

Algebra 1 - Formula & Information Sheet



Scientific Notation: 6.5×10^{11} The first number must be $1 \leq n < 10$		Exponents: $2^1 = 2$ $3^0 = 1$ $5^{-3} = \frac{1}{5^3}$ $(-4)^2 \neq -4^2$ $x^m \cdot x^n = x^{m+n}$ $(x^n)^m = x^{n \cdot m}$ $\frac{x^m}{x^n} = x^{m-n}$ $(xy)^n = x^n \cdot y^n$	
Absolute Value: $ -7 = 7$ $ 7 = 7$ Represents distance		Interval Notation: $(2, 7) \leftrightarrow 2 < x < 7$ $[2, 7] \leftrightarrow 2 \leq x \leq 7$	
Literal equations: Use regular equation methods to solve. $a = b + cd$; solve for c . $a - b = cd$; $(a - b)/d = c$			
Multiply: (distribute or FOIL) $(x + 4)(x + 2) = x \cdot x + x \cdot 2 + 4 \cdot x + 4 \cdot 2$ $= x^2 + 6x + 8$ $(a + b)^2 = a^2 + 2ab + b^2$ $(a - b)^2 = a^2 - 2ab + b^2$			
Add Fractions: Get the common denominator, and add numerators: $\frac{4x}{3} + \frac{3x}{2} = \frac{8x}{6} + \frac{9x}{6} = \frac{17x}{6}$			
Inequalities: $8 - 3x \leq 16 + x$ Remember to $-3x \leq 8 + x$ change direction $-4x \leq 8$ of inequality when $x \geq -2$ mult/div by a negative. $x =$ abscissa, $y =$ ordinate Slope: (rate of change) $m = \frac{\text{vertical change}}{\text{horizontal change}} = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}$			
Factoring: Look to see if there is a GCF (greatest common factor) first. $ab + ac = a(b + c)$ $a^2 - b^2 = (a - b)(a + b)$ $(x + a)^2 = x^2 + 2ax + a^2$ $(x - a)^2 = x^2 - 2ax + a^2$ Factor by Grouping: $x^3 + 2x^2 - 3x - 6$ $(x^2 + 2x^2) - (3x + 6)$ group $x^2(x + 2) - 3(x + 2)$ factor each $(x^2 - 3)(x + 2)$ factor			
Systems: $y - 5x = 1$ $y + 5x = 9$ $y = x^2 - x - 6$ $y = 3x - 1$		Linear: substitute; eliminate one variable; or graph. Linear Quadratic: substitute or graph.	
For inequality systems, graph. Equations of Lines: $m =$ slope $y = mx + b$ slope-intercept form $y - y_1 = m(x - x_1)$ point-slope form			
Properties of Real Numbers: ADDITION Commutative Property: $a + b = b + a$ Associative Property: $a + (b + c) = (a + b) + c$ Distributive Property: $a(b + c) = ab + ac$ Identity: $a + 0 = a$ Inverse: $a + (-a) = 0$ Zero Property:		MULTIPLICATION $ab = ba$ $a(bc) = (ab)c$ $a \cdot 1 = a$ $a \cdot (1/a) = 1$ $a \cdot 0 = 0$	
Degree: Degree of monomial = sum exponents $5x^3$ is of degree 3 x^2y^3 is of degree 5		Undefined: $\frac{3}{7 - x}$ is undefined when $x = 7$ since the denominator = 0.	
Solving Equations: 1. Deal with any parentheses. 2. Combine like terms on each side. 3. Get needed variables on same side. 4. Isolate needed variable (+, -). 5. Find needed variable (x, /).		Exponential Growth/Decay: Decay: $y = ab^x$ where $a > 0$ and $0 < b < 1$ Growth: $y = ab^x$ where $a > 0$ and $b > 1$	
Radicals: Simplify: look for perfect squares. $\sqrt{50} = \sqrt{25 \cdot 2} = \sqrt{25} \cdot \sqrt{2} = 5\sqrt{2}$ Add: Add like radicals only $2\sqrt{2} + \sqrt{3} + 3\sqrt{2} = 5\sqrt{2} + \sqrt{3}$		Mult. multiply in front and then multiply inside. $(2\sqrt{2}) \cdot (3\sqrt{5}) = 6\sqrt{10}$	
Pythagorean Theorem: Right Triangles only. $c^2 = a^2 + b^2$ Triples: 3, 4, 5; 5, 12, 13; 8, 15, 17; 7, 24, 25		Parabola: $y = ax^2 + bx + c$ $y = a(x - h)^2 + k$ Axis of symmetry: $x = \frac{-b}{2a}$ Roots: where the graph crosses x-axis.	
Parallel and Perpendicular: Parallel: slopes are equal. Perpendicular: slopes are negative reciprocals (flip over and negate)		Error in Measurement: Relative error = $\frac{ \text{measure} - \text{actual} }{\text{actual}}$; % Error = Relative \cdot 100%	

Sequences: explicit form: $a_n = 3n + 1$; $n \geq 1$ (integer) recursive: $a_1 = 2$; $a_{n+1} = 2a_n$ (built on previous term) Arithmetic: (+) 2, 5, 8, 11, ... Geometric: (X) 2, 6, 18, 54, ...	Function: A set of ordered pairs in which each x element has only one y element associated with it. $f(x) = 3x + 4$ $f(3) = 3 \cdot 3 + 4 = 13$	Vertical Line Test: A function passes the vertical line test Domain: x -values used; Range: y -values used Transformations: $-f(x)$ over x -axis; $f(-x)$ over y -axis $f(x+a)$ horizontal shift; $f(x)+a$ vertical shift $f(ax)$ stretch horizontal; $af(x)$ stretch vertical
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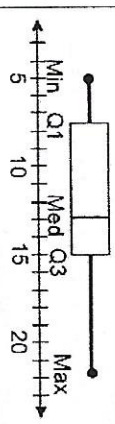
Quadratic Equations: $ax^2 + bx + c = 0$ (Set = 0.)
 Solve by factoring, completing the square, quadratic formula.

Factoring:
 $x^2 - 5x + 6 = 0$ Set = 0.
 $(x-3)(x-2) = 0$ Factors.
 $x = 3$; $x = 2$ Roots.

Quadratic Formula:
 $b^2 - 4ac > 0$ two real unequal roots
 $b^2 - 4ac = 0$ repeated real roots
 $b^2 - 4ac < 0$ two complex roots ($a + bi$)

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
 Square root property: If $x^2 = m$, then $x = \pm\sqrt{m}$

Completing the square: $x^2 - 2x - 5 = 0$
 1. If other than one, divide by coefficient of x^2
 2. Move constant term to other side $x^2 - 2x = 5$
 3. Take half of coefficient of x , square it, add to both sides
 $x^2 - 2x + 1 = 5 + 1$
 4. Factor perfect square on left side. $(x-1)^2 = 6$
 5. Use square root property to solve and get two answers. $x = 1 \pm \sqrt{6}$

Box Plot: Shows data distribution.


Regression Equation: calculator's line of best fit for a scatter plot
Correlation Coefficient: (tells how well a regression equation fits the data) $-1 \leq r \leq 1$
 The closer to 1 or -1, the stronger the fit.

Two-Way Tables:

Joint frequency	CCSS Appendix A	NOT Appendix A	TOTALS	Marginal frequency
PARCC	55	1	56	56/62 = 1.00
NOT PARCC	5	1	6	6/62 = 0.097
TOTALS	60	2	62	62/62 = 1.00

Relative Frequency (by row)

Conditional relative frequency	CCSS Appendix A	NOT Appendix A	TOTALS
PARCC	50/56 ≈ 0.89	1/56 ≈ 0.02	56/56 = 1.00
NOT PARCC	5/6 ≈ 0.83	1/6 ≈ 0.17	6/6 = 1.00
TOTALS	60/62 ≈ 0.97	2/62 ≈ 0.03	62/62 = 1.00

Standard Deviation:
Notation: σ_x = population standard deviation
 Standard deviation is a measure of variability; measuring spread of data and relationship of the mean to the data.
 If σ_x is small, data is close to mean.
 If σ_x is large, there is wide variance in data.
 If σ_x is zero, all data values are equal.

Normal Curve:
