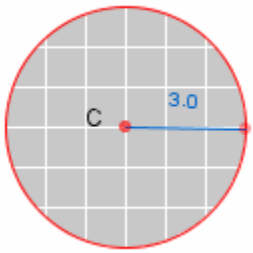
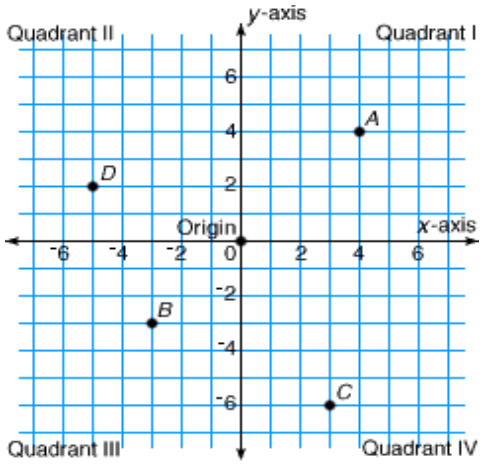
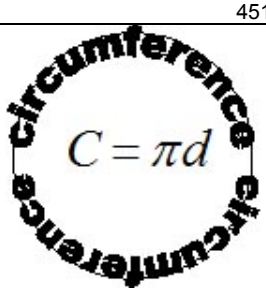
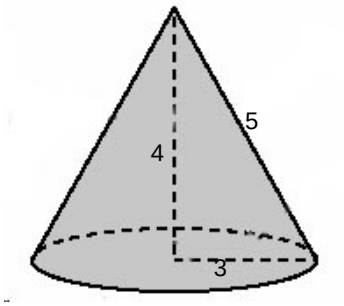
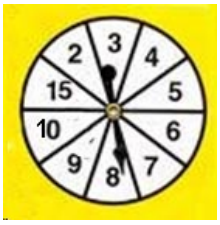
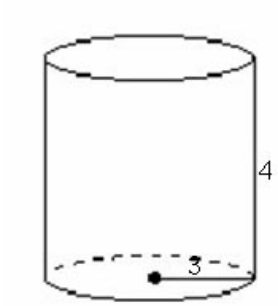
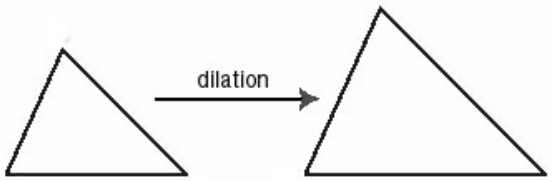
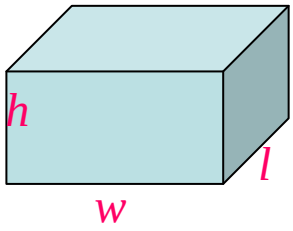
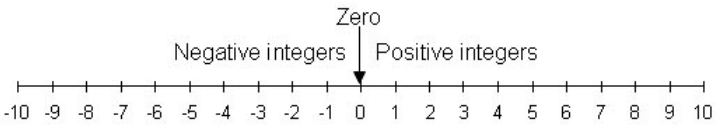
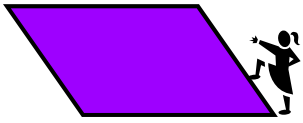
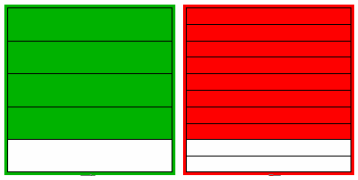
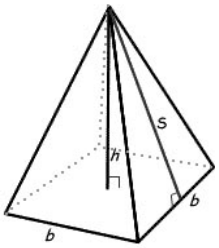
Sixth Grade

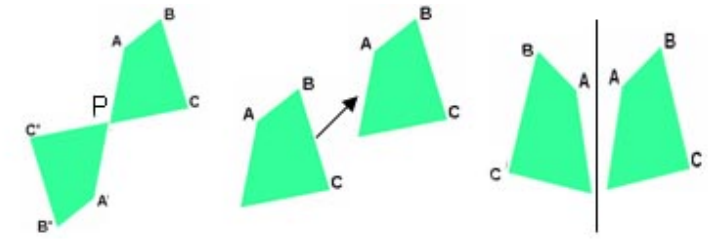
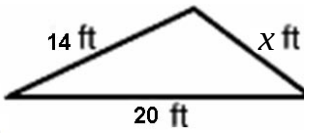
Algebraic Expression: A combination of at least one variable and numbers with at least one operation.	Examples of algebraic expressions: $3x,\quad x-4y,\quad 2a+5,\quad x^2+x-6,\quad \frac{1}{2}\div\frac{3}{x}$ (x by itself would be an algebraic expression since it is $1\cdot x$) An algebraic expression for the sum of six and a number is: $6+x$
Area of a Circle: The area of a circle is the number of square units needed to cover its surface. The formula for the area of a circle is $A=\pi r^2$.	The area of the given circle is $A=\pi r^2=\pi(9)\doteq(3.14)(9)\doteq 28.3$  If you could count the squares covering the circle, you would count about 28.3 of them.
Associative Law (algebraic): The sum (or product) of three or more numbers/variables does not depend on their grouping. Algebraically: (a + b) + c = a + (b + c) or (ab)c = a(bc)	$x+(x+3)=(x+x)+3$ $(2x)(x)=2(x\cdot x)$
Biased Sample : A sample that is not representative of the entire population.	Example of a biased sample: To find out the types of movies preferred by students in your school, you stand outside of a horror movie and ask the student moviegoers what type of movie they prefer. (This would be biased toward those who like horror movies.)
Cartesian Coordinate System: Also called the coordinate plane: a plane formed by two perpendicular axes (the horizontal x-axis and the vertical y-axis) which intersect at a point called the origin. A point in the plane (x,y) is uniquely determined by its horizontal and vertical distance from the origin.	

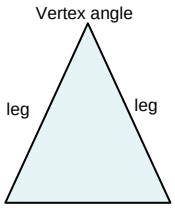
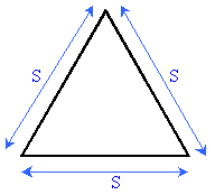
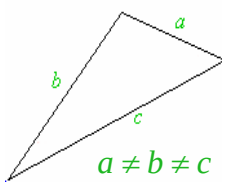
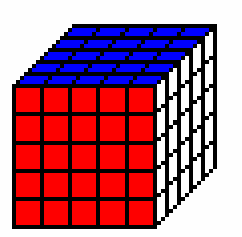
Circumference of a Circle: The distance around the circle; it is similar to the perimeter of a polygon.	The ratio of the circumference of a circle to its diameter is π.  If you take any circle, measure its circumference, measure its diameter, then divide the circumference by the diameter, you will get (depending on the accuracy of your measurements!) a close approximation to π.
Commutative Law (algebraic): The sum or (product) of two or more numbers/variables does not depend on their order Algebraically: $a + b = b + a$ or $ab = ba$	The commutative law tells you that $x+3=3+x$ and $x\cdot 3=3x$
Cone: **(surface area/volume)**: A cone is a 3-dimensional figure with a circular base and one vertex; it has no edges. Its surface area is $SA=\pi rl+2\pi r$ where r is the radius of the circular base and l is the slant height. Its volume is $V=\frac{1}{3}\pi r^2 h$ where r is the radius of the circular base and h is the height (from the vertex to the center of the circular base).	 The Surface area of this cone is: $SA=\pi(3)(5)+2\pi(3)=$ $21\pi \doteq 66$ *square units* The volume is: $V=\frac{1}{3}\pi(9)^2(4)=12\pi$ $\doteq 37.7$ *cubic units* Its volume is $\frac{1}{3}$ the volume of a cylinder with the same radius and same height.
Conjecture (with data): To guess or make a prediction about future outcomes based on patterns, logic or survey results.	Add consecutive odd numbers starting with 1: 1 + 3 =4, 1 + 3 + 5 = 9, 1 + 3 + 5 + 7 = 16, A good conjecture would be that the sums of consecutive odd numbers starting with 1 are always perfect squares.
Complimentary Events: Events having no outcomes in common. Together they contain all possible outcomes of the experiment. The sum of the probability of an event and its complement is one.	 The complement of spinning a prime number (2,3,5,7) is spinning a composite number (4,6,8,9,10,15). The probability of spinning a prime is $\frac{4}{10}=\frac{2}{5}$. The probability of spinning its complement (a composite) is $1-\frac{2}{5}=\frac{3}{5}$.

Cylinder (surface area/volume): A cylinder is a 3-dimensional figure with two parallel congruent circular bases and a curved lateral surface connecting the bases; it has no edges. Its surface area is $SA = 2\pi r^2 + 2\pi rh$ where r is the radius of the circular base and h is the height. Its volume is $V = \pi r^2 h$ where r is the radius of the circular base and h is the height.	The Surface area of this cylinder is:  $SA = 2\pi(3^2) + 2\pi(3)(4) =$ $42\pi \doteq 131.9$ *square units* The volume is: $V = \pi(3)^2(4) = 36\pi$ $\doteq 113$ *cubic units* Its volume is 3 times that of a cone with the same radius and the same height.
Dilation: A transformation that enlarges or reduces a figure by some scale factor, but does not change its shape.	 Each side of the large triangle is $1\frac{1}{2}$ that of the smaller triangle. The dilation left the triangles the same shape, but different sizes with their sides in proportion.
Distributive Law (algebraic): The distributive law allows you to simplify a product when one of the factors is a sum or difference. Algebraically: $x(y+z) = xy + xz$ And $x(y-z) = xy - xz$	Examples: $2(a+3) = 2a + 6$ $x(x+4) = x^2 + 4x$ $5(c-6) = 5c - 30$
Equation (solving): An equation is a mathematical sentence that shows that two quantities are equal. To solve an equation, find a value for the variable that makes the sentence true.	Examples: $x + 8 = 22$ $\quad x = 14$ $3c = 21$ $\quad c = 7$ $\frac{55}{a} = 11$ $\quad a = 5$
Formula: A rule showing the relationship between certain quantities.	The formula for the volume of a rectangular prism is  $V = l \cdot w \cdot h$
Independent Events: Two events are independent if the outcome of one does not affect the outcome of the other.	If you roll a number cube and flip a coin, the probability of rolling an even number on the number cube is independent of getting either heads or tails on the coin.

Integers: The set of whole numbers and their opposites. The numbers in the set {… -3, -2, -1, 0, 1, 2, 3, …}	The set of integers is an infinite set. Zero is an integer that is neither positive nor negative. 
Odds of an Event: Odds in favor: A ratio that compares favorable outcomes to unfavorable outcomes. Odds against: A ratio that compares unfavorable outcomes to favorable outcomes. (It is not the same as probability.)	Example If you roll a six-sided number cube (1 - 6): The **odds in *favor*** of getting a 3 are 1 to 5 (There is one 3, there are five numbers that are not 3) This is different than the *probability* of getting a 3, which is one out of six or $\frac{1}{6}$.
Percent: Per 100 or out of 100; a ratio that compares a number to 100.	Examples: $24\% = \frac{24}{100} = 0.24$ $\quad 1\% = \frac{1}{100} = .01$ $0.5\% = \frac{.5}{100} = \frac{5}{1000} = .005$ $\quad 150\% = \frac{150}{100} = 1.5$
Probability: A ratio that compares the number of ways a certain event can occur to the total number of possible outcomes.	Examples: If you roll a six-sided number cube (1- 6):  The probability of getting a 3 is $\frac{1}{6}$ (there is one way to get a 3 out of six possible outcomes). The probability of getting an even number is 3/6 or 1/2 (there are three outcomes that are even: 2, 4, 6 out of six possible outcomes).
Properties of Polygons: Characteristics or features that can be used to help recognize and identify polygons.	Properties of a **parallelogram**:  Quadrilateral with opposite sides congruent, opposite sides parallel, and opposite angles congruent.

Proportion: An equation stating that two ratios are equal or equivalent. If the cross products of two ratios are equal then the pair forms a proportion.	$\frac{4}{5} = \frac{8}{10}$  $\frac{4}{5}$ and $\frac{8}{10}$ form a proportion because $4 \cdot 10 = 5 \cdot 8$
Pyramid (surface area/volume): The surface area of a pyramid is the sum of the areas of all of its faces. The volume of a pyramid is one-third of the area of the base multiplied by the height. $SA = B + \frac{1}{2}sp$, where B is the area of the base, s is the slant height and p is the perimeter of the base. $V = \frac{1}{3}Bh$, where B is the area of the base, and h is the height.	 In the given square pyramid: $b = 6$, $h = 4$ and $s = 5$ $SA = 36 + \frac{1}{2}(5)(4 \cdot 6)$ $= 96$ square units $V = \frac{1}{3}(36)(4) = 48$ cubic units
Qualitative Graph: A graphs that focuses on the important general features of a situation.	 This qualitative graph could describe the following situation: A boy is walking to his piano lesson, he stops and talks to his friend, then realizes he is going to be late, runs the rest of the way to his lesson.
Random: Occurring without any pattern or order. A chance pick from items which have an equal likelihood of being chosen.	Example: There are six different colored marbles in a hat: If you choose one at random, there is an equal chance that you pick any one of them.
Ratio: A comparison of two numbers or quantities by division. The most common way to express a ratio is by a fraction. Ratios can also be written as x:y.	Examples: If a class has 14 boys and 12 girls then The ratio of boys to girls is $14:12 = 7:6 = \frac{14}{12} = \frac{7}{6}$ The ratio of girls to boys is $12:14 = 6:7 = \frac{12}{14} = \frac{6}{7}$ The ratio of boys to total number of students is $14:26 = 7:13 = \frac{14}{26} = \frac{7}{13}$
Sample Space: A part of a set, group or population that is used to represent the entire population.	Example: Instead of surveying the entire sixth grade class about their favorite food, you only survey two sixth grade classrooms.

Simplify: To write a fraction, expression or equation in its simplest form.	Simplify: $\frac{3}{9}=\frac{3\div3}{9\div3}=\frac{1}{3}$ Simplify: $x + 50 = 60 + 7$ $x + 50 = 67$ $x = 17$ Simplify: $3(2x + 5) = 6x + 15$
Simulation: A model of an experiment. The model is usually used because the experiment would be too difficult or time consuming to do.	Example: Students participate in a stock market simulation game, buying stocks with play money and keeping track of mock portfolios to make predictions and follow trends in the real stock market
Stem-and-Leaf Plot: A graph that uses the digits of each number to show the shape of the data.	Examples: The scores on a test were: 83, 79, 84, 86, 84, 99, 98, 87, 98, 78, 96, 92, 90, 100, 84, and 85. The stem-and-leaf plot would look like: 10 | 0 9 | 0 2 6 8 8 9 8 | 3 4 4 4 5 6 7 7 | 8 9 (The stems represent tens, the leaves represent units)
Transformation (reflection, rotation, & translation) *Reflection:* A "flip" of an image over a line of reflection. Each point of the reflected image and the original image is the same distance from the line of reflection. *Rotation:* A "turn" of an image about a given point a certain number of degrees. *Translation:* A "slide" of an image which moves each point a certin distance in a given direction.	 A rotation of 180 degrees about point P A translation (a slide) A reflection over the vertical line
Triangle Inequality Theorem: The sum of the measures of any two sides of a triangle is always greater than the measure of its third side.	 The triangle inequality states that: $x + 14 > 20$, $x + 20 > 14$ and $14 + 20 > x$ which means that $6 < x < 34$

Types of Triangles (isosceles, equilateral, scalene) *Isosceles:* A triangle with at least two congruent sides. The two congruent sides are called legs, the third side is the base. The angle formed by the legs is the vertex angle. *Equilateral:* A triangle with three congruent sides. (Equilateral triangles also have three congruent angles.) *Scalene:* A triangle with no congruent sides. Its sides are different in length.	 Isosceles  equilateral  scalene
Volume: The number of cubic units needed to fill a three-dimensional shape or solid.	 The volume of the cube that is 5 units on each side is $5\times5\times5=125$ cubic units.