FUNCTIONS & QUADRATIC EQUATIONS

PRAXIS FLASHCARD #144

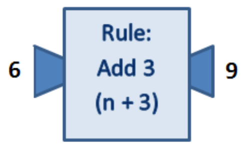
Function

A **function** is a relation between a set of inputs and a set of potential outputs with the property that each input is related to exactly one output.

PRAXIS FLASHCARD #286

Function Machine

A **function machine** is a visual device to help young students understand the concept of a function. Each function machine has a rule it applies to numbers put into the machine (the inputs). After the machine applies the rule, it outputs the result.



PRAXIS FLASHCARD #141

Domain & Range of a Function

The **domain** of a function is the set of all possible x-values. The **range** of a function is the set of all possible y-values.

PRAXIS FLASHCARD #191 & #396

Absolute Value

Absolute value is the value portion of a number without a sign. Absolute values are also described as the distance on a number line from 0. Zero is the only number that is its own absolute value (because zero is neither positive nor negative). The symbol for "absolute value" is a vertical pipe around the expression: |3 – 6|

PRAXIS FLASHCARD #337

Properties of Absolute Value

For all real numbers a and b:

$$|a| \geq 0$$
$$|-a| = |a|$$
$$a \leq |a|$$
$$|ab| = |a||b|$$
$$\left|\frac{a}{b}\right| = \frac{|a|}{|b|}, \quad b \neq 0$$
$$|a + b| \leq |a| + |b|$$

PRAXIS FLASHCARD #339

Simultaneous Equations
(Definition and 3 Ways to Solve)

Simultaneous Equations are two or more equations with multiple variables. These are often called systems of equations. A solution gives values for the variables that are true for all equations in the system. There are many ways to solve a system of equations. Three ways discussed in beginning algebra are:

1. Elimination (sometimes called adding)
2. Substitution
3. Graphing

Another method presented in intermediate/advance algebra is the use of matrices.

PRAXIS FLASHCARD #314

POLYNOMIAL
(TERMS; DEGREES; TYPES)

A **polynomial** is an algebraic expression with one or more terms. A polynomial cannot have a variable in the denominator (which is a negative exponent). A polynomial with one term is called a monomial; two terms, a binomial; and three terms, a trinomial. The term with the highest exponent (sum) determines the degree of the polynomial.

degree	type of polynomial
1	linear
2	quadratic
3	cubic

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A MONOMIAL

A **monomial** is a polynomial with a single term. A term contains a coefficient with possibly one or more variables all multiplied. Neither a term nor a monomial has any addition or subtraction. Here are samples of four monomials:

$$3 \qquad 3x \qquad 3x^2 \qquad x^5$$

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BINOMIAL

A **binomial** is an algebraic expression with exactly 2 terms. **Example:** $3x - 2y$

PRAXIS FLASHCARD #399

TRINOMIAL

A **trinomial** is an algebraic expression with exactly 3 terms. **Example:** $3x^2 + 2x - 1$

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FACTORING POLYNOMIALS

1. Factor out any common factors in all terms.
2. If the polynomial has four terms, factor it by grouping.
3. If it is a binomial, look for a difference of squares, a sum of cubes, or a difference of cubes. (Note that a sum of squares cannot be factored.)
4. If it is a trinomial and the coefficient of the x2 term = 1, un-FOIL to factor.
5. If it is a trinomial and the coefficient of the x2 term is not 1, use the AC method to factor.

PRAXIS FLASHCARD #325

QUADRATIC EQUATION (DEFINITION & FIVE WAYS TO SOLVE)

A **quadratic equation** is a second-degree polynomial equation (the exponent on the leading term is a 2). There are many ways to solve a quadratic equation, but the five most common ways are:

1. Factor and set each factor equal to 0
2. If there is no x-term, solve for x2 and apply the square root method.
3. Graph the equation (as a parabola) and determine the solutions where the parabola crosses the x-axis
4. Complete the square
5. Use the quadratic formula

PRAXIS FLASHCARD #198

EXPONENT

An **exponent** is a symbol to indicate a shortcut of multiplication. The exponent signifies the number of times the base is multiplied by itself. **Example:** $6^3 = 6 \times 6 \times 6 = 216$ **Careful:** $\mathbf{6^3 \neq 6 \times 3}$

PRAXIS FLASHCARD #202

Rules for Exponents

$$a^1 = a$$
$$1^n = 1$$
$$a^0 = 1$$
$$a^n \cdot a^m = a^{n+m}$$
$$a^n \div a^m = a^{n-m}$$
$$(a^n)^m = a^{nm}$$
$$(ab)^n = a^n \cdot b^n$$
$$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$$
$$a^{\frac{m}{n}} = \sqrt[n]{a^m}$$

PRAXIS FLASHCARD #203

Rules for Square

$$\sqrt{ab} = \sqrt{a}\sqrt{b}$$
$$\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$$
$$\sqrt{a}\sqrt{a} = a$$
$$\sqrt{a^2} = |a|$$
$$\sqrt{a^n} = \left(\sqrt{a}\right)^n = a^{\frac{n}{2}}$$

PRAXIS FLASHCARD #201

Square Root of a Number

The **square root** of a number is the value when multiplied by itself makes the number. A number's square root is always smaller than half of the number. The symbol for square root is called a radical sign. There is an index of 2 on the radical sign, but an index of 2 is rarely written -- it is understood to be 2 if not written. Finding a square root is the inverse of squaring a number. Although -6 times -6 also makes 36, we always use the positive square root (also called the principal square root).

$$\sqrt[2]{36} = \sqrt{36} = 6 \ \ because \ \ 6 \times 6 = 36$$

PRAXIS FLASHCARD #340

Simplifying Square Roots

To simplify square roots, take out the square root of any perfect squares that are factors inside the radicand. Perhaps the easiest way to do this is the factor the number inside the radicand so it is obvious which factors can be taken out.

Example: Simplify $\sqrt{72}$

$$\sqrt{72} = \sqrt{2 \times 36} = 6\sqrt{2}$$

PRAXIS FLASHCARD #242

Approximating Square Roots

Approximating square roots means to find the approximate value of a number's square root. We find approximate square roots by comparing the number to perfect square numbers where the square roots are known. For example, to find the approximate square root of 51, use the fact that 7 x 7 = 49 and 8 x 8 = 64. Since 51 is between the perfect squares of 49 and 64 (but closer to 49 than 64), the approximate square root of 51 is between 7 and 8 (but closer to 7 than 8). The approximate square root of 51 is 7.1 or 7.2
