

Strand 1:

Number Sense & Algebra

1-1 Exponent Laws:

Key Concepts

Terminology:



Multiplication Law: where multiplying powers with the SAME BASE you ADD the

$$\text{EXPONENTS. } (a^n)(a^m) = a^{n+m}$$

Division Law: where dividing powers with the SAME BASE you SUBTRACT the

$$\text{EXPONENTS. } \frac{a^n}{a^m} = a^{n-m}$$

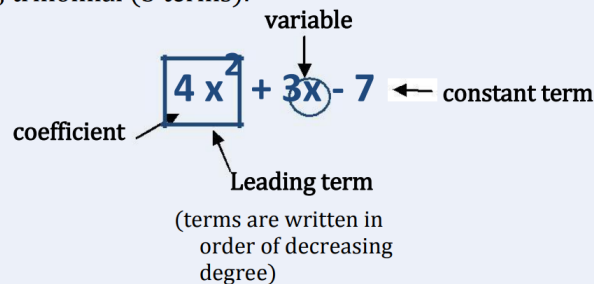
Power Law: where there is a power of a power you MULTIPLY the EXPONENTS $(a^n)^m = a^{nm}$

1-2 Polynomials:

Key Concepts

Polynomial: terms that are separated by addition and/or subtraction

- Can be classified according to their number of terms: monomial (1 term), binomial (2 terms), trinomial (3 terms).



Term: has a coefficient and/or a variable (exponent on variable must be a natural number)

Coefficient: the number and the sign that is in front of the variable

Degree: the value of the exponent on the variable

A constant: a term that does not have a variable

Like terms: terms that have the same variable with the same exponent, only like terms can be added or subtracted

1-3 Distributive Property:

Key Concepts

Distributive Property: distribute the term or constant to each term or constant inside the parentheses.

$$a(b + c) = ab + ac$$

1-4 Solving Equations:

Key Concepts

Equation: contains two expressions which are equivalent. For example: $2x+3=7$

Expression: a representation of a quantity. For example: $7x+1$

Solving Equations: solve multi-step equations by applying inverse order of operations

****KEEP IT SIMPLE:** Eliminate fractions as early as possible by **MULTIPLYING** by the **DENOMINATOR**

Strand 2:

Measurement & Geometry

2-1 Pythagorean Theorem:

Key Concepts

Hypotenuse: the longest side of the right triangle, opposite to the 90^0 angle.

Pythagorean Theorem: in a right angle triangle, the square of the length of the hypotenuse is equal to the sum of the squares of the lengths of the two shorter sides.

$$a^2 + b^2 = c^2$$

2-2 Optimization:

Key Concepts

Optimization: creating the largest or smallest area or perimeter given restrictions.

Maximum area: when obtaining a maximum rectangular area:

-enclose 2 or 4 sides forming a square

-enclose 3 sides forming a rectangle where the length is double the width

Minimum perimeter: when obtaining a minimum perimeter of a rectangular area, form a square.

2-3 Composite Figures:

Key Concepts

Composite Figures: figures that are made up of two or more two-dimensional figures: triangles, squares, rectangles, semicircles, etc.

2-4 Surface Area & Volume:

Key Concepts

Surface Area: the number of square units needed to cover the surface of a 3-D object.

Lateral Faces: the faces of a prism or pyramid that are not bases.

Volume: the amount of space that an object occupies, measured in cubic units.

Prism: a 3-D object with two parallel congruent polygonal bases.

$$\text{Volume of Prism} = \text{AREA of the BASE} \times \text{Height}$$

Pyramid: a 3-D object with one polygonal base and all lateral surfaces meeting at an apex.

$$\text{Volume of Pyramid} = \frac{\text{AREA of the BASE} \times \text{Height}}{3}$$

2-5 Angle & Triangle Theorems:

Key Concepts

Complementary Angles: two angles on a right angle which sum to 90 degrees.

Supplementary Angles: two angles on a straight line which sum to 180 degrees.

Opposite Angles: two angles on the same intersection opposite to each other are equal.

Equilateral Triangle Theorem: all side lengths and all angles are equal.

Isosceles Triangle Theorem: two sides lengths and their opposite angles are equal.

Sum of Angle Triangle Theorem: all interior angles in a triangle add to 180 degrees.

Remote Interior Angle Triangle Theorem: the exterior angle at each vertex of a triangle is equal to the sum of the two interior angles opposite to it.

2-6 Parallel Line Theorems:

Key Concepts

Corresponding Angles: pairs of corresponding angles associated with a transversal are equal.

Alternate Angles: pairs of alternate angles associated with a transversal are equal.

Co-interior Angle: pairs of co-interior angles associated with a transversal have a sum of 180 degrees.

2-7 Polygon Theorems:

Key Concepts

Polygon: a closed figure that is a union of 3 or more line segments in a plane.

Sum of Interior Angles of a Polygon: the interior angles of any polygon is given by the expression:

$$S = 180(n - 2)$$

Sum of Exterior Angles of a Polygon: the exterior angles of any polygon is 360° .

Strand 3:

Analytical Geometry & Linear Relations

3-1 Linear vs. Non-linear

Key Concepts

Linear Equation: an equation where the x -values increase at the same rate as the y -values in a graph: a straight line is used.

in a table of values: the first differences are constant. in an equation: the highest degree is one.

Non-linear Equation: an equation where the x -values increase at a different rate than the y -values. in a graph: a curve is used.

in a table of values: the first differences are not constant.

in an equation: the highest degree is anything other than one or zero.

3-2 Forms of Representing Linear Equations:

Key Concepts

Slope-intercept form: $y = mx + b$, where m represents the slope and b represents the y -intercept.

Standard Form: $Ax + By + C = 0$

Slope: is the measure of how steep a line is. The slope can be calculated from:

- a graph: by determining the rise and run $m = \frac{\text{rise}}{\text{run}}$

- two points: using their coordinates $m = \frac{y_2 - y_1}{x_2 - x_1}$

y -intercept: the point where the line passes through the y -axis.

3-3 Methods of Graphing:

Key Concepts

Table of Values: plot 5 points on the graph and connect them with a straight line.

Slope & y-intercept: plot the “ b ” value on the y -axis. Use the “ m ” value to determine the slope from that point, rise up if a positive slope or down if a negative slope and over to the right.

x & y -intercepts: calculate the x -intercept by subbing in $y = 0$ then calculate the y -intercept by subbing in $x = 0$. Plot these two intercepts and connect them with a straight line.

3-4 Generating an Equation:

Key Concepts

Given two points: first calculate the slope, then find the y -intercept by subbing in one of the points.

Given a word description: determine whether the new slope is parallel or perpendicular to the existing slope.

Given a graph: calculate the slope using the rise and the run, then read the y -intercept from the graph.

3-5 Special Lines:

Key Concepts

Horizontal Lines: lines that are parallel to the x -axis and have a slope of 0.

Vertical Lines: lines that are parallel to the y -axis and have an undefined slope.

Remember: **H**orizontal

Oslope

Y = b

Vertical

Undefined slope

X = a

3-6 Linear Systems:

Key Concepts

Linear System: two or more linear equations considered at the same time.

Solution: the point where the two linear equations intersect.

3-7 Scatter Plots & Lines of Best Fit:

Key Concepts

Scatter Plot: a graphical method of showing the relationship between two variables.

Partial variation: the dependent variable is related to the independent variable; the y-intercept is not zero.

Direct variation: the dependent variable is directly related to the independent variable; the y-intercept is zero.

Correlation: a relationship between the dependent and independent variable. Can be classified as: **positive, negative, no correlation.**

Strength of Correlation:

Perfect correlation: all points lie on the line of best fit

Strong correlation: points are close to the line or best fit

Moderate correlation: points are spread out but there is a definite

trend **Weak correlation:** points are more spread out and trend is less obvious

Line of Best Fit: a line that follows the trend of the data and has the same number of points above and below the line.

Interpolation: method of prediction that reads information within the given range of data.

Extrapolation: method of prediction that requires the line of best fit to be extended to read information outside of the given range of data.