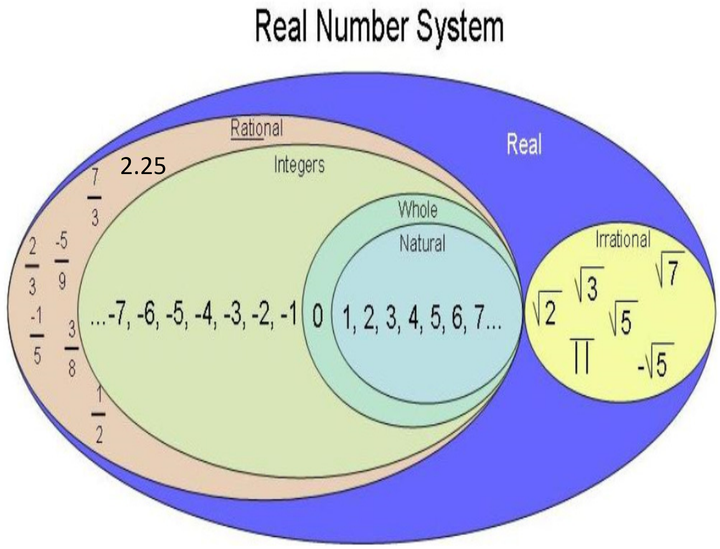
Chapter 0 Summary Sheet



Domain: The set of all x-values

Range: The set of all y-values

Extraneous Solution – a non-solution introduced when solving an equation by raising both sides to a power.

Conjugate - $a+b\sqrt{m}$ and $a-b\sqrt{m}$ are conjugates of each other.

The polynomial $a_n x^n + a_{n-1}x^{n-1} + \ldots + a_1 x + a_0$ is of **degree** n, a_n is the **leading coefficient**, and a_0 is the **constant term**.

Scientific Notation **Ex 1:** $359{,}000{,}000 = 3.59\times10^{8}$ **Ex 2:** $.00000000312 = 3.12\times10^{-9}$

Properties of Exponents

$$a^m a^n = a^{m+n} \quad \frac{a^m}{a^n} = a^{m-n} \quad a^{-n} = \frac{1}{a^n} \quad a^0 = 1 \quad (ab)^m = a^m b^m \quad (a^m)^n = a^{mn} \quad \left(\frac{a}{b}\right)^m = \frac{a^m}{b^m} \quad a^{m/n} = \left(\sqrt[n]{b}\right)^m = \sqrt[n]{a^m}$$

Properties of Radicals

$$\sqrt[n]{a^m} = \left(\sqrt[n]{a}\right)^m \qquad \sqrt[n]{a}\bullet\sqrt[n]{b} = \sqrt[n]{ab} \qquad \frac{\sqrt[n]{a}}{\sqrt[n]{b}} = \sqrt[n]{\frac{a}{b}} \qquad \sqrt[m]{\sqrt[n]{a}} = \sqrt[mn]{a} \qquad \left(\sqrt[n]{a}\right)^n = a$$

Inequality Notation **Ex 1:** $x < a$ or $x \ge b$ **Ex 2:** $a \le x < b$

Interval Notation $(-\infty, a)\cup[b,\infty)$ $[a,b)$

Note:
(Parentheses) for <, >, or ∞
[Brackets] for ≤ or ≥

Absolute Value Equations **Ex:** $|x+a| = b$ **Positive Case:** $x+a=b$ **Negative Case:** $x+a=-b$

Absolute Value Inequalities

Ex 1: $|x+a|<b$ **AND case** **Positive Case:** $x+a<b$ **Negative Case (Flip Sign):** $x+a>-b$

Less th**and** AND (Solution is where the graphs overlap)

Ex 2: $|x+a|>b$ **OR case** **Positive Case:** $x+a>b$ **Negative Case (Flip Sign):** $x+a<-b$

Great**or** OR (Solution is anything that either graph covers)

5 Basic Methods for Factoring Polynomials

	Standard Form	Factored Form
Greatest Common Factor	$2x^3-6x$	$2x(x^2-3)$
Difference of Squares	x^2-81	$(x+9(x-9)$
Big X	$x^2-7x+12$	$(x-3)(x-4)$
Grouping	x^3-2x^2-3x+6	$(x-2)(x^2-3)$
Big X with Grouping	$2x^2+x-15$	$(2x-5)(x+3)$

Factoring Special Polynomials

Difference of Two Squares

$$a^2 - b^2 = (a+b)(a-b)$$

Perfect Square Trinomial

$$a^2 + 2ab + b^2 = (a+b)^2$$
$$a^2 - 2ab + b^2 = (a-b)^2$$

Sum or Difference of Two Cubes

$$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$$
$$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$$

Method for remembering sum and difference of cubes:

Notice that a sum of cubes factors into the product of a binomial and trinomial. The binomial has the <u>same</u> sign as what you started with. The first operation in the trinomial is the <u>opposite</u> of that in the binomial. The second operation in the trinomial is always <u>plus</u>. **Acronym:** SOP (S)ame (O)pposite (P)lus

Special Products

Sum and Difference of Same Terms

$$(a+b)(a-b) = a^2 - b^2$$

Square of a Binomial

$$(a+b)^2 = a^2 + 2ab + b^2$$
$$(a-b)^2 = a^2 - 2ab + b^2$$

Cube of a Binomial

$$(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$$
$$(a-b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$$

Pascal's Triangle

1	$(a+b)^0$
1 1	$(a+b)^1$
1 2 1	$(a+b)^2$
1 3 3 1	$(a+b)^3$
1 4 6 4 1	$(a+b)^4$

Constructing Pascal's Triangle: 1's are on the left and right side and the numbers between are the sum of the two numbers above.

Pascal's triangle helps you determine the coefficients when expanding a product of the same binomial. You should understand how to apply Pascal's triangle instead of remembering the special products.

Note: It easier to treat a difference binomial $(a-b)$ instead as a sum $(a+(-b))$ when applying Pascal's Triangle.

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

Quadratic Formula

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

2 Methods for Remembering the Quadratic Formula

1) A negative boy couldn't decide whether to go to a radical party. He was square so he missed out on four awesome chicks. The party was over at 2 a.m.

2) Pop goes the weasel melody

Annual Interest Rate Formula: $A = P(1 + rt)$

A: Account Balance (How much money is in the account)
P: Principle (The initial amount invested)
R: Interest Rate
T: Length of time Principle is invested

Completing the Square Method

1) Move the constant, *c*, to the right side.
2) If necessary, factor out *a* from the two terms on the left side.
3) Add $\left(\frac{b}{2}\right)^2$ to both sides of the equation. Multiply $\left(\frac{b}{2}\right)^2$ the on the right side by the *a* factor.
4) Complete the square, simplify, and begin the process of isolating x.

Factors Involving Negative Exponents

Factor out the base with the smallest exponent.

$$\begin{aligned} x(x+1)^{-1/2} + (x+1)^{1/2} &= (x+1)^{-1/2}\left[x(x+1)^0 + (x+1)^1\right] \\ &= (x+1)^{-1/2}\left[x + (x+1)\right] \\ &= (x+1)^{-1/2}(2x+1) \end{aligned}$$

U Substitution

Factor

$$(4x-15)^2 - 10(4x-15) + 16$$

$u = 4x - 15$ Substitute u in for $4x - 15$

$u^2 - 10u + 16$ Much easier to factor

$= (u-2)(u-8)$

$= (4x-15-2)(4x-15-8)$ Plug $4x-15$ back in for u.

$= (4x-17)(4x-23)$