihood of the event occurring	
	Calculate the probability of an event by creating a ratio	<a href="http://learnzillion.com/lessons/1206-calculate-the-probability-of-an-event-by-creating-a-ratio">http://learnzillion.com/lessons/1206-calculate-the-probability-of-an-event-by-creating-a-ratio</a>
	Describe the probability of an event using a number line	<a href="http://learnzillion.com/lessons/1238-describe-the-probability-of-an-event-using-a-number-line">http://learnzillion.com/lessons/1238-describe-the-probability-of-an-event-using-a-number-line</a>
	Calculate the probability of an event by making a sum of 1	<a href="http://learnzillion.com/lessons/1259-calculate-the-probability-of-an-event-by-making-a-sum-of-1">http://learnzillion.com/lessons/1259-calculate-the-probability-of-an-event-by-making-a-sum-of-1</a>
<b>7.SP.6.</b>	<b>Experimental Probability</b>	<b>7.SP.6.</b> Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.
	<b>Inferences about a population from sample data</b>	
	Find the experimental probability by creating a ratio	<a href="http://learnzillion.com/lessons/1348-find-the-experimental-probability-by-creating-a-ratio">http://learnzillion.com/lessons/1348-find-the-experimental-probability-by-creating-a-ratio</a>
	Compare experimental and theoretical probability to interpret data	<a href="http://learnzillion.com/lessons/1371-compare-experimental-and-theoretical-probability-to-interpret-data">http://learnzillion.com/lessons/1371-compare-experimental-and-theoretical-probability-to-interpret-data</a>
	Predict the frequency of an event using results from experiments	<a href="http://learnzillion.com/lessons/1386-predict-the-frequency-of-an-event-using-results-from-experiments">http://learnzillion.com/lessons/1386-predict-the-frequency-of-an-event-using-results-from-experiments</a>
	Predict the frequency of an event using the theoretical probability	<a href="http://learnzillion.com/lessons/1387-predict-the-frequency-of-an-event-using-the-theoretical-probability">http://learnzillion.com/lessons/1387-predict-the-frequency-of-an-event-using-the-theoretical-probability</a>
<b>7.SP.7. a.</b>	<b>Theoretical versus Experimental Probability</b>	<b>7.SP.7. a.</b> Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.
	<b>Theoretical Probability</b>	
	Analyze the probability of an event by assigning equal probability to all outcomes	<a href="http://learnzillion.com/lessons/1586-analyze-the-probability-of-an-event-by-assigning-equal-probability-to-all-outcomes">http://learnzillion.com/lessons/1586-analyze-the-probability-of-an-event-by-assigning-equal-probability-to-all-outcomes</a>
	Find the probability of events with multiple possibilities	<a href="http://learnzillion.com/lessons/1587-find-the-probability-of-events-with-multiple-possibilities">http://learnzillion.com/lessons/1587-find-the-probability-of-events-with-multiple-possibilities</a>
<b>7.SP.7. b.</b>	<b>Theoretical versus Experimental Probability</b>	<b>7.SP.7. b.</b> Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?
	<b>Experimental Probability</b>	
	Understand the law of large numbers by comparing experimental result to the theoretical probability	<a href="http://learnzillion.com/lessons/1588-understand-the-law-of-large-numbers-by-comparing-experimental-results-to-the-theoretical-probability">http://learnzillion.com/lessons/1588-understand-the-law-of-large-numbers-by-comparing-experimental-results-to-the-theoretical-probability</a>
	Explain discrepancies in results from a probability model by comparing the experimental and theoretical probabilities	<a href="http://learnzillion.com/lessons/1589-explain-discrepancies-in-results-from-a-probability-model-by-comparing-the-experimental-and-theoretical-probabilities">http://learnzillion.com/lessons/1589-explain-discrepancies-in-results-from-a-probability-model-by-comparing-the-experimental-and-theoretical-probabilities</a>
	Develop probability models based on observations	<a href="http://www.opusmath.com/common-core-standards/7.sp.7b-develop-a-probability-model-which-may-not-be-uniform-by-observing">http://www.opusmath.com/common-core-standards/7.sp.7b-develop-a-probability-model-which-may-not-be-uniform-by-observing</a>

7.SP.8.a.	<b>Represent Sample Spaces for Compound Events</b>	7.SP.8.a. 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.
<b>Find the probability for a compound event</b>		
Analyze independent and dependent events		<a href="http://learnzillion.com/lessons/1859-analyze-independent-and-dependent-events">http://learnzillion.com/lessons/1859-analyze-independent-and-dependent-events</a>
7.SP.8.b.	<b>Represent Sample Spaces for Compound Events</b>	7.SP.8.b. Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event.
<b>Represent sample spaces for compound events</b>		
Find the probability of a compound event by creating an organized list		<a href="http://learnzillion.com/lessons/1860-find-the-probability-of-a-compound-event-by-creating-an-organized-list">http://learnzillion.com/lessons/1860-find-the-probability-of-a-compound-event-by-creating-an-organized-list</a>
Find the probability of a compound event by creating a tree diagram		<a href="http://learnzillion.com/lessons/1861-find-the-probability-of-a-compound-event-by-creating-a-tree-diagram">http://learnzillion.com/lessons/1861-find-the-probability-of-a-compound-event-by-creating-a-tree-diagram</a>
Find the probability of a compound event by creating a table		<a href="http://learnzillion.com/lessons/1862-find-the-probability-of-a-compound-event-by-creating-a-table">http://learnzillion.com/lessons/1862-find-the-probability-of-a-compound-event-by-creating-a-table</a>
7.SP.8.c.	<b>Design and Use a Simulation to Generate Frequencies for Compound Events</b>	7.SP.8.c. Design and use a simulation to generate frequencies for compound events. For example, 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?
<b>Test Experimental versus Theoretical Outcomes for Compound Events</b>		
Use the Fundamental Counting Principle to find the total number of possible combinations		<a href="http://learnzillion.com/lessons/1863-use-the-fundamental-counting-principle-to-find-the-total-number-of-possible-combinations">http://learnzillion.com/lessons/1863-use-the-fundamental-counting-principle-to-find-the-total-number-of-possible-combinations</a>
Design and Use a Simulation to Generate Frequencies for Compound Events Example 1		<a href="http://www.youtube.com/watch?v=9M2-OkV9vVc">http://www.youtube.com/watch?v=9M2-OkV9vVc</a>
Design and Use a Simulation to Generate Frequencies for Compound Events Example 2		<a href="http://hoodamath.com/tutorials/7thgrade/Design_and_Use_a_Simulation_to_Generate_Frequencies_for_Compound_Events_Example_2.php">http://hoodamath.com/tutorials/7thgrade/Design_and_Use_a_Simulation_to_Generate_Frequencies_for_Compound_Events_Example_2.php</a>
Investigate chance processes and develop, use, and evaluate probability models.		<a href="http://mathflix.luc.edu/CommonCore/grade7/Statistics%20and%20Probability/common-core-7SP-5-6-7-8-math-videos.html">http://mathflix.luc.edu/CommonCore/grade7/Statistics%20and%20Probability/common-core-7SP-5-6-7-8-math-videos.html</a>