Algebra – Things to Remember!

Scientific Notation:
3.2×10^{13}
The first number must be $1 \le n < 10$

Factorial:
$5! = 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1$
$1! = 1$
FYI: $0! = 1$

Absolute Value:
$|-5| = 5$
$|5| = 5$
Represents distance

Exponents:
$(-3)^2 \neq -3^2$
$2^0 = 1$
$4^{-3} = \frac{1}{4^3}$
$x^m \cdot x^n = x^{m+n}$
$(x^n)^m = x^{n \cdot m}$
$\frac{x^m}{x^n} = x^{m-n}$
$(xy)^n = x^n \cdot y^n$

Properties of Real Numbers:

Commutative Property:	a + b = b + a	ab = ba
Associative Property:	a+(b+c) = (a+b)+c	a(bc) = (ab)c
Distributive Property:	a(b+c) = ab + ac	
Identity:	a + 0 = a	a • 1 = a
Inverse:	a + (-a) = 0	a • (1/a) = 1
Zero Property:		a • 0 = 0

Undefined:
$\frac{6}{7-x}$ is undefined when $x = 7$ since the denominator = 0.

Polygons and sides:

triangle – 3	octagon – 8
quadrilateral – 4	nonagon – 9
pentagon – 5	decagon – 10
hexagon – 6	dodecagon - 12
septagon – 7	

Degree:
Degree of monomial = sum of exponents
$4x^3$ is of degree 3
x^2y^3 is of degree 5

Multiply: (distribute or FOIL)
$(x+3)(x+2) = x \cdot x + x \cdot 2 + 3 \cdot x + 3 \cdot 2$
$= x^2 + 5x + 6$
$(a+b)^2 = a^2 + 2ab + b^2$
$(a-b)^2 = a^2 - 2ab + b^2$

Direct Variation:
$y = kx$ where k = constant of variation
$k = y/x$

Solving Equations:
1. Deal with any parentheses in the problem.
2. Combine similar terms on same side of = sign.
3. Get the needed variables on the same side of = sign.
4. Isolate the needed variable by add or subtract.
5. Find the needed variable by divide or multiply.

Add Fractions:
Get the common denominator:
$\frac{5x}{6} + \frac{3x}{2} = \frac{5x}{6} + \frac{9x}{6} = \frac{14x}{6} = \frac{7x}{3}$

Factor:
Look for a GCF (greatest common factor)
Factor binomial or trinomial.
$a^2 - b^2 = (a+b)(a-b)$

Quadratic Equation:

$x^2 - 5x + 6 = 0$	Set = 0.
$(x-3)(x-2) = 0$	Factor.
$x = 3; \quad x = 2$	Find roots

Interval Notation:
$(1,5) \leftrightarrow 1 < x < 5$
$[1,5] \leftrightarrow 1 \le x \le 5$

Inequalities:

$5 - 3x \le 13 + x$	Remember to
$-3x \le 8 + x$	change direction
$-4x \le 8$	of inequality when
$x \ge -2$	mult/div by a negative.

Systems:

$y - 2x = 1$ $y + 2x = 9$	*Linear:* substitute; add to eliminate one variable or graph.
$y = x^2 - x - 6$ $y = 2x - 2$	*Linear Quadratic:* substitute or graph

For inequality systems, graph.

Function: Passes the vertical line test.
A set of ordered pairs in which each x element has only one y element associated with it.
$f(x) = 3x + 4$
$f(3) = 3 \cdot 3 + 4 = 13$

Parabola:
$y = ax^2 + bx + c$
Axis of symmetry:
$x = \frac{-b}{2a}$
Roots: where the graph crosses the x-axis.

x = abscissa, y = ordinate

Slope:
$m = \frac{\text{vertical change}}{\text{horizontal change}} = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}$.

Equations of Lines: m = slope
$y = mx + b$ slope-intercept
$y - y_1 = m(x - x_1)$ point-slope

Parallel and Perpendicular:
Parallel: slopes are equal.
Perpendicular: slopes are negative reciprocals (flip over and negate)

Perimeter: add the distances around the outside.

Circumference: $C = 2\pi r = \pi d$

Pythagorean Theorem:
Right Triangles only. $c^2 = a^2 + b^2$
Triples: 3, 4, 5
5, 12, 13
8, 15, 17
7, 24, 25

Trig: Right triangles only
$\sin \measuredangle A = \frac{o}{h}$; $\cos \measuredangle A = \frac{a}{h}$; $\tan \measuredangle A = \frac{o}{a}$
Angle of elevation: from horizontal line of sight up.
Angle of depression: from horizontal line of sight down.

Area:
$A_{triangle} = \frac{1}{2}bh$
$A_{equilateral\ triangle} = \frac{s^2\sqrt{3}}{4}$
$A_{rectangle} = bh$
$A_{square} = bh = s^2$
$A_{parallelogram} = bh$
$A_{rhombus} = bh = \frac{d_1 \bullet d_2}{2}$
$A_{trapezoid} = \frac{1}{2}h(b_1 + b_2)$
$A_{circle} = \pi r^2$
$A_{sector\ of\ circle} = \frac{n}{360}\pi r^2$
$A_{semicircle} = \frac{1}{2}\pi r^2$
$A_{quarter\ circle} = \frac{1}{4}\pi r^2$

Volume and Surface Area:
$V_{rectangular\ solid} = l \bullet w \bullet h$
$SA_{rectangular\ solid} = 2lh + 2hw + 2lw$
$V_{cylinder} = \pi r^2 h$
$SA_{closed\ cylinder} = 2\pi rh + 2\pi r^2$

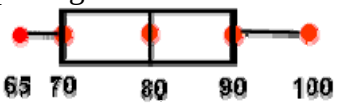
Error in Measurement:
Relative error = $\frac{|\text{measure-actual}|}{\text{actual}}$
% of Error = Relative • 100%

Permutations:
Arrangement in specific order.
${}_n P_r = \frac{n!}{(n-r)!}$

Data:
5 Statistical Summary: minimum, maximum, median, 1st quartile, 3rd quartile
Quartiles divide data into 4 equal parts.
Percentiles divide data into 100 equal parts.
Percentile rank of score $x = \frac{number\ of\ scores\ below\ x}{n} \bullet 100$, where n is the number of scores.
Mean = average.
Mode = most often (may be more than one answer).
Median = middle.
Outliers = values that are far away from the rest of the data.
Median best describes data if outliers exist.
Range = difference between the maximum and minimum values.

Probability: P(A') = 1 – P(A) complement
P(A and B) = P(A)•P(B) independent
P(A and B) = P(A)•P(B/A) dependent
P(A or B) = P(A) + P(B) mutually exclusive
P(A or B) = P(A) + P(B) – P(A and B) not exclusive
P(B/A) = P(A and B)/P(A) conditional probability
P(B/A) means probability of B given A has occurred.

Box and Whisker Plot: 1st and 3rd quartiles are at the ends of the box, median is a vertical line in the box, and the max/min are at the ends of the whiskers.
Helpful in interpreting the distribution of data.



Literal equations:
$a = b + cd$, solve for c.
$a - b = cd$
$\frac{a-b}{d} = c$ Use same strategies as for solving equations.

Sets:
$A \cup B$ Union - all elements in both sets.
$A \cap B$ Intersection - elements where sets overlap.
A' Complement - elements not in the set.
{ } or $\varnothing$ means null set.

Exponential Growth and Decay:
Decay: $y = ab^x$ where $a > 0$ and $0 < b < 1$

Growth: $y = ab^x$ where $a > 0$ and $b > 1$