

# mathSUX<sup>2</sup>

## Algebra Cheat Sheet

### Order of Operations PEMDAS: Properties of Real Numbers:

*P*=Parenthesis  
*E*= Exponents  
*M*= Multiplication  
*D*= Division  
*A*= Addition  
*S*= Subtraction

Commutative Property:  $a + b = b + a$

Associative Property:  $(a + b) + c = a + (b + c)$

Distributive Property:  $a(b + c) = ab + ac$

Zero Property:

Identity:  $a + 0 = a$

Inverse:  $a + -a = 0$

$ab = ba$

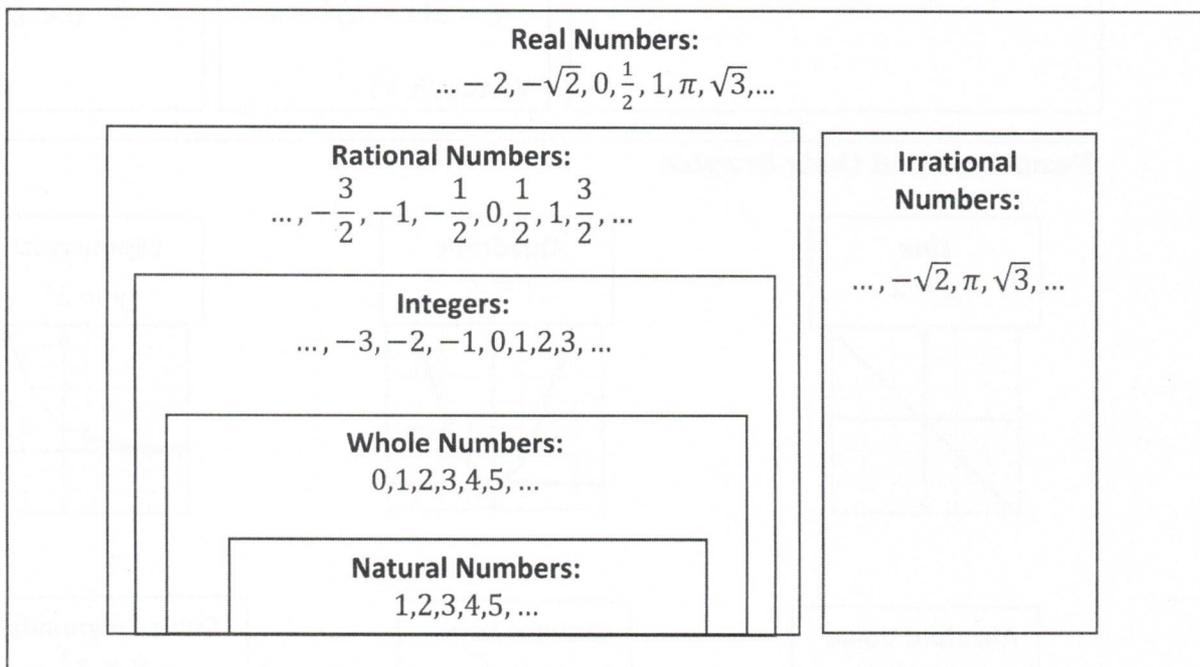
$(ab)c = a(bc)$

$a \times 0 = 0$

$a \times 1 = a$

$a \times \frac{1}{a} = 1$

### Real Numbers:



### Exponent Rules:

$$x^1 \times x^1 = x^{1+1} = x^2$$

$$\frac{x^1}{x^1} = x^{1-1} = x^0$$

$$(x^3)^2 = x^{3 \times 2} = x^6$$

$$(xy)^2 = x^2y^2$$

### Combining Like Terms:

$$x + x = 2x$$

$$3x - x = 2x$$

$$3x^2 + x^2 + 5 = 4x^2 + 5$$

$$5x^2 - 2x^2 + 10x - 5x = 3x^2 + 5x$$

$$10x^2 + 4x - (8x^2 + 2x) =$$

$$10x^2 + 4x - 8x^2 - 2x = 2x^2 + 2x$$

### Factoring Methods to Know:

Greatest Common Factor (GCF)

Product/Sum

Quadratic Formula:  $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Completing the Square

Difference of Two Squares (DOTS)

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**Geometric Sequence Formula:**

(Use when a sequence is formed by multiplying or dividing a number)

$$a_n = a_1 r^{n-1}$$

$a_n$  = Term Value

$a_1$  = First Term

$n$  = Term Number

$r$  = Common Ratio

**Compound Interest Formula:**

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

$P$  = Principle

$r$  = Interest rate

$n$  = number of compoundings per year

$t$  = Total number of years

**Solve for F:**  $C = \frac{5}{9}(F - 32)$

$$\begin{array}{l} C = \frac{5}{9}(F - 32) \\ \frac{5}{9} \quad \frac{5}{9} \\ \hline \frac{5}{9} C = F - 32 \\ \frac{5}{9} C + 32 = F \end{array}$$

**Arithmetic Sequence Formula:**

(Use when a sequence is formed by adding or subtracting a number)

$$a_n = a_1 + (n - 1)d$$

$a_n$  = Term Value

$a_1$  = First Term

$n$  = Term Number

$d$  = Common Difference

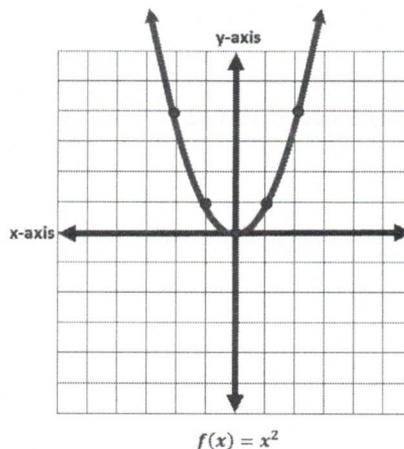
**Simplifying Radicals:**

$$\sqrt{4} = 2$$

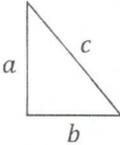
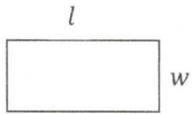
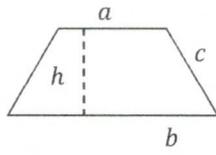
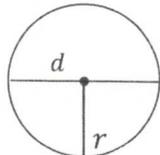
$$\sqrt{40} = \sqrt{4 \cdot 10} = \sqrt{4}\sqrt{10} = 2\sqrt{10}$$

$$\begin{aligned} 2\sqrt{18} + \sqrt{32} &= 2\sqrt{9 \cdot 2} + \sqrt{16 \cdot 2} \\ &= 2\sqrt{9}\sqrt{2} + \sqrt{16}\sqrt{2} \\ &= 2 \cdot 3\sqrt{2} + 4\sqrt{2} \\ &= 6\sqrt{2} + 4\sqrt{2} \end{aligned}$$

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**Transformations of a Parabola:  $f(x) = x^2$ :**

## Area and Perimeter:

Shape	Perimeter	Area
Triangle 	$P = a + b + c$	$A = \frac{1}{2}ab$
Square 	$P = 4s$	$A = s^2$
Rectangle 	$P = 2l + 2w$	$A = l \times w$
Trapezoid 	$P = a + b + 2c$	$A = \frac{1}{2}(a + b)h$
Circle 	$C = \pi d$	$A = \pi r^2$

### Tips and Tricks!

Circumference: Cherry Pie's Delicious  
 $C = \pi d$

Area: Apple Pies Are Two  
 $A = \pi r^2$

## Functions and their Equations:

### Equation of a Line:

$$y = mx + b$$

$m = \text{slope}$

$b = y - \text{intercept}$

### Slope Formula:

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\text{vertical change}}{\text{horizontal change}}$$

### Quadratic Equation:

$$ax^2 + bx + c = 0$$

### Vertex Formula:

$$x = \frac{-b}{2a}$$

### Quadratic Equation in vertex form:

$$y = a(x - h)^2 + k$$

Vertex:  $(h, k)$

### Exponential Equation:

$$y = ab^x$$

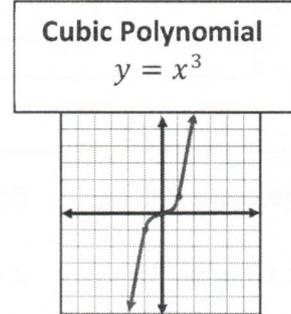
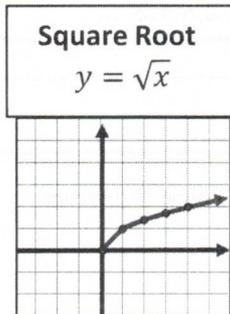
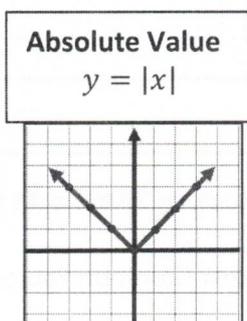
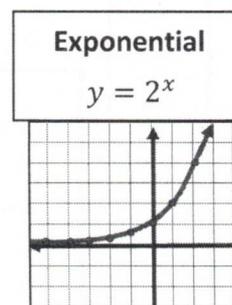
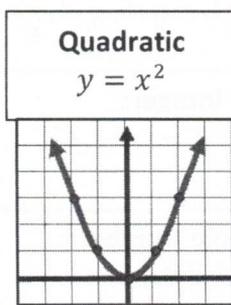
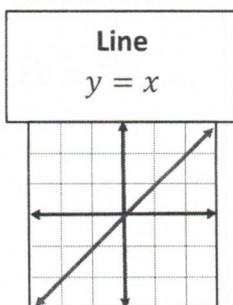
### Exponential Growth:

$$b > 1$$

### Exponential Decay:

$$0 < b < 1$$

## Functions and their Graphs:



## Measures of Central Tendency:

**Mean:** Average

**Median:** Middle (*put numbers in order and find middle*)

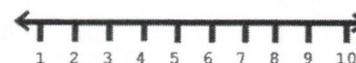
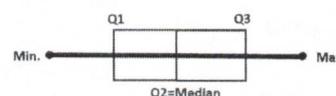
**Mode:** "Most" (*number that appears the most*)

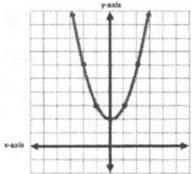
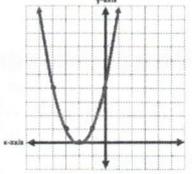
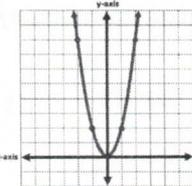
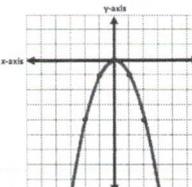
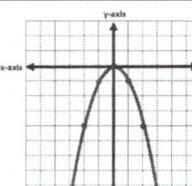
**Q1:** Quartile 1=Median of first half of data

**Q2:** Quartile 2=Median of all data

**Q3:** Quartile 3=Median of second half of data

## Box and Whisker Plot:



Function Transformation	What does it do to the graph?	Graph
$y = f(x) + C$	$C > 0$ moves up $C < 0$ moves down	 $f(x) = x^2 + 2$
$y = f(x + C)$	$C > 0$ moves left $C < 0$ moves right	 $f(x) = (x^2 + 2)$
$y = Cf(x)$	$C > 1$ moves closer to y-axis $0 < C < 1$ moves further from y-axis	 $f(x) = 2x^2$
$y = -f(x)$	Reflection in the x-axis	 $f(x) = -x^2$
$y = f(-x)$	Reflection in the y-axis	 $f(x) = -x^2$