math**SUX**^{2}
Algebra Cheat Sheet

Order of Operations PEMDAS:

P=Parenthesis

E= Exponents

M= Multiplication

D= Division

A= Addition

S= Subtraction

Properties of Real Numbers:

Commutative Property: $a + b = b + a$ $\qquad ab = ba$

Associative Property: $(a + b) + c = a + (b + c)$ $\quad (ab)c = a(bc)$

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

Zero Property: $\qquad\qquad\qquad\qquad\qquad\qquad a \times 0 = 0$

Identity: $\qquad\qquad\qquad a + 0 = a \qquad\qquad a \times 1 = a$

Inverse: $\qquad\qquad\qquad a + -a = 0 \qquad\quad a \times \frac{1}{a} = 1$

Real Numbers:

Real Numbers:
$$\dots - 2, -\sqrt{2}, 0, \tfrac{1}{2}, 1, \pi, \sqrt{3}, \dots$$

Rational Numbers:
$$\dots, -\frac{3}{2}, -1, -\frac{1}{2}, 0, \frac{1}{2}, 1, \frac{3}{2}, \dots$$

Integers:
$$\dots, -3, -2, -1, 0, 1, 2, 3, \dots$$

Whole Numbers:
$$0, 1, 2, 3, 4, 5, \dots$$

Natural Numbers:
$$1, 2, 3, 4, 5, \dots$$

Irrational Numbers:
$$\dots, -\sqrt{2}, \pi, \sqrt{3}, \dots$$
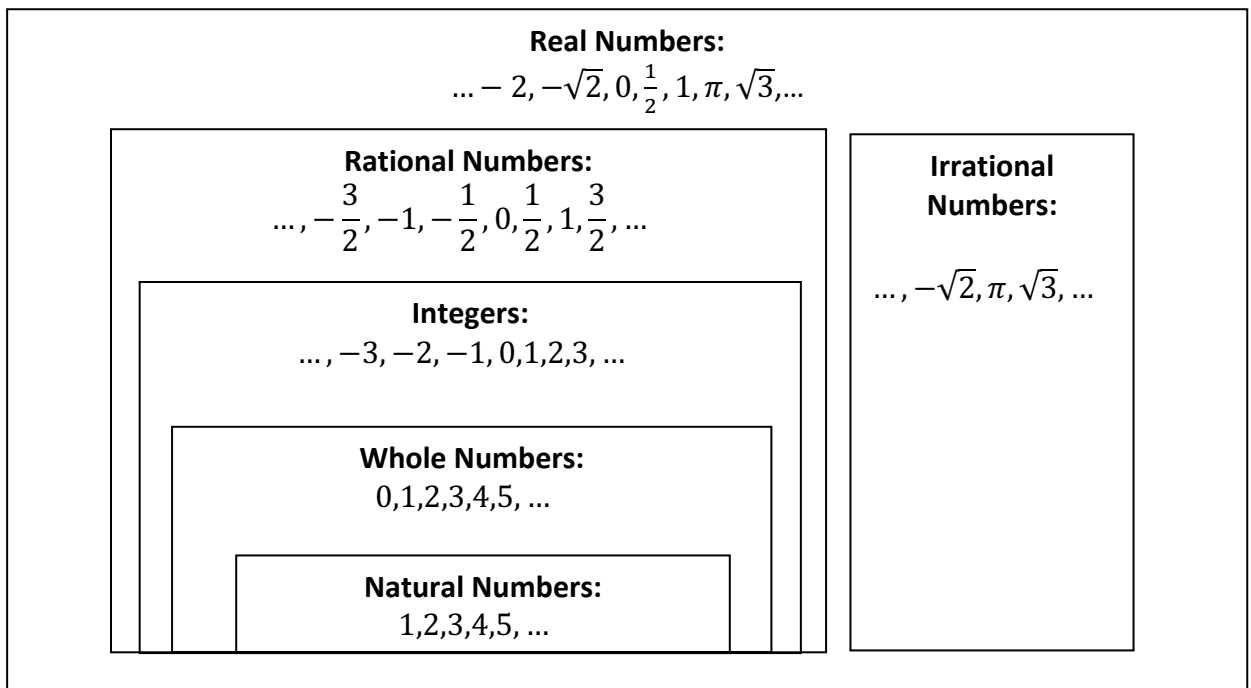
Exponent Rules:

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

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

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

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

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

Completing the Square

Difference of Two Squares (DOTS)

---

 math**SUX**^{2}

Functions and their Equations:

Equation of a Line:
$$y = mx + b$$
$m = slope$
$b = y - intercept$

Slope Formula:
$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{vertical\ change}{horizontal\ change}$$

Quadratic Equation:
$$ax^2 + bx + c = 0$$

Vertex Formula:
$$x = \frac{-b}{2a}$$

Quadratic Equation in vertex form:
$$y = a(x - h)^2 + k$$

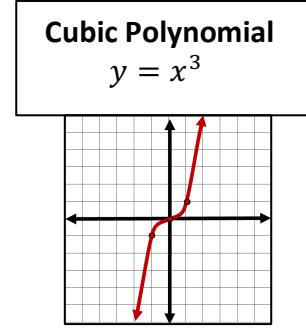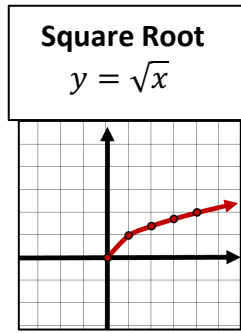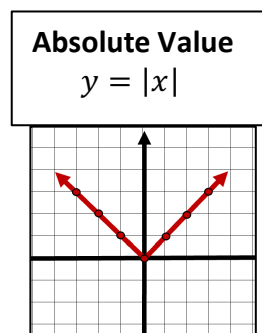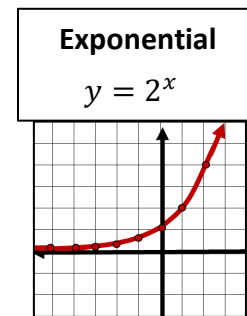**Vertex:** (h, k)

Exponential Equation:
$$y = ab^x$$

Exponential Growth:
$$b > 1$$

Exponential Decay:
$$0 < b < 1$$

Functions and their Graphs:

Line
$$y = x$$

Quadratic
$$y = x^2$$

Exponential
$$y = 2^x$$

Absolute Value
$$y = |x|$$

Square Root
$$y = \sqrt{x}$$

Cubic Polynomial
$$y = x^3$$
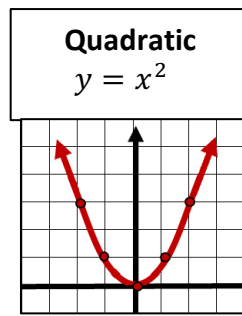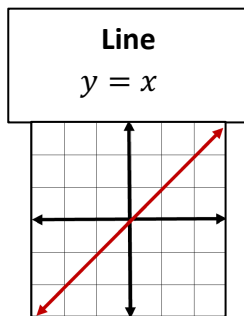
Measures of Central Tendency:

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:

2   math**SUX**²

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:
$$A = P(1 + \frac{r}{n})^{nt}$$
$P = Principle$
$r = Interest\ rate$
$n = number\ of\ compoundings\ per\ year$
$t = Total\ number\ of\ years$

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

$$C = \frac{5}{9}(F - 32)$$
$$\frac{\frac{5}{9}}{\frac{5}{9}} \qquad \frac{\frac{5}{9}}{\frac{5}{9}}$$
$$\frac{9}{5}C = F - 32$$
$$\frac{9}{5}C + 32 = F$$

Arithmetic Sequence Formula:
(Use when a sequence is formed by adding or subtracting a number)
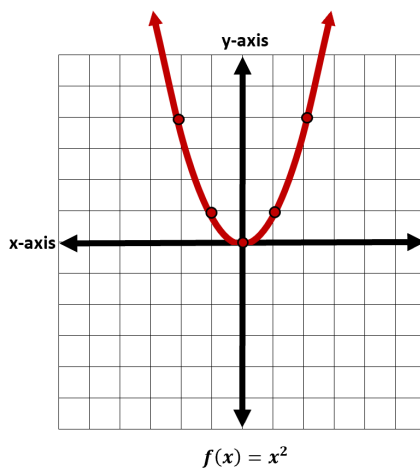$$a_n = a_1 + (n - 1)d$$
$a_n = Term\ Value$
$a_1 = First\ Term$
$n = Term\ Number$
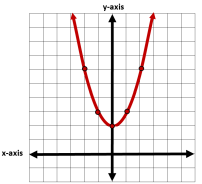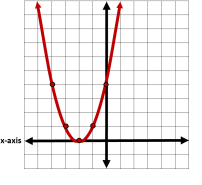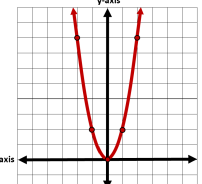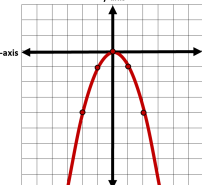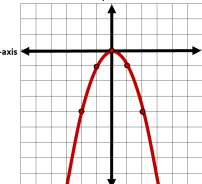$d = Common\ Difference$

Simplifying Radicals:

$$\sqrt{4} = 2$$

$$\sqrt{40} = \sqrt{4 \cdot 10} = \sqrt{4}\sqrt{10} = 2\sqrt{10}$$
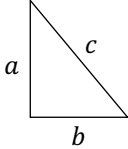
$$\begin{aligned}
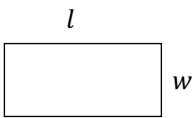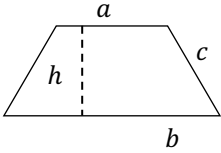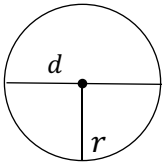2\sqrt{18} + \sqrt{32} &= 2\sqrt{9 \cdot 2} + \sqrt{16 \cdot 2} \\
&= 2\sqrt{9}\sqrt{2} + \sqrt{16}\sqrt{2} \\
&= 2 \cdot 3\sqrt{2} + 4\sqrt{2} \\
&= 6\sqrt{2} + 4\sqrt{2}
\end{aligned}$$

_____

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

$f(x) = x^2$

3   mathSUX²

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

4   mathSUX²

Area and Perimeter:

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

Tips and Tricks!

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

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

5

math**SUX**²