Algebra – Things to Remember!

Scientific Notation:	**Exponents:**	**Properties of Real Numbers:**	
3.2×10^{13} The first number must be $1 \le n < 10$	$(-3)^2 \ne -3^2 \qquad x^m \bullet x^n = x^{m+n}$ $2^0 = 1 \qquad\qquad (x^n)^m = x^{n \bullet m}$ $4^{-3} = \dfrac{1}{4^3} \qquad \dfrac{x^m}{x^n} = x^{m-n}$ $\qquad\qquad\qquad (xy)^n = x^n \bullet y^n$	Commutative Property: $a + b = b + a$ $ab = ba$ Associative Property: $a+(b+c) = (a+b)+c$ $a(bc) = (ab)c$ Distributive Property: $a(b+c) = ab + ac$	
Factorial: **Absolute Value:** 5! = 5•4•3•2•1 | -5 | = 5 0! = 1 | 5 | = 5		Identity: $a + 0 = a$ $a \bullet 1 = a$ Inverse: $a + (-a) = 0$ $a \bullet (1/a) = 1$ Zero Property: $a \bullet 0 = 0$	

Undefined:	**Polygons and sides:**	**Degree:**	
$\dfrac{6}{7-x}$ is undefined when $x = 7$ since the denominator = 0.	triangle – 3 quadrilateral – 4 pentagon – 5 hexagon – 6	Degree of monomial = sum of exponents $4x^3$ is of degree 3 x^2y^3 is of degree 5	
Multiply: (distribute or FOIL) $(x+3)(x+2) = x \bullet x + x \bullet 2 + 3 \bullet x + 3 \bullet 2$ $\qquad\qquad = x^2 + 5x + 6$ $(a+b)^2 = a^2 + 2ab + b^2$ $(a-b)^2 = a^2 - 2ab + b^2$	septagon – 7 octagon – 8 nonagon – 9 decagon – 10 dodecagon - 12	**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:	**Factor:**	**Quadratic Equation:**	**Interval Notation:**
Get the common denominator: $\dfrac{5x}{6} + \dfrac{3x}{2} = \dfrac{5x}{6} + \dfrac{9x}{6} = \dfrac{14x}{6} = \dfrac{7x}{3}$	Look for a GCF (greatest common factor) Factor binomial or trinomial. $a^2 - b^2 = (a+b)(a-b)$	$x^2 - 5x + 6 = 0$ Set = 0. $(x-3)(x-2) = 0$ Factor. $x = 3; \quad x = 2$ Find roots	$(1,5) \leftrightarrow 1 < x < 5$ $[1,5] \leftrightarrow 1 \le x \le 5$

Inequalities:	**Circles:**	**Function:**	**Parabola:**
$5 - 3x \le 13 + x$ Remember to $-3x \le 8 + x$ change direction $-4x \le 8$ of inequality when $x \ge -2$ mult/div by a negative.	Equation of circle center at origin: $x^2 + y^2 = r^2$ where r is the radius Equation of circle not at origin: $(x-h)^2 + (y-k)^2 = r^2$ where (h,k) is the center and r is the radius	Passes the vertical line test. A set of ordered pairs in which each x element has only one y element associated with it.	$y = ax^2 + bx + c$ Axis of symmetry: $x = \dfrac{-b}{2a}$ Roots: where the graph crosses the x-axis.
x = abscissa, y = ordinate **Slope:** $m = \dfrac{vertical\ change}{horizontal\ change} = \dfrac{rise}{run} = \dfrac{y_2 - y_1}{x_2 - x_1}.$	**Equations of Lines:** $y = mx + b$ 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 $\sin \angle A = \dfrac{o}{h};\ \ \cos \angle A = \dfrac{a}{h};\ \ \tan \angle A = \dfrac{o}{a}$ Angle of elevation: from horizontal line of sight up. Angle of depression: from horizontal line of sight down.

Area:

$A_{triangle} = \dfrac{1}{2}bh$

$A_{equilateral\ triangle} = \dfrac{s^2 \sqrt{3}}{4}$

$A_{rectangle} = bh$

$A_{square} = bh = s^2$

$A_{parallelogram} = bh$

$A_{rhombus} = bh = \dfrac{d_1 \cdot d_2}{2}$

$A_{trapezoid} = \dfrac{1}{2}h(b_1 + b_2)$

$A_{circle} = \pi r^2$

$A_{sector\ of\ circle} = \dfrac{n}{360}\pi r^2$

$A_{semicircle} = \dfrac{1}{2}\pi r^2$

$A_{quarter\ circle} = \dfrac{1}{4}\pi r^2$

Volume and Surface Area:

$V_{rectangular\ solid} = l \cdot w \cdot h$

$SA_{rectangular\ solid} = 2lh + 2hw + 2lw$

$V_{cylinder} = \pi r^2 h$

$SA_{closed\ cylinder} = 2\pi rh + 2\pi r^2$

Permutations:
Arrangement in specific order.

$_n P_r = \dfrac{n!}{(n-r)!}$

$0! = 1$

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 $x = \dfrac{number\ of\ scores\ below\ x}{n} \cdot 100$, where n is the number of scores.

Mean = average.
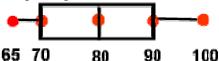Mode = most often (may be more than one answer).
Median = middle.
Outliers = values that are far away from the rest of the data.
Median best describes data if outliers exist.
Range = difference between the maximum and minimum values.

Box and Whisker Plot: The first and third quartiles are at the ends of the box, the median is indicated with a vertical line in the interior of the box, and the maximum and minimum are at the ends of the whiskers. Box-and-whisker plots are helpful in interpreting the distribution of data.

65 70   80   90   100

Conditional probability: P(B/A) means probability of B given A has occurred.	**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 $b > 1$