Analyzing Equations and Inequalities

Expressions and Formulas

(All area formulas that are covered in these sections are at bottom of last page)

Order of Operations

1. Simplify the expressions inside of grouping symbols, such as parentheses
2. Evaluate all powers
3. Do all multiplications and divisions from left to right
4. Do all additions and subtractions from left to right

Mnemonic

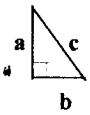
Please	Excuse	My	Dear	Aunt	Sally
Parentheses	Exponents	Multiplication	Division	Addition	Subtraction

Algebraic expressions - contain at least on variable and can be solved by substituting

formula - is a mathematical sentence that expresses the relationship between certain quantities.

In a right triangle the side opposite the right triangle is called the hypotenuse, it is always the longest side. The other two sides are called the legs of a right triangle.

Pythagorean Theorem - In a right triangle if a and b are the legs and c is the hypotenuse, then $c^2 = a^2 + b^2$



"The square of the hypotenuse = sum of the squares of the other 2 sides"

Properties of Real Numbers

Every real # is either rational or irrational. A rational # can be expressed as a ratio, where m and n are integers and n is not zero. Any # that is not rational is irrational, and can not be expressed as a ratio.

For any real #'s a, b, and c

	Addition	Multiplication
Commutative	$a + b = b + a$	$ab = ba$
Associative	$(a + b) + c = a + (b + c)$	$(ab)\,c = a\,(bc)$
Identity	$a + 0 = a = 0 + a$	$a\,(1) = a = 1\,(a)$
Inverse	$a + (-a) = 0 = (-a) + a$	If $a \neq 0$, then $a\,(1/a) = 1 = 1/a\,(a)$
Distributive	$a(b + c) = ab + ac$ and $(b + c)a = ba + ca$	

Integration: Statistics

Sometimes it is convenient to have one # that describes a set of data. This # is called a measure of central tendency. The most commonly used measure of central tendency are Median, Mode, and Mean.

Median - The median of a set of data is the middle value. If there are two middle values, it is the mean of the two middle values.

Mode - The mode of a set of data is the most frequent value. Some sets of data have multiple modes and others have no mode.

Mean - The mean of a set of data is the sum of all the values divided by the # of values.

Extreme values - are those data values that vary greatly form the central group of data values.

Solving Equations

Golden Rule of Equations - Whatever you do to one side you must do to the other side.

Golden Rule of Inequality - Whatever you do to one side you must do to the other side except when you multiply and divide by ~~fraction~~ NEGATIVE NUMBER in which case you just flip the sign.

Reflective Property of Equality	For any real number a, $a = a$.
Symmetric Property of Equality	For all real numbers a and b, if $a = b$, then $b = a$.
Transitive Property of Equality	For all real numbers a, b, and c if $a = b$ and $b = c$ then $a = c$.
Substitution Property of Equality	If $a = b$, then a may be replaced by b.
Addition and Subtraction Properties of Equality	For any real numbers a, b, and c, if $a = b$, then $a + c = b + c$ and $a - c = b - c$
Multiplication and Division Properties of Equality	For any real numbers a, b, and c, if $a = b$, then $ac = bc$ and, if $c \neq 0$, $a/c = b/c$.

Solving Absolute Value Equations

absolute value - Number of units a number is from 0 on the number line.

Absolute Value	For any real number a: if $a > 0$, then $\lvert a \rvert = a$; if $a < 0$, then $a = \lvert -a \rvert$

empty set - Is symbolized by { } or 0. ~~It is what the absolute value of a negative number is called~~.

Solving Inequalities

Trichotomy Property - For any two real numbers, a and b, exactly one of the following statements is true. $a < b$ $a = b$ $a > b$

Addition and Subtraction Properties for Inequalities	For any real numbers, a, b, and c: 1. if $a > b$, then $a + c > b + c$ and $a - c > b - c$ 2. if $a < b$, then $a + c < b + c$ and $a - c < b - c$
Multiplication and Division Properties for Inequalities	For any real numbers, a, b, and c 1. if c is positive and $a < b$, then $ac < bc$ and $a/c < b/c$ 2. if c is positive and $a > b$., then $ac > bc$ and $a/c > b/c$ 3. if c is negative and $a < b$, then $ac > bc$ and $a/c > b/c$ 4. if c is negative and $a > b$, then $ac < bc$ and $a/c < b/c$

Solving Absolute Value Inequalities

compound inequality - A sentence like $c > 0.32$ and $c < 0.55$; a compound inequality containing *and* is true only if both parts of it are true. The graph of a compound inequality containing *and* is the intersection of the graphs of two inequalities.