7th Grade Mathematics Handbook

"Talk like a mathematician"

Learning Target: I can explain my thinking and respond to the mathematical thinking of others.

All students will engage in discourse around mathematics each and every day.

Discourse is a way of representing, thinking, talking, agreeing, and disagreeing; the way ideas are exchanged and what the ideas entail.

Sentence Starters Mathematicians Use

▪ I noticed that…
▪ I noticed a connection between…
▪ Using the numbers in my table…
▪ I tried…
▪ I wondered why…
▪ This didn't work, so…
▪ This is true because…
▪ I decided to… so that/because…
▪ When I looked…
▪ This reminded me of…
▪ I tested…
▪ I already know that… so…
▪ This worked, so…
▪ I agree/disagree because…

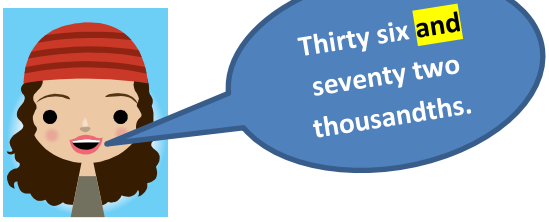
6 words to eliminate & what to replace each word with.

#1 When reading a number with a decimal point say 'and' in place of saying ~~'point'~~. Use appropriate place value with numbers.

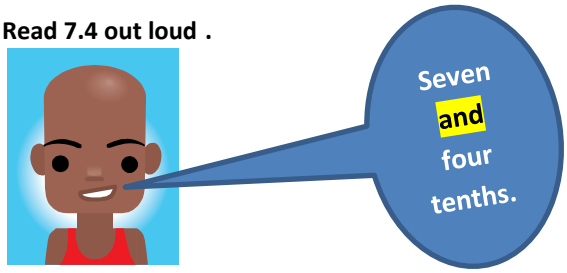
Hundreds	Tens	Ones	Tenths	Hundredths	Thousandths
(100)	(10)	(1)	(0.1)	(0.01)	(0.001)

"and"

For example: **Read 36.72 out loud.**



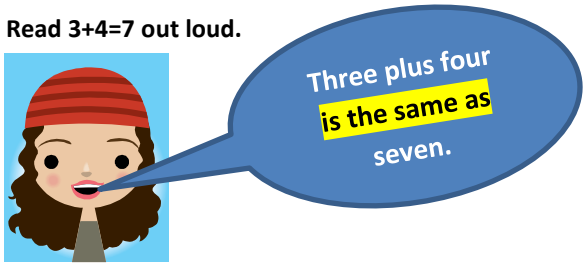
Read 7.4 out loud .



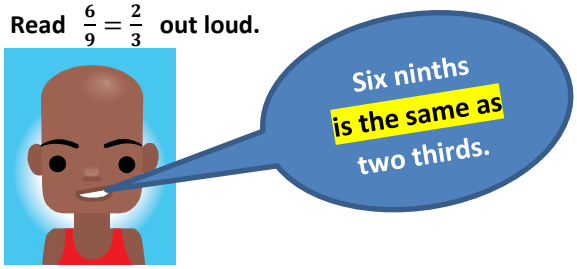
~~point~~

#2 When reading an equation with the an equal sign say 'is the same as' in place of saying ~~'equals'~~.

For example: **Read 3+4=7 out loud.**

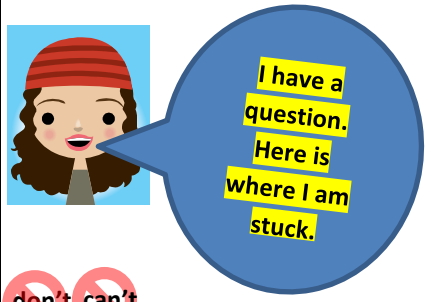


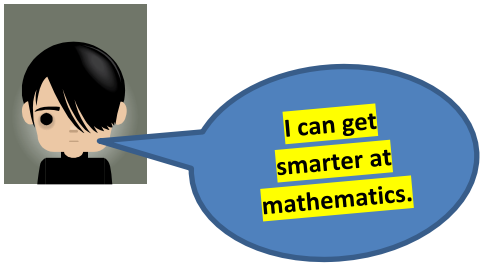
Read $\frac{6}{9}=\frac{2}{3}$ out loud.

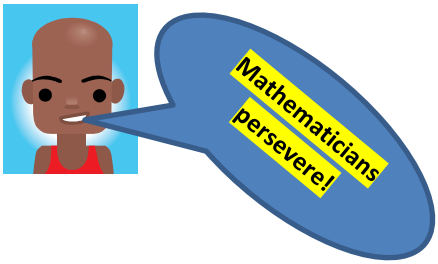


~~equals~~

#3/4 When you are stuck or frustrated say 'I can get smarter at mathematics' in place of saying ~~'I can't'~~ or ~~'I don't know'~~.





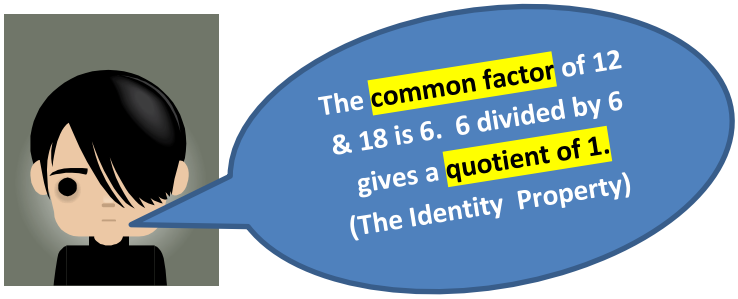


~~don't~~ ~~can't~~

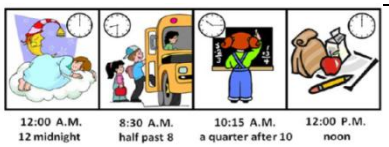
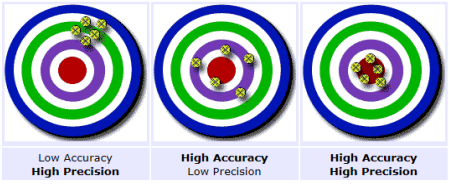
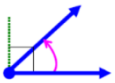
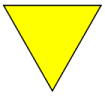
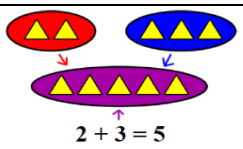
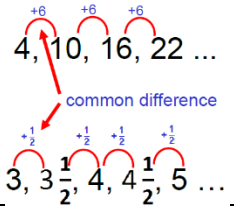
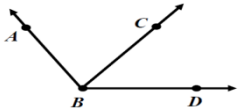
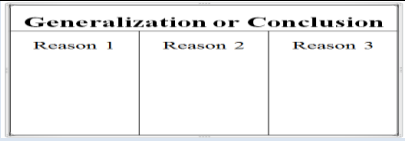
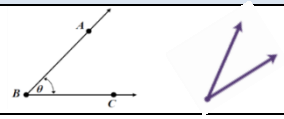
#5 When are simplifying fractions say 'divide the common factors giving a quotient of 1' in place of saying ~~'cancel out'~~ the common factors' or '~~reduce~~ the fraction'.

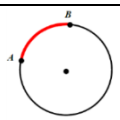
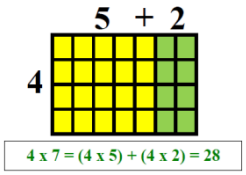
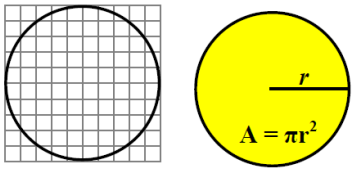
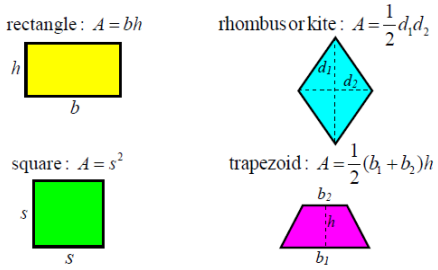
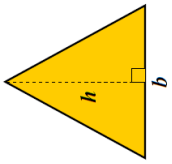
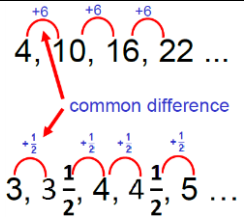
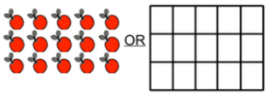
For example: **Write $\frac{12}{18}$ in simplest form.**

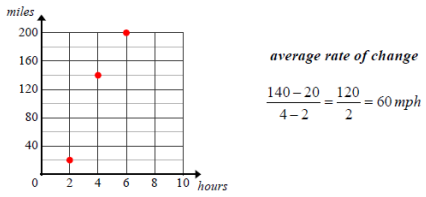
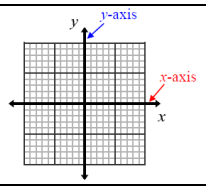
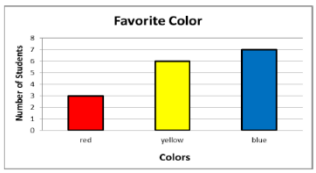
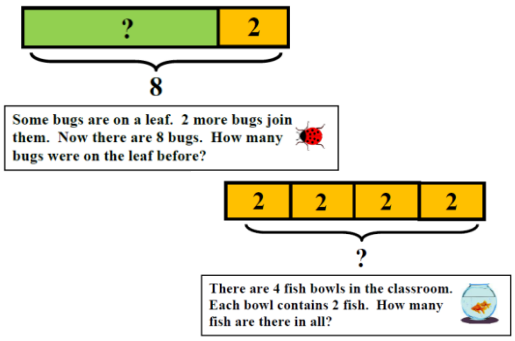
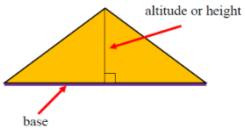
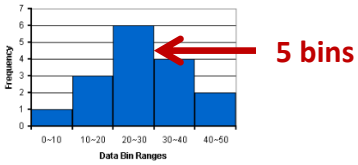
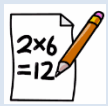
$$\frac{12}{18}=\frac{2\times\cancel{6}}{3\times\cancel{6}}=\frac{2}{3}$$

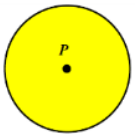
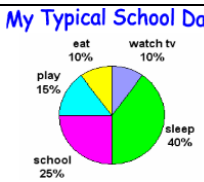
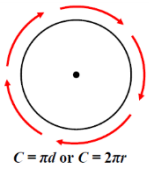
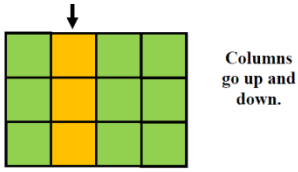
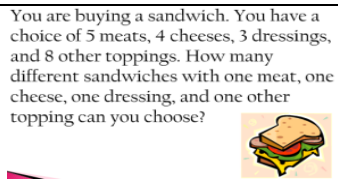
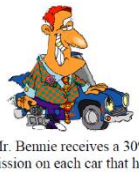
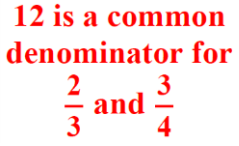
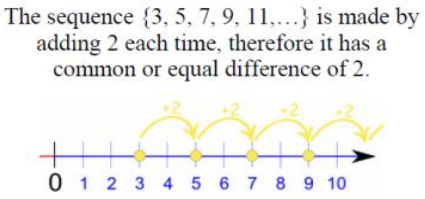
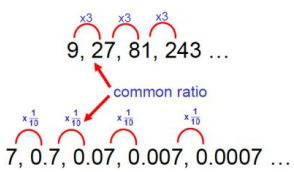


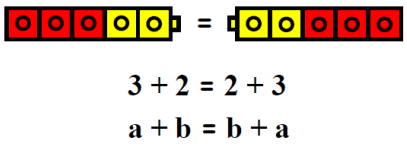
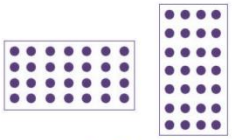
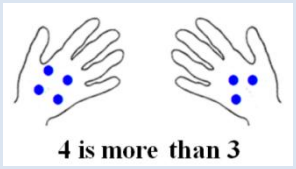
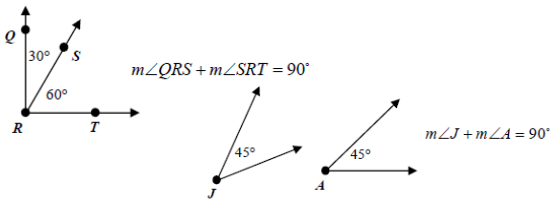
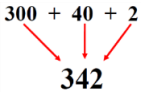
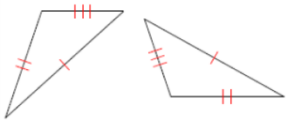
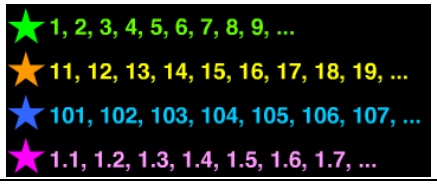
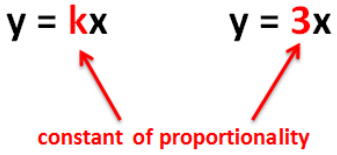
~~cancel out~~ ~~reduce~~

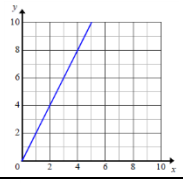
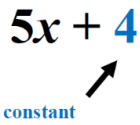
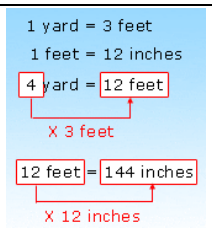
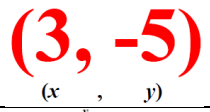
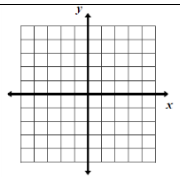
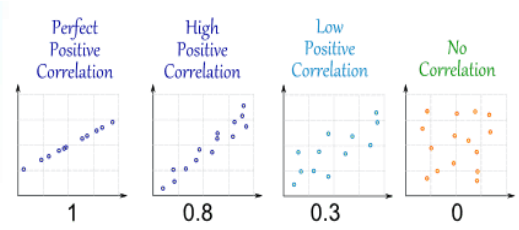
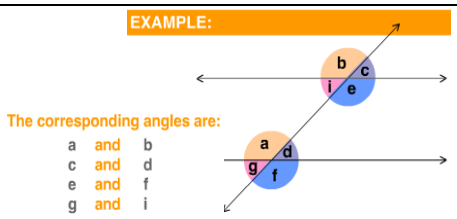
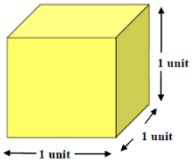
Grade	Term	Visual	Definition
3	**a.m.**		A time between 12:00 midnight and 12:00 noon.
7	**absolute value**	$\lvert -5 \rvert = 5$	The distance of a number from zero on the number line. Always positive.
*	**accuracy accurate**		Accuracy is how close a measured value is to the actual (true) value. Being accurate is minimizing our error in measurements, readings & observations (ie: reducing human error).
*	**acute angle**		An angle with a measure less than 90°.
*	**acute triangle**		A triangle with no angle measuring 90° or more.
3	**add**		To combine, put together two or more quantities.
*	**additive inverse**	$^{+}3 + {}^{-}3 = 0$ $^{+}3$ is the additive inverse, or opposite, of $^{-}3$ $^{-}3$ is the additive inverse, or opposite, of $^{+}3$	A number that is the same distance from 0 on the number line, but in the opposite direction
*	**additive thinking**		Additive thinking is present when a constant number is added to a value to get the resulting value.
6	**adjacent angles**	 $\angle ABC$ is adjacent to $\angle CBD$.	Two angles in a plane that have a common vertex and a common side.
*	**algorithm**	47 + 16 13 Add the ones. 7 + 6 = 13 + 50 Add the tens. 40 + 10 = 50 63 Add the partial sums.	A step-by-step method for computing.
*	**analyze**		To break apart. To examine by separating into parts and studying their interrelations.
3 4	**angle**		The union of two rays that have the same endpoint. The amount of turning between 2 lines meeting at a common point.

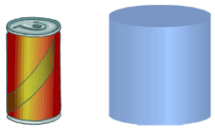
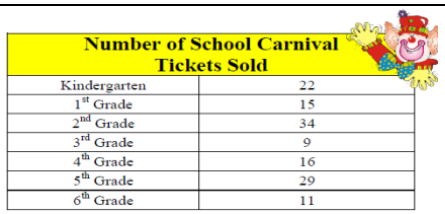
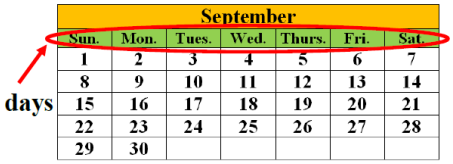
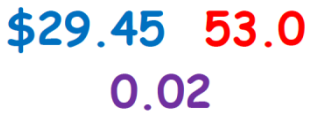
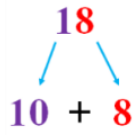
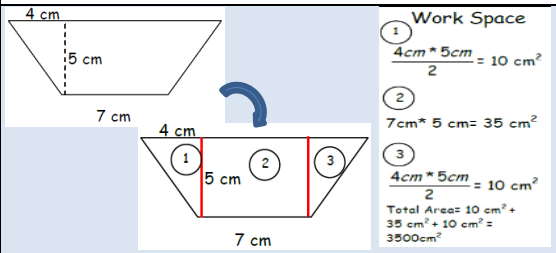
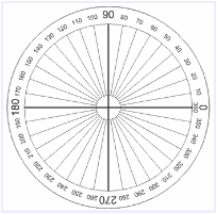
*	**arc**		Part of a circle between any two of its points.
4 5	**area**	**2 rows of 5 = 10 square units** **or** **2 x 5 = 10 square units** 	The measure, in square units, of the interior region of a 2-dimensional figure or the surface of a 3-dimensional figure.
*	**area model**		A model of multiplication that shows the product within a rectangle drawing. Can break apart the model into smaller arrays to find unknown facts.
7	**area of circle**		The measure, in square units, of the interior region of a 2-dimensional figure. The formula for the area of a circle, $A = \pi r^2$.
6	**area of a quadrilateral**		Area is the measurement of the 2-dimensional region enclosed by the quadrilateral.
6	**area of a triangle**		The area of a triangle is $A = \frac{1}{2}bh$, where b = the base and h = the vertical height.
8	**arithmetic sequence**		A sequence of numbers in which the difference between any two consecutive numbers is the same. e.g. 1, 5, 9, 13… is an arithmetic sequence pattern. The difference between any two consecutive numbers is 4.
*	**array**		An arrangement of objects in equal rows and equal columns.
8	**associative property of addition**	**(5 + 7) + 3 = 5 + (7 + 3)** **12 + 3 = 5 + 10** **15 = 15**	Changing the grouping of three or more addends does not change the sum.
8	**associative property of multiplication**	**(5 x 7) x 3 = 5 x (7 x 3)** **35 x 3 = 5 x 21** **105 = 105**	Changing the grouping of three or more factors does not change the product.

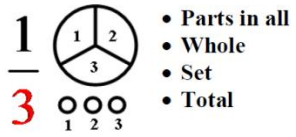
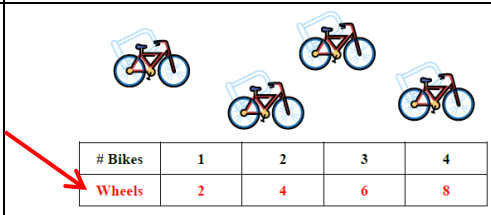
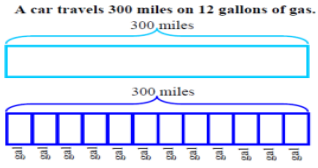
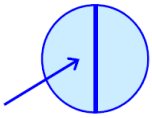
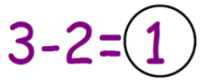
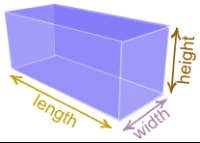
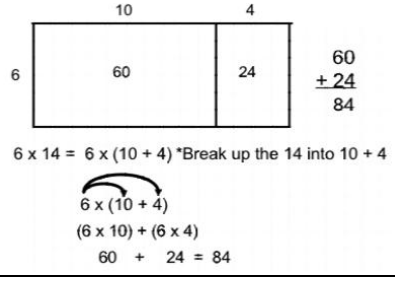
7	**average rate of change**		The average rate of change of a function between any two points is the slope of the line connecting those two points.
*	**axis**		A reference line from which distances or angles are measured in a coordinate grid. (plural – axes)
3 4	**bar graph**		A graph that uses height or length of rectangles to compare data.
*	**bar model**		A model that uses bars to represent known and unknown quantities and the relationship between these quantities.
8	**base (of an exponent)**		The number that is raised to a power. In 10^4, 10 is the base and 4 is the exponent. 10 is raised to the power of 4. (104 = 10 x 10 x 10 x 10 = 10,000)
5 6	**base (of a polygon)**		The side of a polygon that is perpendicular to the altitude or height.
*	**benchmark fractions**	$\frac{1}{4}\ \frac{1}{3}\ \frac{1}{2}\ \frac{2}{3}\ \frac{3}{4}$	Fractions that are commonly used for estimation.
*	**bins**		The vertical bars in a histogram into which the sample values are sorted. Most histograms have 5-9 bins.
*	**calculate**		To work out an answer, usually by adding, multiplying etc.
6	**capacity**		Capacity refers to the amount of liquid a container can hold.
6	**certain event**		Something that is sure to happen. For example, the sun will always rise.

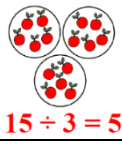
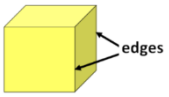
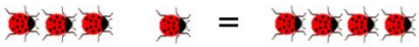
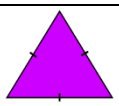
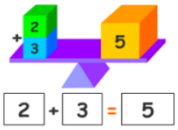
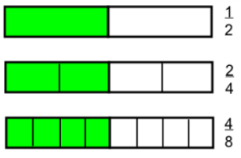
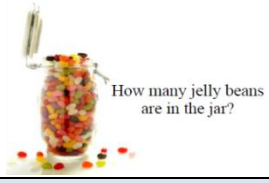
7	**circle**		A plane figure with all points the same distance from a fixed point called a center.
7	**circle graph**		Also called pie chart. It is a circular graph that uses radii to divide the circle into sectors in such a way that the areas of the sectors are proportional to the quantities represented.
7	**circumference**		The distance around a circle. The length of the circumference equals a little more than three times its diameter.
4	**clockwise**		Moving in the direction of the hands on a clock.
8	**coefficient**		A numerical factor in a term of an algebraic expression.
*	**column**		A vertical arrangement of numbers or information in an array or table.
6	**combinations**		A collection of things, in which the order does not matter. Example: If you are making a sandwich, how many different combinations of 2 ingredients could you make with cheese, mayo and turkey? Answer: {cheese, mayo}, {cheese, turkey} or {mayo, turkey}
*	**commission**		A fee charged by a broker or agent for his/her service in facilitating a transaction.
5	**common denominator**		For two or more fractions, a common denominator is a common multiple of the denominators.
8	**common difference (or equal difference)**		The common difference between each number in an arithmetic sequence.
8	**common ratio**		The ratio of successive terms in a geometric sequence.

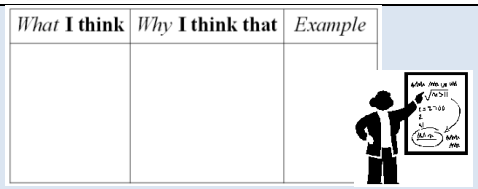
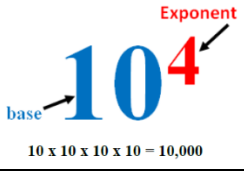
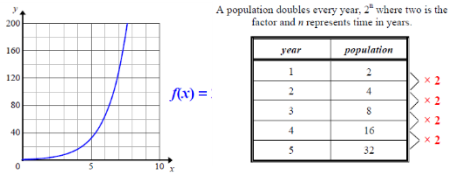
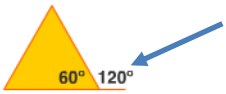
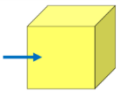
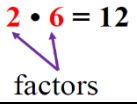
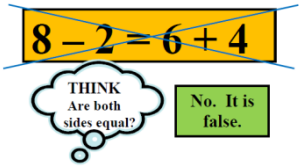
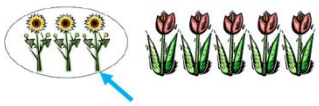
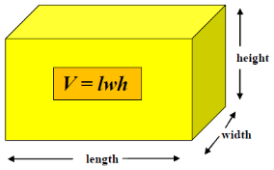
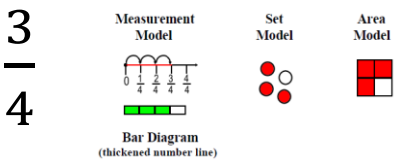
8	**commutative property of addition**		Changing the order of the addends does not change the sum.
8	**commutative property of multiplication**		Changing the order of the factors does not change the product.
3 6	**compare**		To examine (2 or more objects, ideas…) in order to notice similarities and differences. To decide if one number is greater than, less than, or equal to another number.
6	**complementary angles**		Two angles are complementary if they add up to 90° (right angle). They don't have to be next to each other.
*	**compound event**		Two or more independent events considered together.
7	**compound interest**		Where interest is calculated on both the amount borrowed and any previous interest. Usually calculated one or more times per year.
*	**compose**		To make or create a whole by putting together its basic parts.
5	**cone**		A geometric solid with a circular base and curved surface that meets at a point.
4 5	**congruent**		Two figures are congruent if they have the same shape and size.
8	**consecutive**		Numbers which follow each other in order, without gaps, from smallest to largest. 12, 13, 14 and 15 are consecutive numbers.
7	**constant of proportionality**		A constant (or number) value of the ratio of 2 proportional quantities. (for example: a unit rate)

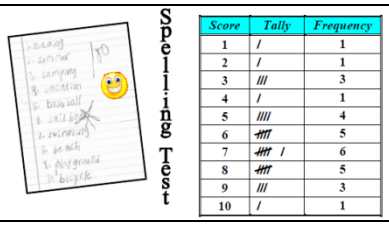
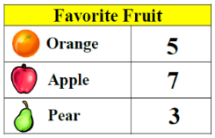
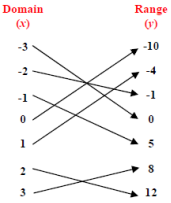
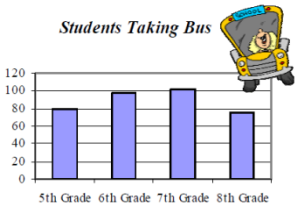
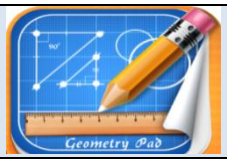
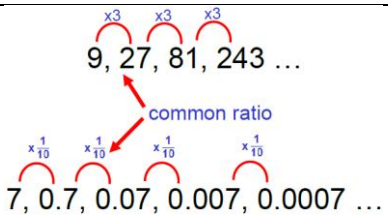
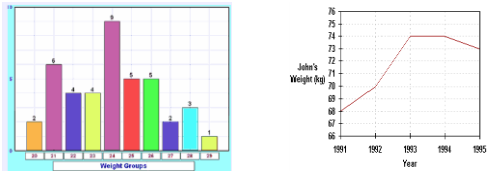
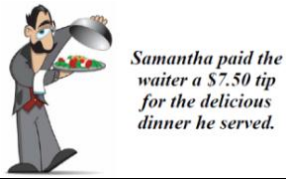
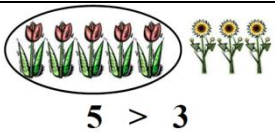
7	**constant rate of change**		In linear relationships the constant rate of change is illustrated as the slope of the graph of the equation. This is so because the change in *y* divided by the change in *x* is constant for any two points on the line.
8	**constant term**		A term whose value does not change.
7	**conversion**		To change from one unit of measure to another. (1 yard=36 inches) • The ratio of a measurement in one unit to the equivalent numerical value in another unit. • For example, the conversion factor from meters to centimeters is 100 because 1 meter = 100 centimeters.
7	**coordinate**		An ordered pair of numbers that identify a point on a coordinate plane.
6	**coordinate grid**		A 2-dimensional system in which the coordinates of a point are its distances from two intersecting, usually perpendicular, straight lines called axes. (Also called coordinate *plane* or *system*.)
8	**correlation**		When two sets of data are strongly linked together we say they have a **High Correlation**. • Correlation is **Positive** when the values **increase** together, and • Correlation is **Negative** when one value **decreases** as the other increases
7	**corresponding angles**		When two lines are crossed by another line (which is called the Transversal), the angles in matching corners are called corresponding angles.
4	**counter-clockwise**		Moving in the opposite direction to the hands on a clock.
*	**create**		To produce through artistic or imaginative effort. To make your own.
*	**cubic units**		A unit such as a cubic meter to measure volume or capacity.
6	**customary system**		A system of measurement used in the U.S. The system includes units for measuring length, capacity, and weight.

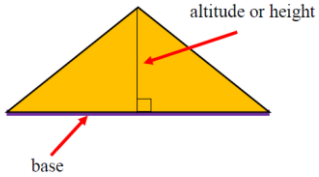
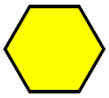
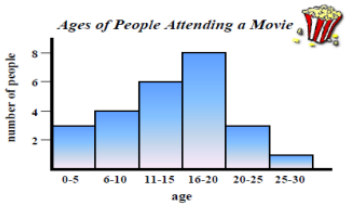
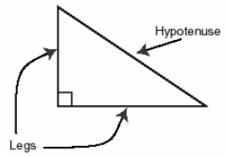
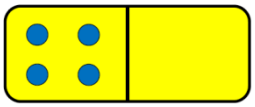
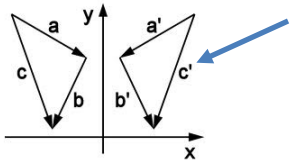
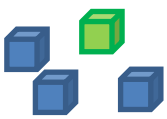
5 7	**cylinder**		A geometric solid with 2 circular bases and a curved surface.
5	**data**	 **Number of School Carnival Tickets Sold** Kindergarten 22 1st Grade 15 2nd Grade 34 3rd Grade 9 4th Grade 16 5th Grade 29 6th Grade 11	Information, especially numerical information. Usually organized for analysis.
3	**days**	 **September** Sun. Mon. Tues. Wed. Thurs. Fri. Sat. 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 days	There are 24 hours in a day.
*	**decagon**		A polygon with ten sides.
4	**decimal**	 $29.45 53.0 0.02	A number with one or more digits to the right of a decimal point.
*	**decompose (partition)**	 18 10 + 8	To separate into basic elements.
*	**decompose (a shape)**	 4 cm 5 cm 7 cm 4 cm 1 2 3 5 cm 7 cm Work Space 1 $\frac{4cm * 5cm}{2} = 10\ cm^2$ 2 $7cm * 5\ cm = 35\ cm^2$ 3 $\frac{4cm * 5cm}{2} = 10\ cm^2$ Total Area= 10 cm² + 35 cm² + 10 cm² = 3500cm²	To break apart a shape into smaller polygons (often triangles & quadrilaterals).
3	**decrease**		Make something smaller (in size or quantity). As the parrot drinks, the amount left in the can will decrease.
3	**degrees**		A measure for angles. There are 360 degrees in a full rotation. The symbol for degrees is ° Example: 90 degrees (90°) is a right angle.
*	**delete**		To remove, erase, cancel, or strike-out.
*	**demonstrate**		To show or present. To show to be true.

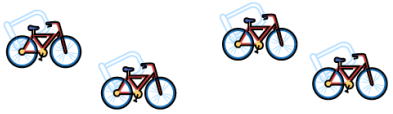
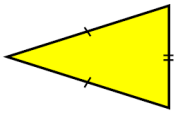
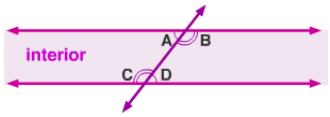
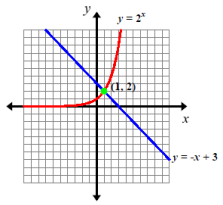
4	**denominator**		The quantity below the line in a fraction. It tells how many equal parts are in the whole.
8	**dependent variable**		In a function, a variable whose value is determined by the value of the related independent variable.
*	**describe**	looks sounds feels smells tastes 	To tell everything you know. To give details and examples.
*	**determine**		To decide or settle conclusively.
*	**diagram**		A drawing that represents a mathematical situation.
7	**diameter**		A straight line going through the center of a circle connecting two points on the circumference.
3 5	**difference**		The result when one number is subtracted from another.
3	**digits**	0 1 2 3 4 5 6 7 8 9	Any of the symbols 0, 1, 2, 3, 4, 5, 6, 7, 8, or 9.
3	**dime**		A coin worth 10 cents.
*	**dimensions**		A measurement of length in one direction. Examples: width, depth and height are dimensions.
8	**distributive property**	Example: $5(x + 8) = (5 \cdot x) + (5 \cdot 8)$ 	$a \cdot (b + c) = (a \cdot b) + (a \cdot c)$ and $a \cdot (b - c) = (a \cdot b) - (a \cdot c)$, where a, b, and c stand for any real numbers. When one of the factors of a product is a sum, multiplying each addend before adding does not change the product.

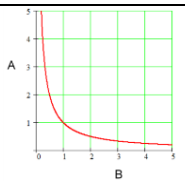
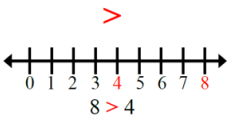
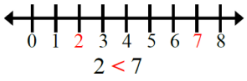
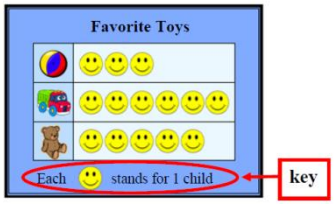
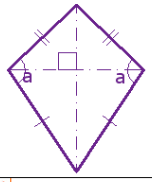
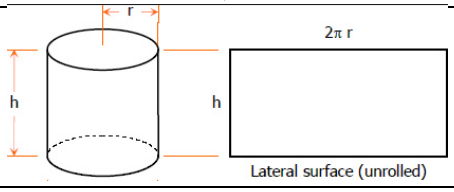
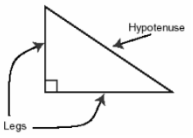
3 4	**divide**	 $15 \div 3 = 5$	To separate into equal groups and find the number in each group or the number of groups.
4 5	**dividend**	$7\overline{)56}$	A number that is divided by another number.
4 5	**divisor**	$7\overline{)56}$	The number by which another number is divided.
8	**domain**	$\{(2, -3), (4, 6), (3, -1), (7, 6), (6, 3)\}$ **domain:** $\{2, 3, 4, 6, 7\}$	The set of "input" values for which a function is defined.
5	**edge**		The place where two flat surfaces of a solid figure meet.
3	**equal**	$13 + 5 = 10 + 8$ $13 + 5$ $10 + 8$ These expressions balance the scale because they are equal.  **3 + 1 is the same amount as 4**	Having the same amount.
*	**equilateral triangle**		A triangle whose sides are all the same length.
3 4 5	**equation**	$9x + 3 = 4x - 7$ $8 = 5 + 3$ 	A statement that shows two mathematical expressions are equal.
4 5 6	**equivalent**	$9 + 12 = 1 + 20$  	Naming the same number. Fractions that have the same value.
3	**estimate**	Close to 1 Close to 1 $\frac{3}{4} + \frac{5}{6} \approx 2$ is approximately equal 	To find a number close to an exact amount; an estimate tells *about* how much or *about* how many.
6 7	**evaluate**	$42 - 13 = n$ $n = 29$	To find the value of a mathematical expression.
6	**event**	What is the probability of drawing a five of diamonds out of a set of playing cards? **P(5 of diamonds) =** $\frac{1}{52}$ 	A set of outcomes to which a probability is assigned.

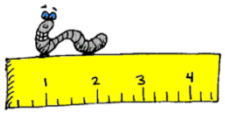
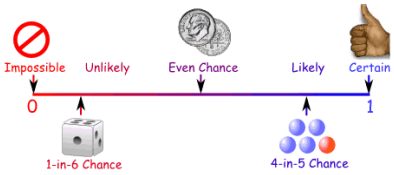
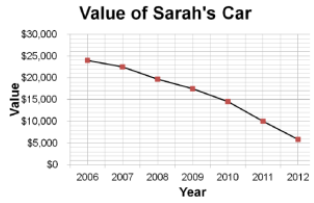
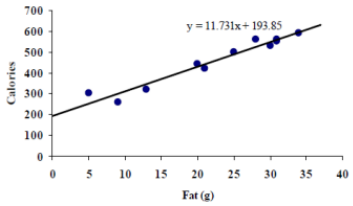
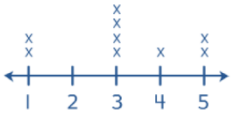
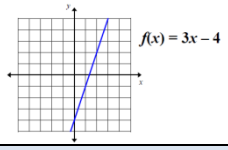
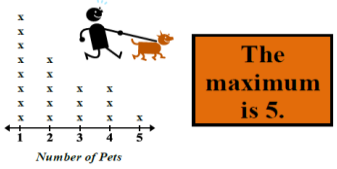
6	**experimental probability**		The ratio of the number of times the event occurs to the total number of trials.
*	**explain**		To tell **all** about.
6 7	**exponent**		The number that tells the number of times the base is multiplied by itself.
8	**exponential equation**		A function that repeatedly multiplies an initial amount by the same positive number. You can model all exponential functions by using $f(x) = ab^x$, where a is a nonzero constant, $b > 0$ a $b \neq 1$.
5 6	**expression**		A mathematical phrase without an equal sign. A variable or combination of variables, numbers, and symbols that represents a mathematical relationship.
6	**exterior angle**		The angle formed outside a polygon when one side is extended.
5	**face**		A surface on a solid figure.
4 6	**factor**		An integer that divides evenly into another.
*	**false**		Not true; incorrect. A false equation does not have the same value on each side of the equal sign.
3	**fewer**		Smaller quantity or amount.
5	**formula**		A rule that is written as an equation.
3	**fraction**		A way to describe a part of a whole or a part of a group by using equal parts.

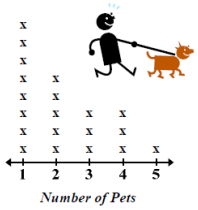
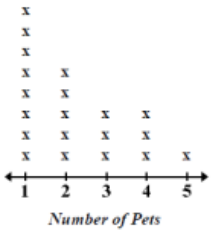
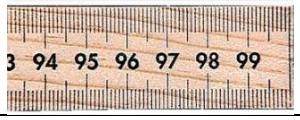
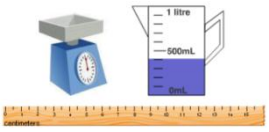
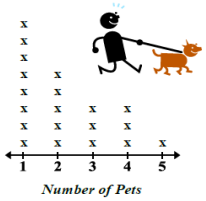
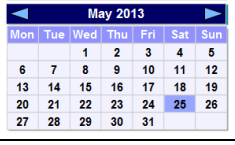
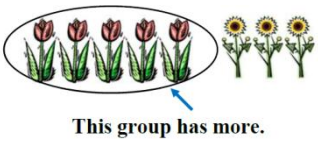
6	**frequency**		The number of times an event occurs within a specific time period.
7	**frequency table**		A table that uses numbers to record data.
6	**function**		A relation that assigns exactly one value in the range to each value in the domain.
8	**function notation**	$f(x) = 3x - 8$	To write a rule in function notation, you use the symbol $f(x)$ in place of y.
5	**graph**		A pictorial device used to show a numerical relationship.
*	**generate**		To produce or bring into being; create.
*	**geometric figure**		Any combination of points, lines, planes, or curves in two or three dimensions.
8	**geometric sequence**		A sequence which has a constant ratio between terms.
*	**graph**		A diagram of values, usually shown as lines or bars.
*	**gratuities**		Something given voluntarily or beyond obligation usually for some service: tip.
3	**greater than**		Greater than is used to compare two numbers when the first number is larger than the second number.

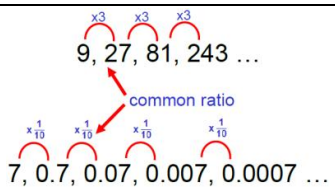
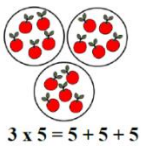
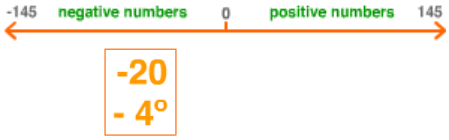
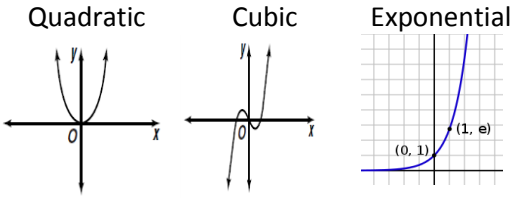
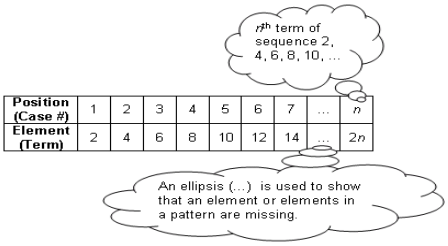
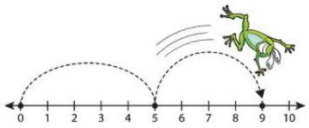
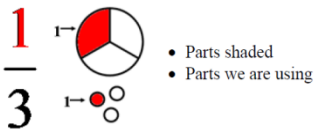
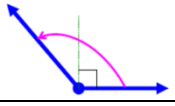
6	**greatest common factor**	12 (1, 2, 3, 4, 6, 12) 18 (1, 2, 3, 6, 9, 18) GCF = 6	GCF. The largest factor of two or more numbers.
5	**height**		The perpendicular distance from a vertex to the opposite side of a plane figure.
*	**hexagon**		A figure with 6 straight sides and 6 vertices.
7	**histogram**		A bar graph in which the labels for the bars are numerical intervals.
4	**horizontal**		Going side-to-side, like the horizon. Parallel to the horizon.
3	**hours**	 60 minutes = 1 hour	A unit of time equal to 60 minutes.
6	**hypotenuse**		The longest side of a right triangle, or the side directly across from the right angle
*	**identify**		To name.
8	**identity property**	 1 group of 3 = 3 1 x 3 = 3  4 + 0 = 4	If you multiply a number by one, the product is the same as that number. When you add zero to a number, the sum is that same number.
7	**image**		The new position of a point, a line, a line segment, or a figure after a transformation is called its image.
6	**impossible**	P(red cube)=0 	No chance. Will not happen. An outcome with a probability of zero.

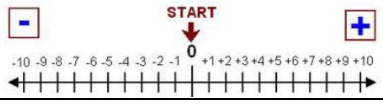
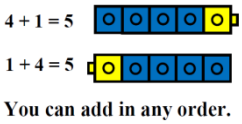
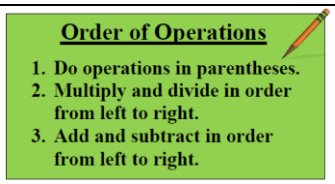
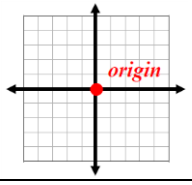
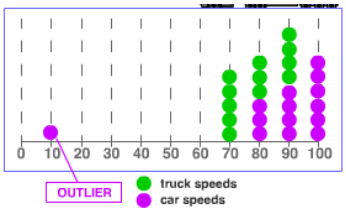
4 5 6	**improper fraction**	$\frac{15}{6}$ $\frac{6}{3}$ $\frac{16}{5}$	A term for a fraction whose numerator is greater than or equal to its denominator.
3	**increase**		To get larger in size or number.
8	**independent variable**	 **# Bikes** 1 2 3 4 **Wheels** 2 4 6 8	A variable in a mathematical equation whose value determines that of a dependent variable.
5 6 7	**inequality**	$5x + 6 < 20 - 2x$ 	A mathematical sentence that compares two unequal expressions using one of the symbols <, >, ≤, ≥, or ≠.
8	**infinite**		Having no boundaries or limits.
4 5	**input**	$f(x) = 2(x + 1) - 7$ **input:** $x = 3$ $f(3) = 2(3 + 1) - 7$ $= 2(4) - 7$ $= 8 - 7$ $= 1$	A value of the independent variable.
*	**isosceles triangle**		A triangle that has at least two congruent sides.
6 7	**integer**		The set of whole numbers and their opposites.
6	**interior angle**	 	• An angle within a polygon. • An angle within two lines when they are crossed by a 3rd line (a transversal).
6	**intersection**		A point where two or more functions intersect.
7	**inverse**	$5 \times \frac{1}{5} = 1$ **multiplicative inverses**	Two numbers whose product is 1. Also called reciprocals.

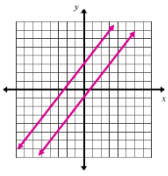
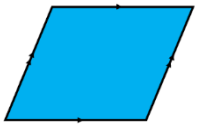
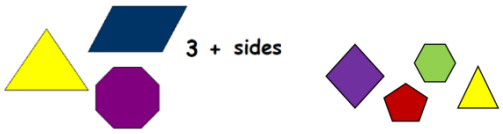
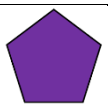
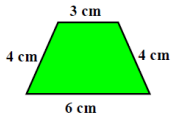
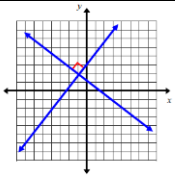
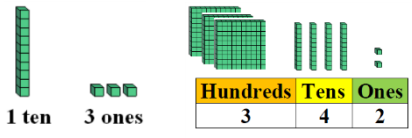
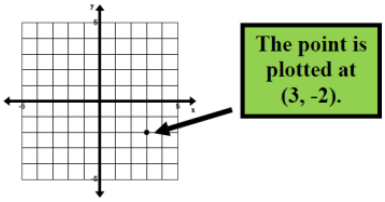
*	**inverse operations**	**Multiplication and division are inverse operations.** 8 x 5 = 40 40 ÷ 5 = 8	Operations that undo each other. • addition & subtraction • multiplication & division • squaring a # & square roots
7	**inversely proportional**	$y = \frac{k}{x}$ 	A relationship where a number either increases as another decreases or decreases as another increases.
8	**irrational numbers**	These numbers are irrational: $\sqrt{2} = 1.414213562...$ 0.01011011101111... $\pi \doteq 3.14159265358979323...$	A number that cannot be written as a ratio of two integers. Irrational numbers in decimal form are non-terminating and nonrepeating.
6	**is greater than**	 8 > 4	The symbol > means greater than.
6	**is less than**	 2 < 7	The symbol < means less than.
*	**justify**	 	To prove; give evidence or facts.
*	**key**		A part on a graph or chart that tells what each picture on a picture graph stands for.
6	**kite**		A 4-sided flat shape with straight sides that: - has two pairs of sides. - each pair is adjacent sides (they meet) that are equal in length.
*	**lateral area**		The sum of the surface areas of all a solids faces excluding the base of the solid.
3	**least**	The least of {16,4,9} is 4.	Smallest.
6	**least common multiple**	6, 12, 18, 24, 30, 36, 42… 8, 16, 24, 32, 40, 48, 56… LCM = 24	LCM. The smallest common multiple of a set of two or more numbers.
6	**leg**		The longest side of a right triangle, or the side directly across from the right angle

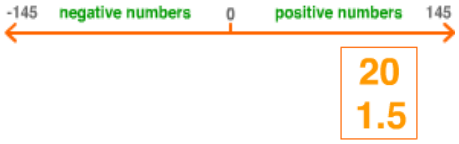
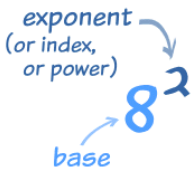
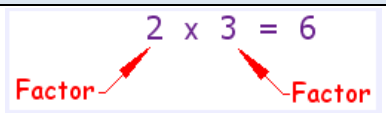
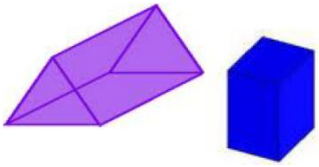
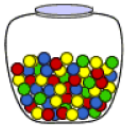
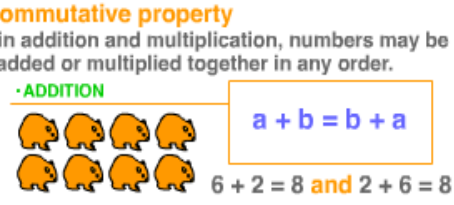
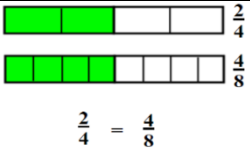
3 4	**length**		How long something is. The distance from one point to another.
3	**less than**	 $3 < 5$	Less than is used to compare two numbers when the first number is smaller than the second number.
*	**likelihood**		The chance that something might happen; probability.
6	**likely event**	 $P(\text{number} < 5) = \frac{4}{6} = \frac{2}{3}$	An event that is most likely to happen.
5	**line graph**		A graph that uses points connected by lines to show how something changes in value.
8	**line of best fit**		A line of best fit (or "trend" line) is a straight line that best represents the data on a scatter plot. This line may pass through some of the points, none of the points, or all of the points.
3	**line plot**		A diagram showing data on a number line.
8	**linear equation**	$2(x-5) = 3x + 4$	An algebraic equation in which each term is either a constant or the product of a constant and (the first power of) a single variable.
8	**linear function**		Functions that are a first degree polynomial of one variable. The graph of the function is a line.
4	**locate**		To find by searching, examining, or experimenting.
5	**maximum**		The largest amount; the greatest number in a data set.

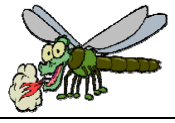
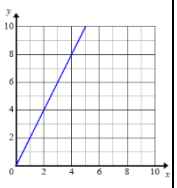
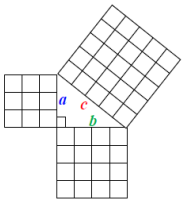
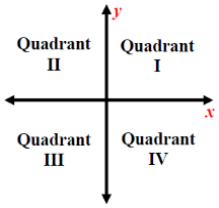
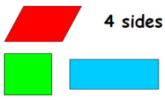
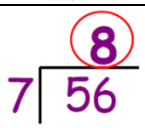
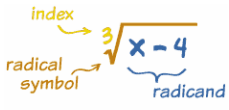
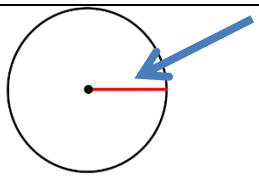
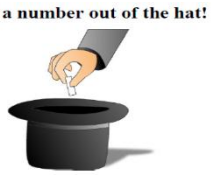
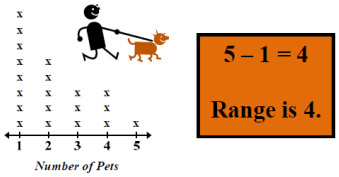
5	**mean**	Data Set: 14, 21, 27, 33, 45, 46, 52 Step 1: 14 + 21 + 27 + 33 + 45 + 46 + 52 = 238 Step 2: 238 ÷7 = 34 ← mean	The sum of a set of numbers divided by the number of elements in the set. (A type of average)
5	**measures of center**	 Examples: Mode = 1 Median = 2 Mean = 2.3	An average; a single value that is used to represent a collection of data. Three commonly used types of averages are mode, median, and mean. (Also called measures of central tendency.)
*	**measures of variation**	 Range = 4 	A measure of how much a collection of data is spread out. Commonly used types include range and quartiles. (Also known as spread or dispersion.)
5	**median**	14, 21, 27, 33, 45, 46, 52 median	The middle number of a set of numbers when the numbers are arranged from least to greatest, or the mean of 2 middle numbers when the set has 2 middle numbers.
3	**meter stick**		A measuring tool that is 100 centimeters long.
6	**metric system**		A system of measurement based on tens. The basic unit of capacity is the liter. The basic unit of length is the meter. The basic unit of mass is the gram.
5	**minimum**	 The minimum is 1.	The smallest amount; the smallest number in a data set.
3	**minutes**		A unit of time equal to 60 seconds.
4 5 6	**mixed number**	$1\frac{5}{8}$ $4\frac{3}{4}$	A number that has a whole number (not 0) and a fraction.
3	**months**		One of the twelve parts of the year.
3	**more**		Greater quantity or amount.

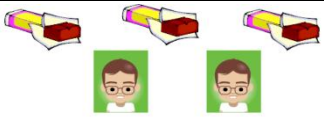
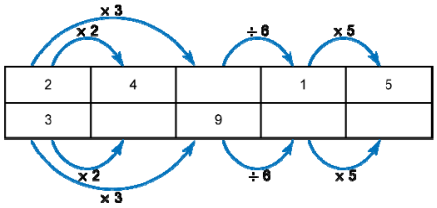
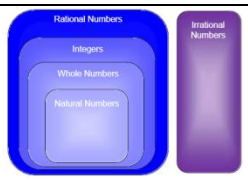
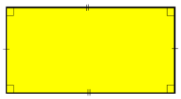
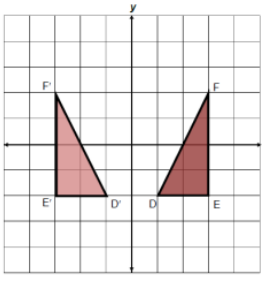
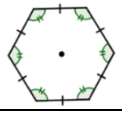
	multiplicative thinking		Multiplicative thinking is present when a value is multiplied by a constant to get the resulting value.
3 4	**multiply**		The operation of repeated addition of the same number.
*	**negative number**		A number less than zero. We use − to show a negative number.
5	**net**		A 2-dimensional shape that can be folded into a 3-dimensional figure is a net of that figure.
3	**nickel**		A coin worth 5 cents.
8	**non-linear function**		Equations whose graphs are not straight lines.
8	**nth term**		A formula that enables one to find any term of a sequence.
*	**number line**		A diagram that represents numbers as points on a line.
3 4	**number sentence**	$3 + 5 = 8$ $6 - 2 = 4$	A mathematical sentence written in numerals and mathematical symbols. (often used in place of the word 'equation')
4	**numerator**		The number written above the line in a fraction. It tells how many equal parts are described in the fraction.
*	**Obtuse angle**		An angle with a measure greater than 90º but less than 180º.
*	**obtuse triangle**		A triangle that contains one angle with a measure greater than 90º (obtuse angle) and two acute angles.

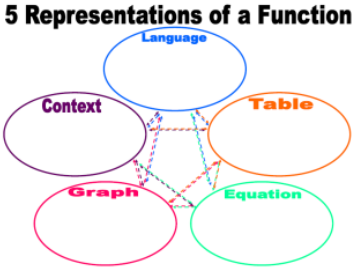
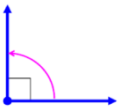
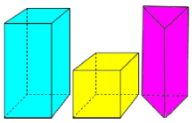
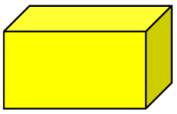
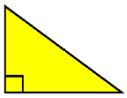
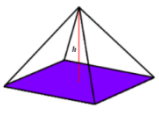
*	**octagon**		A polygon with eight sides.
4	**operation**		A mathematical process. The most common are add, subtract, multiply and divide (+, -, ×, ÷).
7	**opposite**	+3 and -3 are opposites. 	Having a different sign but the same numeral.
3 4	**order**	$\frac{2}{8}$ $\frac{2}{6}$ $\frac{2}{4}$ In order from least to greatest.  You can add in any order.	A sequence or arrangement of things. To order fractions, compare two fractions at a time.
6	**order of operations**		A set of rules that tells the order in which to compute.
5 6	**ordered pair**	(-5, 2) (*x* , *y*)	A pair of numbers that gives the coordinates of a point on a grid in this order (horizontal coordinate, vertical coordinate). Also known as a coordinate pair.
7	**origin**		The intersection of the *x*- and *y*-axes in a coordinate plane, described by the ordered pair (0, 0).
6	**outcome**	coin toss - heads or tails  $P = \frac{0}{0}$ outcomes heads / outcomes total	One of the possible results of a probability experiment.
*	**outlier**		A value far away from most of the rest in a set of data.
4 5	**output**	$f(x) = 2(x + 1) - 7$ input: $x = 3$ $f(3) = 2(3 + 1) - 7$ $= 2(4) - 7$ $= 8 - 7$ $= 1$ **output** is 1	A value of the dependent variable.
3	**p.m.**		The time between 12:00 noon and 12:00 midnight.

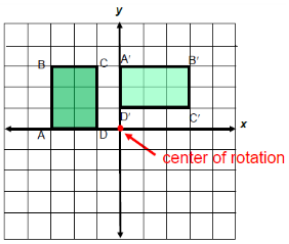
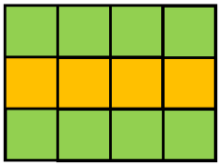
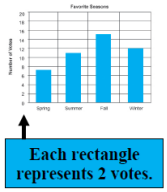
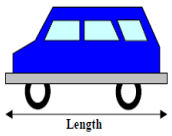
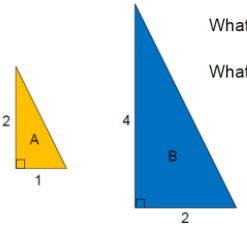
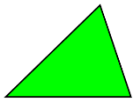
3 4	**parallel**		Two lines in the same plane that never intersect. Parallel lines have the same slope.
*	**parallelogram**		A quadrilateral with two pairs of parallel and congruent sides.
*	**pattern**		A repeating or growing sequence or design. An ordered set of numbers or shapes arranged according to a rule.
*	**polygon**		A closed plane figure made by line segments. A polygon has 3 or more sides.
3	**penny**	 1¢	A unit of money. A penny is one cent or 1¢. 100 cents = one dollar
*	**pentagon**		A polygon with 5 straight sides.
6	**per**	35 miles per hour or 35 $\frac{miles}{hour}$	For each. 'out of' Usually means you will divide.
6	**percent**	 **80% of the pentagon is shaded.**	A special ratio that compares a number to 100 using the symbol %.
3	**perimeter**	 Perimeter = 4cm + 6cm + 4cm + 3cm = 17cm	The continuous line forming the boundary of a closed geometric figure.
3 4	**perpendicular**		Lines that intersect to form right angles. Two lines are perpendicular if the product of their slopes is -1.
5	**place value**		The value a digit has because of its place in a number.
6 7	**plot**		To place points on a graph or coordinate plane.

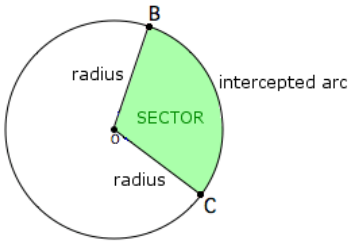
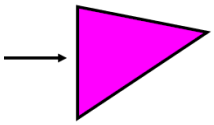
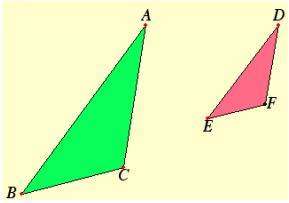
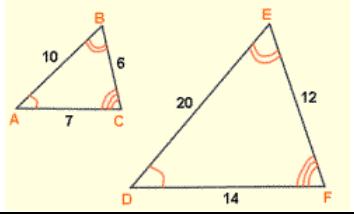
8	**point-slope form**	$y - y_1 = m(x - x_1)$	A form of a linear equation. You need one point (x, y) and the slope to write an equation in this form.
*	**positive number**		A number greater than zero.
6	**power**		The power of a number shows you how many times to use the number in a multiplication. It is written as a small number to the right and above the base number.
6	**predict**		To make a guess based on the given information.; tell what will come next.
6	**prime factor**		A factor that is a prime number. One of the prime numbers that, when multiplied, give the original number.
5	**prism**		A 3-dimensional figure that has two congruent and parallel faces that are polygons. The remaining faces are parallelograms.
6	**probability**	**Example:** A glass jar contains 6 red, 5 green, 8 blue and 3 yellow marbles. If a single marble is chosen at random from the jar, what is the probability of choosing a red marble?  $P(red) = \frac{\#\ of\ ways\ to\ choose\ red}{total\ \#\ of\ marbles} = \frac{6}{22} = \frac{3}{11}$	The chance that a particular outcome will occur, measured as a ratio of the total possible outcomes.
3 4 5	**product**		The answer to a multiplication problem.
8	**progression**		A sequence of numbers or quantities. A pattern of numbers.
7	**property**		A common feature or characteristic.
7	**proportion**		An equation showing that two ratios are equivalent.

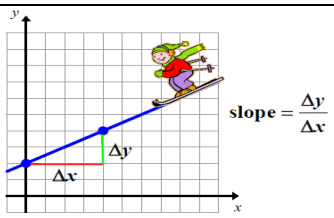
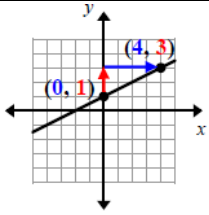
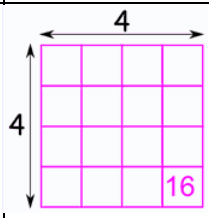
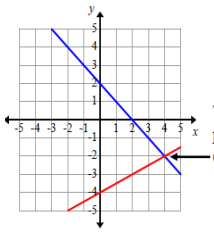
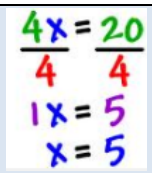
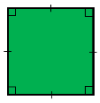
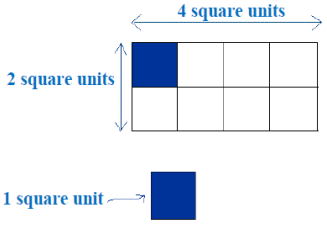
7	**proportional reasoning/ relationships**	**Example:** A dragonfly travels 25 meters per second. At this speed, how long would it take for the dragonfly to travel 375 meters? There are three quantities in this example: distance traveled, time elapsed, and the speed with which the dragonfly travels. We could use the letter d stand for the distance the dragonfly travels, t stand for the time that has elapsed, and r stand for the speed or rate in which it travels. Thus, $d = rt$. $375 = 25 \cdot t$ $\frac{375}{25} = t$ $t = 15\text{sec}$ 	A proportional relationship is a relationship between two variable quantities x and y, where y is a constant multiple (k) of x. This can be expressed in the simple equation, $y = kx$. 
5	**pyramid**		A polyhedron whose base is a polygon and whose other faces are triangles that share a common vertex.
8	**The Pythagorean Theorem**	$a^2 + b^2 = c^2$ $a = 3$ $b = 4$ $c = 5$ $3^2 + 4^2 = 5^2$ $9 + 16 = 25$ 	In any right triangle, the sum of the squares of the length legs (a and b) is equal to the square of the length of the hypotenuse c.
8	**quadrant**		The four sections of a coordinate grid that are separated by the axes.
*	**quadrilateral**		A polygon with 4 straight sides.
3	**quarter**		A coin worth 25 cents.
4 5	**quotient**		The answer to a division problem.
8	**radical**	 Cube root of "x–4"	An expression that has a square root, cube root, etc. The symbol is √
7	**radius**		The distance from the center of a circle to the edge.
6	**random**		A selection that is chosen randomly (purely by chance, with no predictability.)
5	**range**		The difference between the greatest number and the least number in a set of numbers.

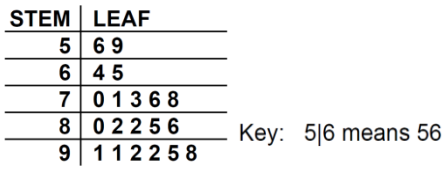
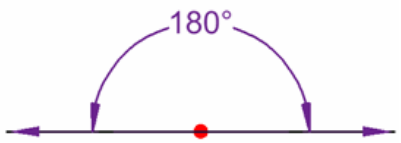
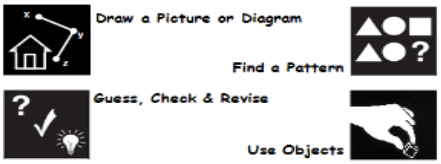
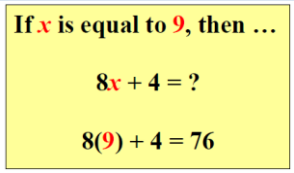
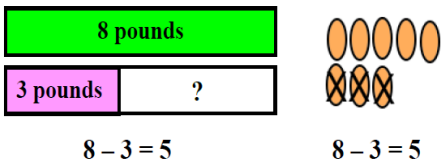
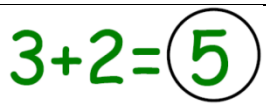
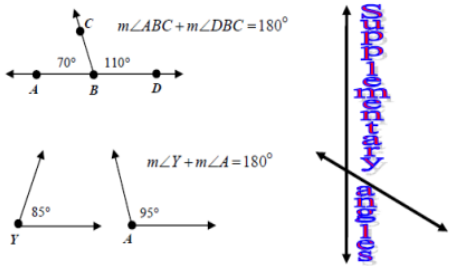
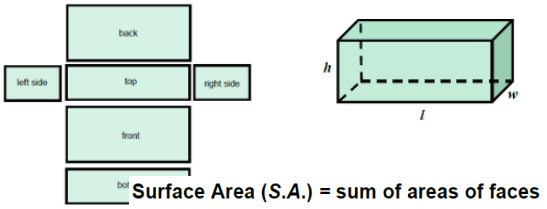
8	**range of a function**	{(2, -3), (4, 6), (3, -1), (7, 6), (6, 3)} **range: {-3, 6, -1, 6, 3}**	The set of "output" values for which a function is defined.
6	**rate**	 The car was traveling 65 miles per hour on the freeway.	A ratio comparing two different units.
6	**ratio**	 The ratio of chocolate bars to boys is 3:2.	A comparison of two numbers using division.
*	**ratio table**		A strategy to show equivalent ratios. Entries in a column are multiplied or divided by the same amount. A ratio table shows a proportion. 2/3=4/6.
6 7	**rational number**	$2\frac{3}{5}$ -5 0.3 $\sqrt{16}$ $\frac{13}{7}$	A number that can be expressed as a ratio of two integers.
8	**real numbers**		The set of all rational and irrational numbers.
6	**reciprocal**	$5 \times \frac{1}{5} = 1$ **reciprocals**	Two numbers whose product is 1. Also called multiplicative inverses.
*	**rectangle**		A quadrilateral with two pairs of congruent, parallel sides and four right angles.
*	**recursive**	**2, 5, 8, 11, 14…** $a_n = a_{n-1} + d$ $a_n = a_{n-1} + 3$	Pertaining to or using a rule or procedure that can be applied repeatedly.
4	**reflection**	 Preimage / Image D(1,-2) / D′(-1,-2) E(3,-2) / E′(-3,-2) F(3,2) / F′(-3,2)	An image or shape as it would be seen in a mirror. A 'flip'.
*	**regular polygon**		A polygon that is both equilateral and equiangular. Its center is the point that is equidistant from its vertices.

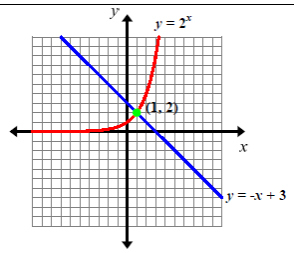
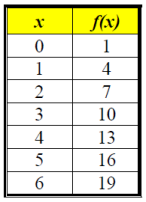
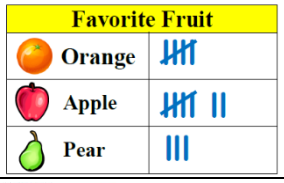
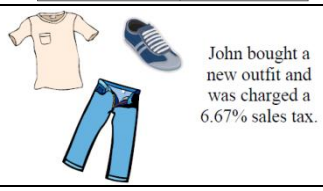
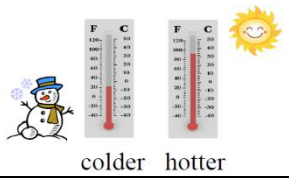
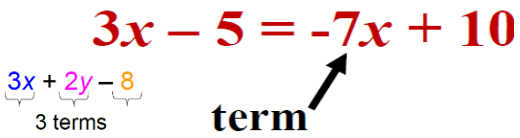
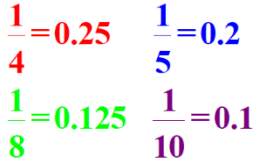
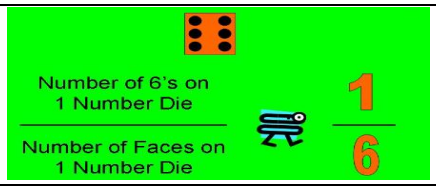
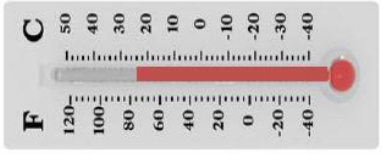
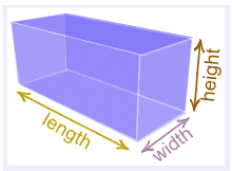
*	**relational thinking**	$8+4=\_\_+5$ "7 is the missing number because 5 is one more than 4, so I need a number that is one less than 8."	Students who can express a number in terms of other numbers and operations on those numbers hold a *relational understanding of the number*.
7	**relative frequency**	**Example:** Suppose we toss a coin 50 times and have 27 heads and 23 tails. The relative frequency of heads is: $\frac{27}{50}=54\%$ 	The ratio of the actual number of favorable events to the total possible number of events; often taken as an estimate of probability.
5	**remainder**	There are 22 students going on a field trip. There are 5 chaperones. How many students can be in a group? $22 \div 5 = 4$ R2  4 or 5 students can be in a group.	The amount left over when one number is divided by another.
7	**repeating decimal**	$\frac{1}{3}=0.333333333333$ $\frac{1}{7}=0.142857142857$	A decimal which has repeating digits or a repeating pattern of digits.
*	**representation**	**5 Representations of a Function** 	A way of displaying a function including tables, graphs, equations, context and language.
*	**rhombus**		A quadrilateral with all four sides equal in length.
8	**right angle**		An angle that forms a square corner. 90°
*	**right prism**		A prism where the lateral faces are at right angles to the base.
*	**right rectangular prism**		A prism with six rectangular faces where the lateral edge is perpendicular to the plane of the base.
8	**right triangle**		A triangle that has one 90º angle.
*	**right triangular pyramid**		A pyramid that has its apex aligned directly above the center of its rectangular base.
*	**rise**		The vertical distance between the two points on the graph. Rise/Run gives you the slope of the line.

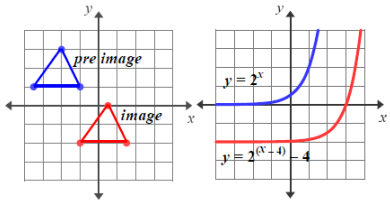
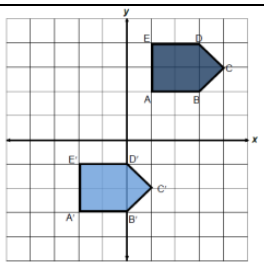
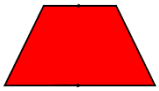
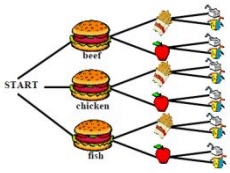
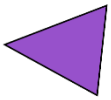
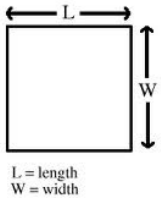
4	**rotation**	 Preimage / Image A(-3,0) / A′(0,3) B(-3,3) / B′(3,3) C(-1,3) / C′(3,1) D(-1,0) / D′(0,1)	A circular movement. A 'turn'. There is a central point that stays fixed and everything else moves around that point in a circle.
*	**row**	Rows go from left to right. → 	A horizontal arrangement of numbers or information in an array or table.
3 4 5	**rule**	Input / Output 4 / 5 12 / 9 16 / 11 24 / 15 Rule: Divide by two and add three	A set of instructions about what should be done in a given set of circumstances.
3	**ruler**	 **12 inches = 1 foot**	A tool used to draw straight lines and measure length.
*	**run**		The horizontal distance between the two points on the graph. Rise/Run gives you the slope of the line.
6	**sample space**	 **sample space: {head, tail}**  **sample space: {1, 2, 3, 4, 5, 6}**	The set of all possible outcomes of a random process.
7	**scale (on a graph)**		The numbers that show the units used on a graph.
7	**scale drawing**	Since it is not always possible to draw on paper the actual size of real-life objects such as the real size of a car, an airplane, we need scale drawings to represent the size like the one you see below of a van.  In real-life, the length of this van may measure 240 inches. However, the length of the van above is 2 inches. You can write this scale factor as 1:20 or 1/20 or 1 to 20.	A drawing of an object or structure showing all parts in the same proportion of their true size.
7	**scale factor**	Figures A and B are similar.  What is the scale factor from A to B? Scale factor = 2 What is the scale factor from B to A? Scale factor = $\frac{1}{2}$	A ratio between two sets of measurements. When comparing 2 similar geometric figures the ratio of any two corresponding edge lengths.
*	**scalene triangle**		A triangle that has no congruent sides.

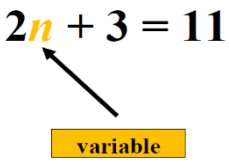
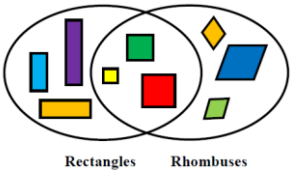
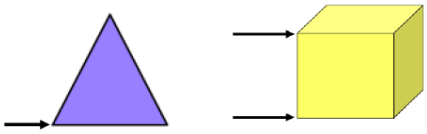
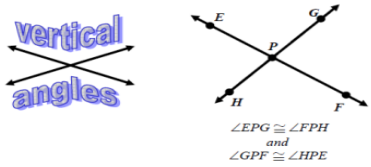
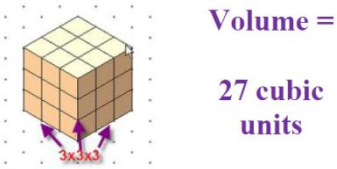
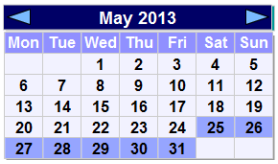
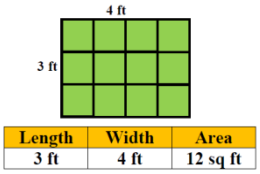
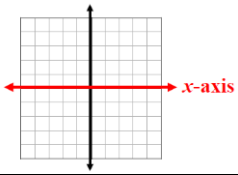
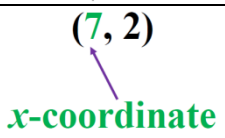
8	**scatter plot**		A graphic tool that illustrates the relationship between two sets of data.
8	**scientific notation**	$a \times 10^n$ a = number greater than or equal to 1 and less than 10 n = integer $17{,}500{,}000 = 1.75 \times 10^7$ $0.0000026 = 2.6 \times 10^{-6}$	Where a number is written in two parts: First: just the digits (with the decimal point placed after the first digit), Followed by: ×10 to a power that would put the decimal point back where it should be.
*	**sector**		A section of a circle bounded by 2 radii and an arc.
3 4	**side**		A line segment that forms a shape on a 2-dimensional figure.
*	**signed number**	-5 +8 +45 -23	Positive or negative number.
7	**similar**		Having the same shape but not necessarily the same size.
*	**similarity**		**A** relationship between two geometric objects in which the two objects are congruent as a result of the uniform enlarging or shrinking of one of them.
7	**simple interest**	$I = p \bullet r \bullet t$ **Interest = Principal × Rate × Time** 'Interest' is the total amount of interest paid. 'Principal' is the amount lent or borrowed. 'Rate' is the percentage charged as interest each year. 'Time' is the time in years of the loan.	A quick method for calculating the interest charge on a loan.
6 7 8	**simplify**		To express a fraction in simplest form.
*	**skip count**	5, 10, 15, 20	Counting by a given number greater than 1.

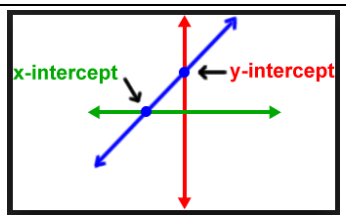
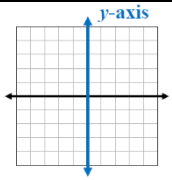
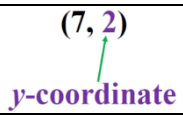
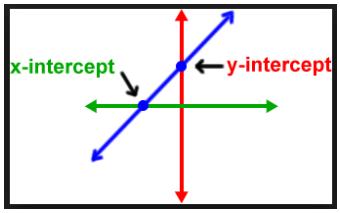
7	**slope**		Slope describes steepness, incline, or grade of a line. A higher slope value indicates a steeper incline. The slope of a line is the ratio of the change in *y* over the change in *x*.
7	**slope formula**	 $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3-1}{4-0} = \frac{2}{4} = \frac{1}{2}$	The formula used to find the slope of a line. Slope is often represented with the variable *m*. $\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x}$ $m = \frac{y_2 - y_1}{x_2 - x_1}$, where $x_2 - x_1 \neq 0$
8	**slope-intercept form**	$y = mx + b$ slope y-intercept	A form of a linear equation. In the equation y=2x+3, 2/1 is the slope and (0,3) is the y-intercept.
8	**square root**	 radical symbol $\sqrt{36} = 6$ $\sqrt{36} = \sqrt{6 \cdot 6} = \sqrt{6^2} = 6$ $\sqrt{16} = 4$	The square root of a number is a value that, when multiplied by itself, gives the number. Example: 4 × 4 = 16, so the square root of 16 is 4. The symbol is $\sqrt{}$
8	**solution**	 The solution point is the ordered pair where the two lines intersect (4, -2).	A solution point or intersection; is a single point where two lines meet or cross each other.
6	**solve**	 	To find a solution to. To work out a correct solution.
*	**sphere**		A geometric solid with a curved surface.
*	**square**		A parallelogram with four equal angles AND four equal sides.
*	**square unit**		A unit, such as square centimeter or square inch, used to measure area.
8	**standard form**	$Ax + By = C$ A, B, and C are numbers	A form of a linear equation written in the form Ax+By=C

7	**stem-and-leaf plot**		A data display that shows groups of data arranged by place value.
6	**straight angle**		A straight angle changes the direction to point the opposite way. It looks like a straight line. It measures 180° (half a revolution, or two right angles).
4	**strategy**		A plan, a method or a way to solve a problem or reach an answer.
7	**substitute or substitution**		The replacement of the letters in an algebraic expression with known values.
3	**subtract**		An operation that gives the difference between two numbers. Subtraction can be used to compare two numbers, or to find out how much is left after some is taken away.
3 5	**sum**		The answer to an addition problem.
6	**supplementary angles**		If the sum of the measures of two angles is 180°, then the two angles are **supplementary**. If two angles form a straight line, then they are supplementary.
5	**surface area**		The total area of the faces (including the bases) and curved surfaces of a solid figure.
4	**survey**		A way to gather data by asking questions.
4	**symmetry**		An object is symmetrical when one half is a mirror image of the other half.

8	**system of equations**		A system of equations is two or more equations with the same variables, graphed on same coordinate plane.
4	**table**		A list of numbers that are used to substitute one variable, such as within an equation of a line or other functions, to find the value of the other variable.
3	**tally chart**		A chart that uses tally marks to record data.
*	**tax**		A fee charged by a government on a product, income, or activity. (usually in percent form)
3	**temperature**		How hot or cold a thing is. Temperature is measured using a thermometer, usually in the Celsius or Fahrenheit scale.
*	**term**		A mathematical expression which may form a separable part of an equation, a series, or another expression.
7	**terminating decimal**		A decimal which has a finite number of digits.
6	**theoretical probability**		It is the likeliness of an event happening based on all the possible outcomes.
3	**thermometer**		How hot or cold a thing is. Temperature is measured using a thermometer, usually in the Celsius or Fahrenheit scale.
5	**three-dimensional**		An object that has height, width and depth, like any object in the real world.

7	**transformation**		To change the position of a shape or function on a coordinate plane. There are three basic transformations: translations, reflections, rotations
4	**translation**	 Preimage / Image A(1,2) / A′(-2,-3) B(3,2) / B′(0,-3) C(4,3) / C′(1,-2) D(3,4) / D′(0,-1) E(1,4) / E′(-2,-1)	A transformation that moves points the same distance in the same direction.
*	**trapezoid**		A quadrilateral with only one pair of parallel sides.
6	**tree diagram**		A diagram shaped like a tree used to display sample space by using one branch for each possible outcome.
*	**triangle**		A polygon with three sides and three angles.
*	**true**	$4 + 2 = 9 - 3$ THINK Are both sides equal? Yes. It is true.	Accurate; correct. A true equation has the same value on each side of the equal sign.
*	**two-dimensional**		Having 2 dimensions (length and width).
8	**undefined**	$\frac{5}{0} = ?$	Does not exist. Without sensible meaning. Cannot be determined.
6	**unit rate or constant of proportionality**	Cereal is $0.43 per 1 ounce.  $4 per gallon = $\frac{\$4}{1 \text{ gallon}}$ 70 miles per hour = $\frac{70 \text{ miles}}{1 \text{ hour}}$	A rate with a denominator of 1.
6	**unlikely**	 1-in-6 chance of rolling a 6	An event that will probably not happen. An outcome with a probability between 0 and 0.5
3	**value**	$5x - 2 = 23$ The value of x is 5.	The amount something is worth.

4 5	**variable**		A quantity that changes or can have different values. A symbol, usually a letter, that can stand for a variable quantity.
4	**Venn Diagram**		A drawing with circles or rings to show how sets of objects are related.
3 4 5	**vertex (vertices)**		A corner of a figure. (plural - vertices)
4 6	**vertical angle**		A pair of angles is said to be **vertical** if the angles share the same vertex and are bounded by the same pair of lines but are opposite to each other. Such angles are congruent and thus have equal measure.
6	**vertical**		In an up-down position. Upright. Example: trees grow in a vertical direction.
5	**volume**		The number of cubic units it takes to fill a figure.
3	**weeks**		A time period of 7 days. Example: Wednesday, Thursday, Friday, Saturday, Sunday, Monday and Tuesday together make a week.
3 4	**width**		One dimension of a 2-dimensional or 3-dimensional figure.
*	**whole numbers**		Whole numbers are 0 and the counting numbers 1, 2, 3, 4, 5, 6, and so on.
6	**x-axis horizontal axis**		In a Cartesian grid, the horizontal axis.
*	**x-coordinate**		In an ordered pair, the value that is always written first.

8	**x-intercept**		The point at which a function crosses the *x*-axis. The x-intercept can be found by substituting "0" for the variable *y* in the equation *y* = *mx* + b. **0 = *m* • *x* + *b***
3	**yardstick**	 **1 yard = 3 feet**	A measuring tool that is 3 feet or 36 inches long.
6	**y-axis** **vertical axis**		In a Cartesian grid, the vertical axis.
*	**y-coordinate**		In an ordered pair, the value that is always written second.
8	**y-intercept**		The point at which a function crosses the *y*-axis. The y-intercept can be found by substituting "0" for the variable *x* in the equation *y* = *mx* + b. ***y* = *m* • 0 + *b***
3	**years**		A period of time in which the Earth makes a complete revolution around the sun. There are 365 days in a normal year and 366 days in a leap year.

Mathematical Notation and Symbols

less than	greater than	less than or equal to	greater than or equal to
$<$	$>$	$\leq$	$\geq$
congruent	**equal sign**	**similar** or approximately equal to	**approximately equal to**
$\cong$	$=$	$\sim$	$\approx$

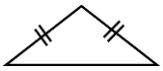
ways of representing multiplication			
3x4	3(4)	3•4	3n

division	division	absolute value	square root (radical)
$20 \div 4 = 5$	$\frac{20}{4} = 5$	$\lvert -6 \rvert = 6$	$\sqrt{36} = 6$

ways of representing a ratio			
3 to 4	3:4	3 out of 4	$\frac{3}{4}$

percent	fraction	decimal	repeating decimal
25%	$\frac{1}{4}$	0.25 "25 hundredths"	$0.\overline{33}$

segment	length of a segment	ray	line
$\overline{AB}$	AB	$\overrightarrow{AB}$	$\overleftrightarrow{AB}$

angle	measure of angle	triangle	congruent hash marks
$\angle A$	$m\angle A$	ΔABC	

square units	cubic units	degrees	pi
cm^2	cm^3	$45°$	π

point	label for point after **transformation**	rate	rate
J	J'	mph	per

proportional or direct variation		inversely proportional or indirect variation	
$k = \frac{y}{x}$	$y = kx$	$y = \frac{k}{x}$	$xy = k$

lines used for reflections

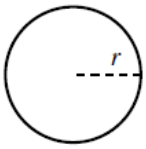
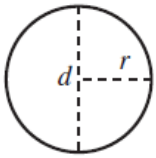
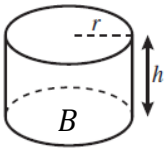
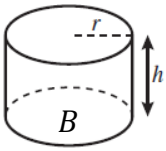
function notation	linear function	exponential function	carat (exponent)
f(x)	f(x) = mx+b	$f(x)=ab^x$	2^3 = 2^3

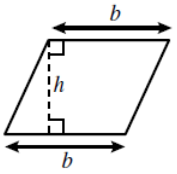
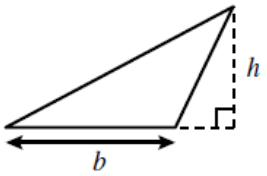
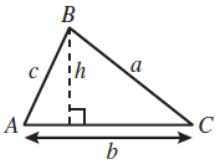
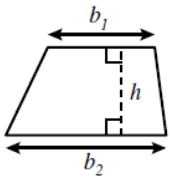
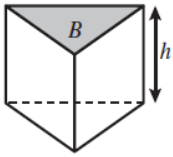
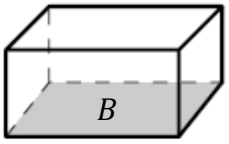
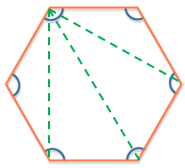
factorial	!	infinity	∞	delta /change in	Δ	therefore	$\therefore$

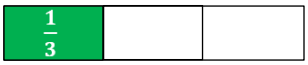
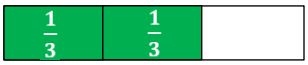
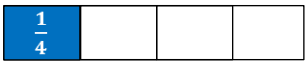
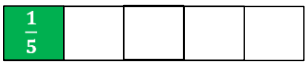
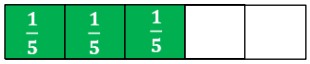
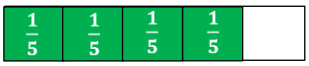
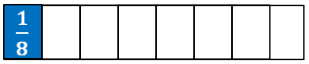
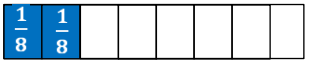
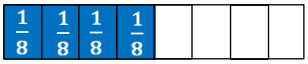
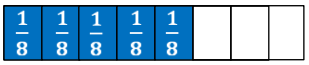
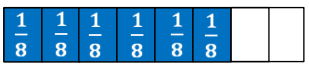
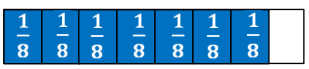
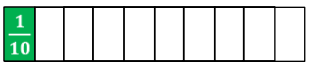
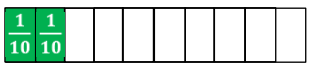
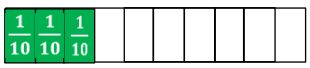
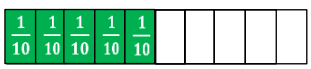
Where do 1's and 0's HIDE?

Expression or Equation	Description	1's and 0's revealed
3	Invisible zeros after decimal point.	3.0
3.5	Invisible zeros after decimal point.	3.5000
$.5$	Invisible zeros before decimal point.	0.5
a	Invisible coefficent of a variable.	$1a$
3	Invisible exponent of a rational number.	3^1
a	Invisible exponent of a variable.	a^1
3	Invisible denominator of an integer.	$\frac{3}{1}$
$\frac{4}{4}$	Invisible 1's written as fractions.	$1\frac{4}{4}$
$\frac{3}{5} \times \frac{4}{4} = \frac{12}{20}$	Invisible 1's to create equivalent fractions.	$\frac{3}{5} \times 1\frac{4}{4} = \frac{12}{20}$
$x=x$ $3=3$	Additive Identity.	$x + 0 = x$ $3 + 0 = 3$
$x=x$ $3=3$	Multiplicative Identity.	$x \cdot 1 = x$ $3 \cdot 1 = 3$
$x + -x$ $3 + -3$	Additive Inverse.	$x + -x = 0$ $3 + -3 = 0$
$x \cdot \frac{1}{x}$ $3 \cdot \frac{1}{3}$	Multiplicative Inverse.	$x \cdot \frac{1}{x} = 1$ $3 \cdot \frac{1}{3} = 1$
$y=5$	Invisible addends.	$y=5+0$
Putting it all together * Multiple hidden 1's and 0's		
$y=x$	Invisible coefficients, exponents and addends.	$1y=1x^1+0$
$y=2x-4$	Invisible coefficients, exponents & denominators.	$1y=\frac{2}{1}x^1 - 4$

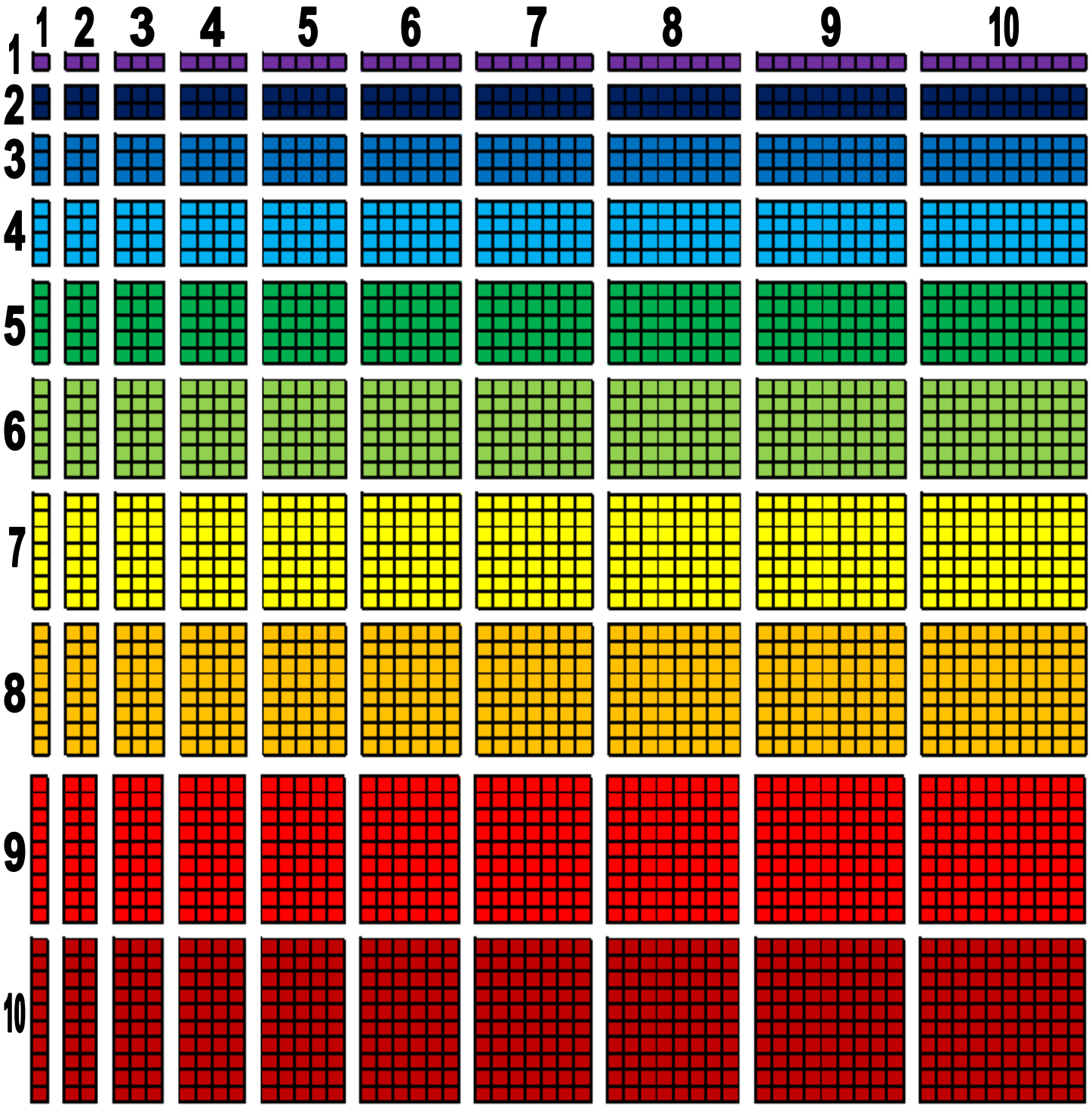
Minnesota Grade 6 & 7 Formula Sheet

Variables	Formulas	Diagram
A = area *r = radius*	$A = \pi r^2$	
C = circumference *d = diameter*	$C = \pi d$	 ***Also:*** $C = 2\pi r$
B = area of base *h = height* *p = perimeter* *SA = surface area*	$SA = ph + 2B$	 ***Also:*** $SA = 2\pi r\ h + 2\pi r^2$
B = area of base *h = height* *V = volume*	$V = Bh$	 ***Also:*** $V = \pi r^2 h$

A = area *b = base* *h = height*	$A = bh$	  ***Also:*** $A = l \cdot w$
	$A = \frac{1}{2}\ bh$	 
	$A = \frac{1}{2}\ h(b_1+b_2)$	
B = area of base *h = height* *V = volume*	$V = Bh$	  ***Also:*** $V = l \cdot w \cdot h$
n = number of sides *s = sum of angles*	$S = 180(n-2)$	 S = 180(6-2) = 180•4 = 720°

Fraction	Decimal Equivalent	Percent	Picture	Equivalent Fractions – How many can you name?
$\frac{1}{2}$	0.5	50%		$\frac{2}{4}$
$\frac{1}{3}$	$0.\overline{33}$	33.3%		
$\frac{2}{3}$	$0.\overline{66}$	66.6%		
$\frac{1}{4}$	0.25	25%		
$\frac{2}{4}$	0.5	50%		
$\frac{3}{4}$	0.75	75%		
$\frac{1}{5}$	0.2	20%		
$\frac{2}{5}$	0.4	40%		
$\frac{3}{5}$	0.6	60%		
$\frac{4}{5}$	0.8	80%		
$\frac{1}{8}$	0.125	12.5%		
$\frac{2}{8}$	0.25	25%		
$\frac{3}{8}$	0375	37.5%		
$\frac{4}{8}$	0.5	50%		
$\frac{5}{8}$	0.625	62.5%		
$\frac{6}{8}$	0.75	75%		
$\frac{7}{8}$	0.875	87.5%		
$\frac{1}{10}$	0.1	10%		
$\frac{2}{10}$	0.2	20%		
$\frac{3}{10}$	0.3	30%		
$\frac{4}{10}$	0.4	40%		
$\frac{5}{10}$	0.5	50%		

Visual Multiplication Chart



What patterns do you see?
What do you notice?
What is similar?
What is different?

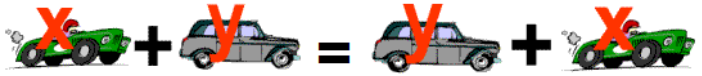
Properties of Real Numbers

Commutative Property - interchange or switch the elements

Example shows commutative property for addition:

$$X + Y = Y + X$$

Think of the elements as "commuting" from one location to another. "They get in their cars and drive to their new locations." This explanation will help you to remember that the elements are "moving" (physically changing places).

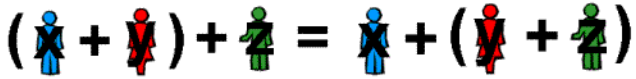


Associative Property- regroup the elements

Example shows associative property for addition:

$$(X + Y) + Z = X + (Y + Z)$$

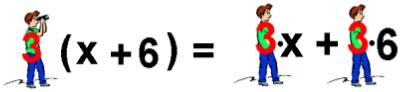
The associative property can be thought of as illustrating "friendships" (associations). The parentheses show the grouping of two friends. In the example below, the red girl (y) decides to change from the blue boyfriend (x) to the green boyfriend (z). "I don't want to associate with you any longer!" Notice that the elements do not physically move, they simply change the person with whom they are "holding hands" (illustrated by the parentheses.)



Distributive Property- *multiply* across the parentheses. Each element inside the parentheses is multiplied by the element outside the parentheses.

$$a(b + c) = a \cdot b + a \cdot c$$

Let's consider the problem $3(x + 6)$. The number in front of the parentheses is "looking" to distribute (*multiply*) its value with all of the terms inside the parentheses.



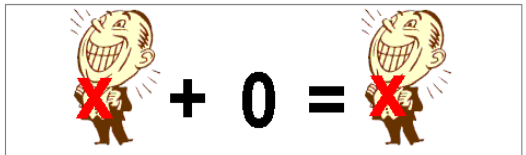
$$= 3x + 18$$

Identity Property- What returns the input unchanged?

$X + 0 = X$ Additive Identity

$X \cdot 1 = X$ Multiplicative Identity

Try to remember the "**I**" in the word identity. Variables can often times have an "attitude". "**I** am the most important thing in the world and **I** do not want to change!" The identity element allows the variable to maintain this attitude.

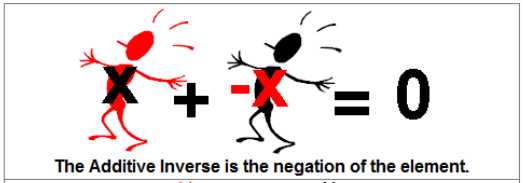


Inverse Property- What brings you back to the identity element using that operation?

$X + -X = 0$ Additive Inverse

$X \cdot 1/X = 1$ Multiplicative Inverse

Think of the inverse as "inventing" an identity element. What would you need to add (multiply) to this element to turn it into an identity element?



A complete coordinate graph has:

- ☐ A **title** showing the relationship between the 2 variables for your graph centered on the top of the page.
- ☐ Your **name and date** written on the upper right hand corner.
- ☐ **Axes drawn** with a ruler or straight edge. Axes have arrows.
- ☐ **Independent variable** on the x-axis.
- ☐ **Dependent variable** on the y-axis
- ☐ **Labels** on the x and y-axis, including **units**.
- ☐ Appropriate & **consistent scale** that allows for all data points to be plotted (use intervals of 1's, 2's, 5's, 10's or whatever scale will use most of the page)
- ☐ Scale begins at the **origin (0,0)** or uses a break mark **//** .
- ☐ Correctly plotted **coordinate points**. (Do not connect points!)
- ☐ A color-coded **key** for graphs with multiple data sets.

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