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Grading Rubric

All work in this workbook needs to be in pencil.

	0-1 points	**2-3 points**	**4-5 points**
Completeness	No parts have been completed. Majority of definitions and example work is missing.	Some information is written down. Some steps or parts are missing. Ordered pairs or scale from the graphs are missing.	All definitions and examples are completed, no steps missing
Neatness	The information is not clear or comprehendible.	There are some parts that are not clear. Some steps are missing or not clear.	All work is neatly written and clear. A final answer is circled.
Organization	Information is not presented in the right or designated place.	Some information is not presented in the designated place or is presented inappropriately. Three or fewer steps don't follow logically. Some equal signs are missing.	All information is in the right and/or designated place. There is a logic flow to all work. No equal or mathematical signs are missing.
Correctness	There are many mistakes in the work or the definitions.	Three or fewer mistakes in the definitions or worked examples.	No mistakes are made and all work is correct.
			TOTAL 20 Points

Class 1 – Review

Set:____

The following are examples of sets

- **Natural numbers**: ___________________________

- **Whole numbers**: ____________________________

- **Integers**: ___________________________________

- **Rational numbers** ____

- **Irrational numbers**

- **Real numbers**

- **Prime number**

  Practice: Give at least three examples of prime numbers ______________________________________

- **Absolute Value** of a number a, denoted by $|a|$, is ____

Example:

1. $|4| =$

2. $|-3| =$

Fractions

A Fraction is ____

Give a few examples ____

- **Simplifying:** To simplify a fraction we

  Simplify: $\frac{32}{24} =$

- **Reciprocal** of a fraction is ____

  Find the reciprocal of $\frac{3}{7}$

- **Multiplying**: To multiply two fractions we ______________________________

  Multiply: $\frac{11}{2} \cdot \frac{4}{3} =$

- **Dividing**: To divide two fractions we ______________________________

  Divide: $\frac{11}{3} \div \frac{5}{6}$

- **Adding/Subtracting**: To add/Subtract fractions we ______________________________

- **LCD is** ____

Add: $\frac{11}{3}+\frac{5}{2}$

Practice on the following problems:

3. $\frac{5}{11}+\frac{7}{11}=$

4. $\frac{3}{4}-\frac{5}{7}=$

5. $\frac{5}{12}+\frac{3}{20}=$

6. $\frac{12}{28}+\frac{5}{24}=$

Exponential Expression

An **exponential expression** is an expression of the form ____

Give at least two examples:________________________________

Simplify

7. $7^1 =$

8. $\left(\frac{2}{3}\right)^3 =$

9. $(-3)^4 =$

10. $-5^2 =$

Exponential Rules:

Write the exponential rules for each of the following:

- $a^x \cdot a^y =$ _________ $\quad (ab)^x =$ _________ $\quad a^1 =$ _________
- $\frac{a^x}{a^y} =$ _________ $\quad \left(\frac{a}{b}\right)^x =$ _________ $\quad a^0 =$ _________
- $\left(a^x\right)^y =$ _________ $\quad a^{-x} =$ _________ $\quad a^{x/y} =$ _________

Practice: Simplify the following:

11. $\left(\frac{r}{s}\right)^6 =$

12. $\left(\frac{5x^6}{9y^3}\right)^2 =$

13. $\left(\frac{9x^3}{y}\right)^{-2} =$

14. $\frac{6^{-5}x^{-1}y^2}{6^{-2}x^{-4}y^4} =$

15. $\frac{(3x^{-2}y)^{-2}}{4x^7y} =$

Order of Operation (P-E-M-D-A-S)

-
-
-
-

Example: Evaluate the following.

16. $\dfrac{8\cdot 2^3 - |3-7| + 5(3^2-4)}{5\cdot 2 - 7} =$

- **Scientific Notation:**

A number is written in scientific notation if ____

____

Give an Example: ____________________________

17. Practice: Write the number in Scientific Notation

9,060,000,000 = 0.00017 =

18. Write the number in Decimal Notation

$3.067 \times 10^{-4} =$ $6.002 \times 10^{6} =$

19. Perform each operation and write in standard form and Scientific Notation

$(9 \times 10^{7})(4 \times 10^{-9})$ $\dfrac{8\times 10^{4}}{2\times 10^{-3}} =$

Radicals:

In General: ____

Notation ____________________________________

Examples: $\sqrt{100} =$ $-\sqrt{36} =$ $\sqrt{-1} =$ $\sqrt{\frac{25}{81}} =$

- **Product Rule:** ____
- **Quotient Rule**: ____
- **Simplify:** ____

Simplify: $\sqrt{4x^6} =$ $\sqrt{\frac{16y^{24}}{81}} =$

- **Add/Subtract:** ____

Add the following:

$\sqrt{28} + \sqrt{63} =$

$\sqrt{72x^2} + \sqrt[3]{54} - x\sqrt{50} - 3\sqrt[3]{2} =$

- **Multiply** ____

Multiply the following:

$2\sqrt{3} \cdot 7\sqrt{5} =$ $\sqrt[4]{8} \cdot \sqrt[4]{2} =$

More Definitions:

- **Variables** ____

Give at least three *examples*: ____________________________

- **Algebraic Expression** ______________________________________

Give a few *examples*: ______________________________________

We can Evaluate algebraic expressions if we know the value of the variable(s).

Example: Evaluate $2x - y^2$ if $x = 3$ and $y = 2$

____

- **Equation**: ____

Give two Examples: ______________________________________

- **Solution/Root**____

Check to see if $x = 2$ *is a solution to the equation* $5x - 3 = 4x - 1$

Polynomials

A **Polynomial in *x* is** ____

Give at least three examples ____________________________________

____________Fun things we do with polynomials______________

- **Evaluating:** ____

Find the value of the polynomial $6x^2 + 11x - 20$ when x = -1.

- **Simplifying, Adding and Subtracting:** ______________________________

Add/Subtract the following:

$14y^2 + 3 - 10y^2 =$ ______________________________

$(5x^2 - 2x + 1) - (-6x^2 + x - 1) =$ ______________________________

- ***Multiplying:*** ____

Multiply : $(5y^2 - 6y + 7)(4y + 3) =$

Special Products

- **FOIL** = ____

  Foil the following: $(x+7)(x-5)=$

- **Squaring a Binomial:** $(a+b)^2=$ ______________ *or* $(a-b)^2=$ ________________

  Square the following: $(2x+5)^2=$

- **Difference of Squares:** $(a+b)(a-b)=$ ___________________________

  Multiply the following:

  $$\left(x-\frac{1}{3}\right)\left(x+\frac{1}{3}\right)= \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_$$

  $$(2x^2+6x)(2x^2-6x)= \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_$$

- ***Dividing Polynomials***

  - Dividing by a **Monomial:** ____.

    Divide: $\dfrac{25x^3+5x^2}{5x}=$

  - Dividing **by a polynomial other than a monomial:** _______________________

    Divide: $\dfrac{x^2+7x+12}{x+3}=$

Factoring

- **Factoring is the process of___** ____

- **GCF of a list of Integers** ____

- **To find the GCF** ____

____

Find the $GCF(45,75)$ ____

Find the GCF of the following numbers:

$32\ \ and\ \ 33 =$ $24,\ 60\ \ and\ \ 96 =$

- **GCF of a list of Common Variables** ____

Example: *Find the* $GCF(x^5, x^3)$ → ____

- **GCF of a list of a list of TERMS** ____

Find the $GCF(-9x^2, 15x^4, 6x)\}$:

The fist step to factoring a polynomial ______________________________

- **Prime Polynomial** ____

- **Factoring by Grouping is used for** ________________________________

- **To Factor by Grouping** ____

Factor the polynomial $ab+4a+7b+28=$

Practice: *Factor the following polynomials*

21. $5a^2+2ab-5a-2b$

22. $15xz+15yz-5xy-5y^2$

- **Factoring Trinomials of the form** x^2+bx+c

____

Example $x^2+9x+20=$ ____

Practice: *Factor the following*

23. $x^2-13x+22=$

24. $x^2+5x-36=$

- **Factoring Trinomials of the form** $ax^2 + bx + c$

____

Example $2x^2 + 5x - 12$

Factoring Binomials

- **Difference of two squares:** $a^2 - b^2 =$ ______________________________

Factor $a^2 - 16 =$

Practice on factoring the following:

$25x^2 - 1 =$ $p^4 - 81 =$

$48x^4 - 3 =$ $c^2 - \frac{9}{25} =$

- $\boxed{a^2 + b^2}$ **is** ____

- **Sum/Difference of two Cubes:** $x^3 + y^3 =$ $x^3 - y^3 =$

Factor the following: $125x^3 - 1 =$ $16p^3 + 250y^3 =$

Rationals

- **Rational Expression** ____

____

- **Domain** ____

- To find the domain ____

Ex: $\frac{2x-5}{x+3}$ *is defined for* ________________________________

Example: Find the domain of the following expressions:

$\frac{4}{x-2}$, $\frac{x}{x^2-1}$, $\frac{2x-3}{6x^2-5x+1}$

Operations

- **Simplifying**: ____.

Simplify $\frac{x^2+6x+5}{x^2-25}$

- **Multiplying**:

  ____

  Multiply $\frac{x-7}{x-1}\cdot\frac{x^2-1}{3x-21}$

- **Dividing**:

  ____

  Divide: $\frac{x^2-2x-8}{x^2-9}\div\frac{x-4}{x+3}$

- **<u>Adding & Subtracting</u>**:

  ____

  Add: $\frac{x+3}{x^2+x-2}+\frac{2}{x^2-1}$

Complex Fractions

- To simplify complex fractions ____

Simplify: $\dfrac{\dfrac{1}{x}-\dfrac{3}{2}}{\dfrac{1}{x}+\dfrac{3}{4}}$

Simplify: $\dfrac{2d}{\dfrac{d}{r_1}+\dfrac{d}{r_2}}$

Class 2: Linear Models

Objectives:

- ~ Graph Equations on the Rectangular coordinate system.
- ~ Solve Linear Equations in One Variable
- ~ Solve Rational Equations with Variables on the denominator
- ~ Use Linear Equations to Solve Problems.
- ~ Solve a Formula for a Variable

- **The Rectangular Coordinate System comprises of**__________________________________

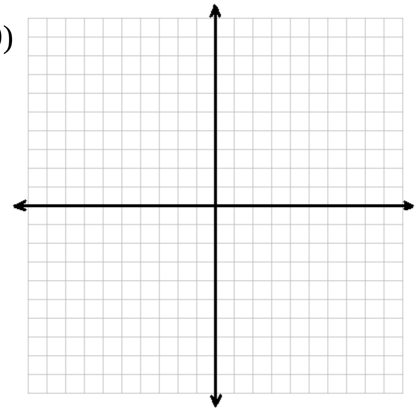
Draw and label a rectangular coordinate system below:

The way we plot a point (a,b) in the coordinate system is ________________________________

____

Practice 1: Plot the following points in the coordinate system below.

(4, 2), (2, -2), (-1, -3), (-5, 1), (0, 2), (3, 0), (0, -4), (-4, 0)

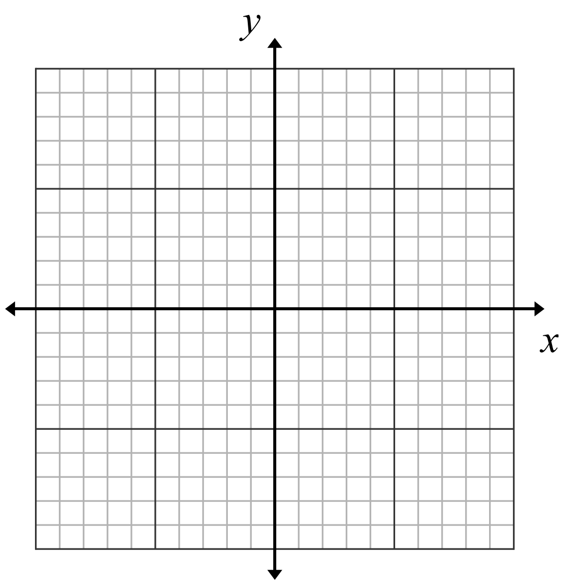


- An equation in two variables such as $2x - y = 1$ or $y = 4x^2 + 3$ has a solution ______________

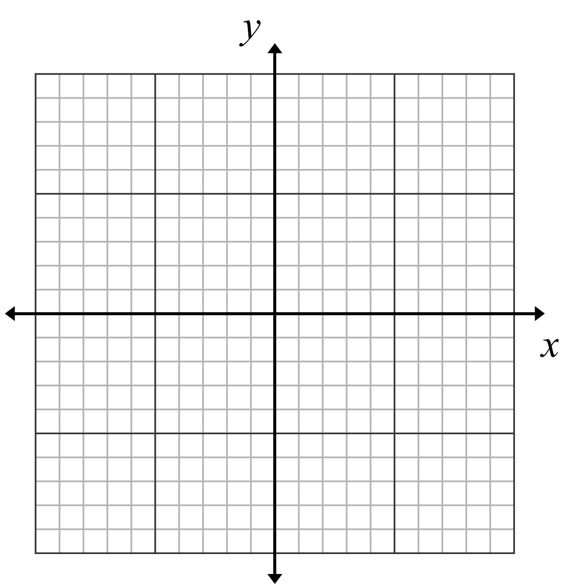
  ____

- **Graph of an Equation** ____

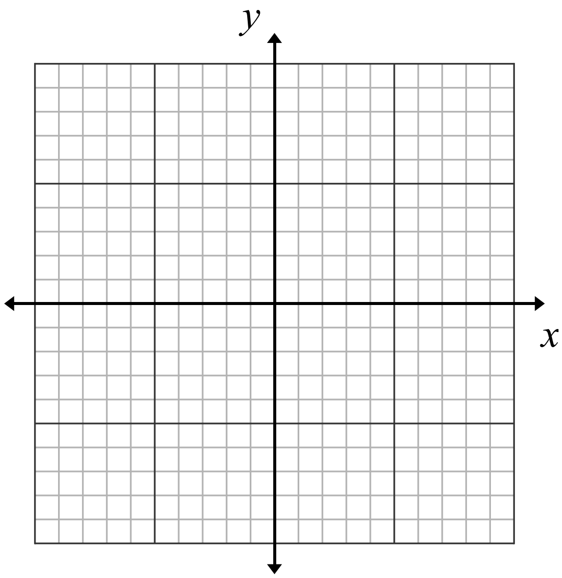
Practice 2: Graph the equation $y = 2x - 3$ by using the point-plotting method.



Practice 3: Graph the equation $y = x^2 + 3$ by using the point-plotting method.



Practice 4: Graph the equation $y = |x+3| - 2$ by using the point-plotting method.



- **Intercepts**
  - **X-Intercept is**____
  - **To find the x-intercept** ____________________________________
  - **Y -Intercept is**____
  - **To find the x-intercept** ____________________________________

Practice 5: Find the x and y-intercepts of $2x - y = 12$

Solving Equations

General Strategy of Solving Linear Equations

1.

2.

3.

4.

5.

6.

Practice: Solve each of the equations

6. $-6(2x+1)-14=-10(x+2)-2x$

7. $\frac{2}{5}-\frac{1}{x}=\frac{3}{4}$

8. $\dfrac{5-x}{3} = 2x-7$

➢ Literal Equations are ____

Solve each of the following for s

9. $V = C - \dfrac{C-S}{L}N$

Word Problems

General Strategy of Solving Word Problems
1.
2.
3.
4.

Example:

1. Twice the difference of a number and 8 is equal to three times the sum of the number and 3. Find the number.

Step 1:

Step 2:

Step 3:

Step 4:

2. To make an international call, you need the code for the country you are calling. The codes for Belgium, France and Spain are three consecutive integers whose sum is 99. Find the code for each country.

Step 1:

Step 2:

Step 3:

Step 4:

Practice:

15. The sum of twice a number and 7 is equal to the sum of a number and 6.

16. If ¾ is added to three times a number, the result is ½ subtracted from twice the number.

17. The room numbers of two adjacent classrooms are two consecutive even numbers. If their sum is 654, find the classroom numbers

18. A 40-inch board is to be cut into three piece so that the second piece is twice as long as the first piece and the third piece is 5 times as long as the first piece. Find the lengths of all three pieces.

Formulas

$A = lw$ ______________________________

$P = 2l + 2w$ ______________________________

$P = a + b + c$ ______________________________

$A = \frac{1}{2}bh$ ______________________________

$V = lwh$ ______________________________

$A = \pi r^2$ ______________________________

$P = 2\pi r$ ______________________________

$d = rt$ ______________________________

$I = PRT$ ______________________________

$F = \frac{9}{5}C + 32$ ______________________________

Further Problem Solving

- **Solve problems involving Percents**

    - Increase____

    - Percent Increase =

    - Decrease____

    - Percent Decrease =

21. Nordstrom's advertised a 25% off sale. If a London Fog coat originally sold for $256, find the decrease in price and the sale price

23. How many cubic centimeters (cc) of a 25% antibiotic solution should be added to 10cc of a 60% antibiotic solution to get a 30% antibiotic solution?

<u>25</u>. A jet plane traveling at 500mph overtakes a propeller plane traveling at 200mph that had a 2-hour head start. How far from the starting point are the planes?

<u>26</u>. Karen invested some money at 9% annual simple interest and $250 more than that amount, at 10% annual simple interest. If her total yearly interest was $101, how much was invested in each?

Class 3: Quadratics

Objectives:

- ~ Perform Operations with Complex Numbers
- ~ Solve Quadratic Equations by any method
- ~ Solve Polynomial Equations by factoring
- ~ Solve Radical Equations.
- ~ Solve Equations with Rational Exponents
- ~ Solve Equations involving Absolute Values
- ~ Solve linear and Absolute Value Inequalities

- **The Imaginary Unit is**____

- **A complex Number is**____

  ____

- **Complex Conjugate**____

Operations with Complex Numbers

Powers of Imaginary Numbers.

Practice 1. Perform the indicated Operation

$(i)^5 =$

$(-2i)^7 =$

Addition/Subtraction: ____

Subtract: $(-7+5i)-(-9-11i)=$

Multiplication. ____

Multiply: $(9-45i)(5-i)$

- **Division.** ____

Practice 5: $\dfrac{8+5i}{8-5i}$

Quadratic Equation

- A Quadratic Equation____

____

- **Zero Factor Theorem:** ____

Example: $x^2 - 5x - 14 = 0$

- **Factoring :**

Solving Quadratic Equations by Factoring:

1.

2.

3.

4.

5.

Solve: $-5x^2 + 20x + 60 = 0$

- **Square Root Property**

If $x^2 = a \quad for \;\; a \ge 0 \Rightarrow x = \pm\sqrt{a}$

Example: $x^2 - 49 = 0 \Rightarrow$ $x =$___________

Solve by the square root property: $(x-4)^2 = 36$ $x =$____________

Completing the Square

- To complete the square____

Example $x^2 + 8x + 1 = 0$

General Strategy for Completing the Square

1.

2.

3.

4.

5.

Example: $x^2 + 2x = 4$

Quadratic Formula

- The Quadratic Formula____

Solve by using the Quadratic Formula: $2x^2 - x - 5 = 0$

Practice 6: $3x^2 + 8x = 3$

- **The Discriminant**____

Discriminant	Number of Solutions

Practice: Use the discriminant to find the # of solutions

7. $5x^2 + 2x - 3 = 0$ 8. $x^2 + 2x + 2 = 0$ 9. $x^2 + 2x + 1 = 0$

________________ ________________ ________________

Other Equations

- **Radical Equation**____

  Give at least two Examples____

- **Domain**____

  Find the domain $\sqrt{x-4} = 9$

  ____

Strategy on Solving Radical Equations containing nth Roots

1.
2.
3.
4.

Solve the equation: $15 + \sqrt{3x+17} = x$

Equations with Rational Exponents:

- **Equations with rational exponents are ____**

Rewrite as radical: $a^{\frac{m}{n}} =$ ______________________________

Strategy on Solving Equations with Rational Exponents

1.

2.

3.

4.

Solve the following equations for their real solutions.

10. $8x^{\frac{5}{3}} - 24 = 0$

11. $2x^{\frac{2}{3}} + 4x^{\frac{1}{3}} = 6$

Equations Involving Absolute Values

$$|x| = \begin{cases} \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \\ \\ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \end{cases}$$

Solve: $5|3x-7|+6=21$

Inequalities

- **Linear Inequalities**____

Solve the following inequality $5x+11<26$

Absolute Value Inequalities

If u is an algebraic expression and c is a positive number, then

$$|u| < c$$ ____

And

$$|u| > c$$ ____

Solve the following inequality

$$7|2x-8|+14 \geq 35$$

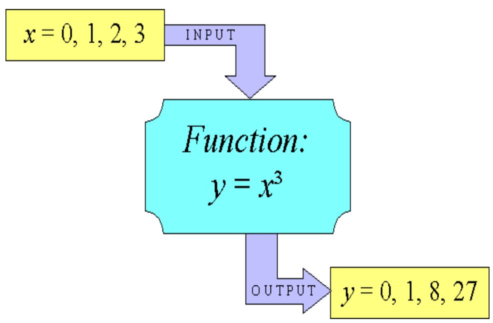
Class 4: Function and Their Graphs

Objectives:

- ~ Identify and Graph Functions
- ~ Identify Domain and Range
- ~ Identify Characteristics of Functions
- ~ Calculate the slope of a Line.
- ~ Write and find the point-Slope and Slope intercept of the equation of a line
- ~ Solve Equations involving Absolute Values

- **A Relation is** ______________________________
- **Domain** ______________________________
- **Range** ______________________________
- **Functions is** ______________________________

Domain →



←Range

There are four possible ways to represent a function: List them below:

1.
2.
3.
4.

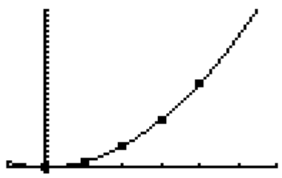
Example:

- **Verbally:** The area of a square plot of land is equal to the square of the length of the lot.
- **Numerically:** (0,0), (1,1), (2,4), (3,9), (4,16) …

Or

Length	**0**	**1**	**2**	**3**	**4**	**…**
Area	0	1	4	9	16	…

- **Visually:**



- **Algebraically:** $A(s) = s^2$

- **Notation:**

A function *f* of *x* is represented as: ______________________________

***x* – represents**______________________________

y - represents______________________________

The Graph of a Function ______________________________

Determining whether a relation is a function

- **Numerically**

***Practice*:** Determine if the following examples are functions. If not, explain.

1. In the following ordered pairs the first element represents "Number of hours worked" and the second element represents "Total pay".

(0, \$0)	(1, \$7.50)	(2, \$15.00)
(3, \$22.50)	(4, \$30.00)	(5, \$37.50)
(6, \$45.00)	(7, \$52.50)	(8, \$60.00)

2. The first element of each ordered pair is "Student First Name" and the second element of each ordered pair is "Number of Math Courses Taken".

1. (Peter, 2)	2. (Jackie, 0)	3. (Marian, 2)
4. (Tammy, 3)	5. (Jess, 1)	6. (Jackie, 1)
7. (John, 3)	8. (Joe, 2)	9. (Ron, 0)

- **Algebraically**

To determine if an equation is a function ________________________________

____

Practice: Determine if the following equations define y as a function of x.

3. $x^3 + y = 14$
4. $x^3 + y^2 = 14$
5. $xy + 3y = 4$

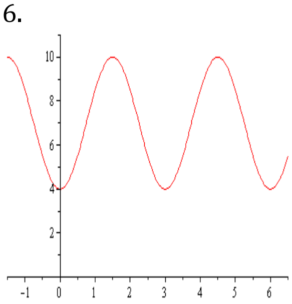
- **Visually**

- **The Vertical Line Test :** ____

____

Practice: Determine if y is a function of x.

6.



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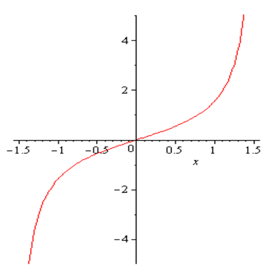

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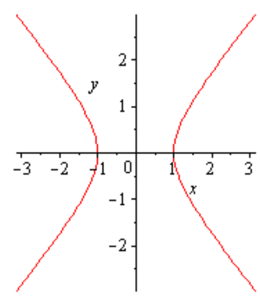


Graph of a Function

- **Arrows indicate**____
- **A closed dot ● indicates** ____________________________________
- **An open dot ○ , indicates** __________________________________

➢ Finding Domain and Range

Practice: Find the Domain and Range in each of the following cases:

- **Numerically**

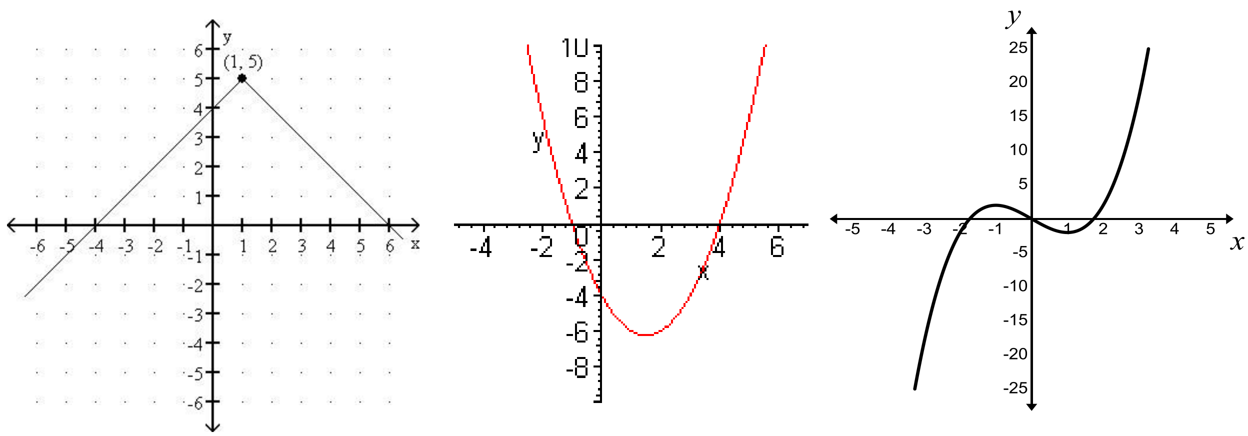
7. (0, 1650), (10, 1750), (20, 1860), (30, 2070), (40, 2300),
   (50, 2560), (60, 3040), (70, 3710), (80, 4450), (90, 5280)

Domain ____

Range ____

- **Visually**

8.



Domain: ______________ ______________ ______________

Range: ______________ ______________ ______________

http://lima.osu.edu/people/iboyadzhiev/GeoGebra/domain_range.html

- **Algebraically**

The Domain of any polynomial function is ______________________________

Exceptions:

- ____
- ____

Give an example of each of the above exceptions:

____

Evaluating Functions

Same process as evaluating an algebraic expression

9. Example: Consider the function $f(x) = 2x^2 - 5x + 3$. Evaluate the following:

a. $f(-3)$

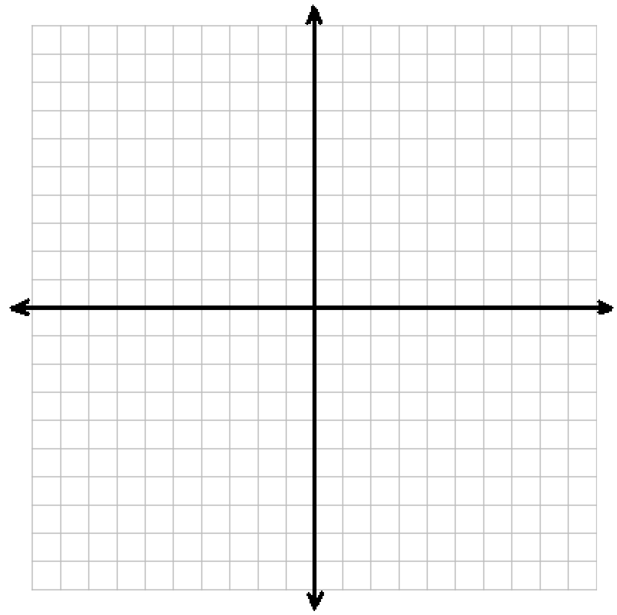
b. $f(h)$

c. $f(h+2)$

Piece-Wise Functions

10. Practice: Graph the following function.

$$f(x) = \begin{cases} x-3, & if\ \ x<0 \\ 4, & if\ \ x=0 \\ x+6, & if\ \ x>0 \end{cases}$$



Domain: ______________________________

Range: ______________________________

Evaluate f(-2)=
----

f(3)=

Characteristics of Functions:

- **DOMAIN** - ______________________________
- **RANGE** - ______________________________
- **MAX/MIN** - ______________________________
- **Increase/Decrease** - ______________________________
- **X-INTERCEPTS** - ______________________________
- **Y-INTERCEPTS** - ______________________________
- **Odd** – ______________________________
- **Even-** ______________________________

Linear Functions and Slope

- **Write the General Form of the Equation of a Line: ______________________________**
- **Write the equation of a horizontal line:______________________________**
- **Write the equation of a vertical line:______________________________**
- **Slope is______________________________**
- **Write the formula used to find the slope of a line ______________________________**
- **Write the slope -intercept form of a linear equation and state what each part represent.**

  ____

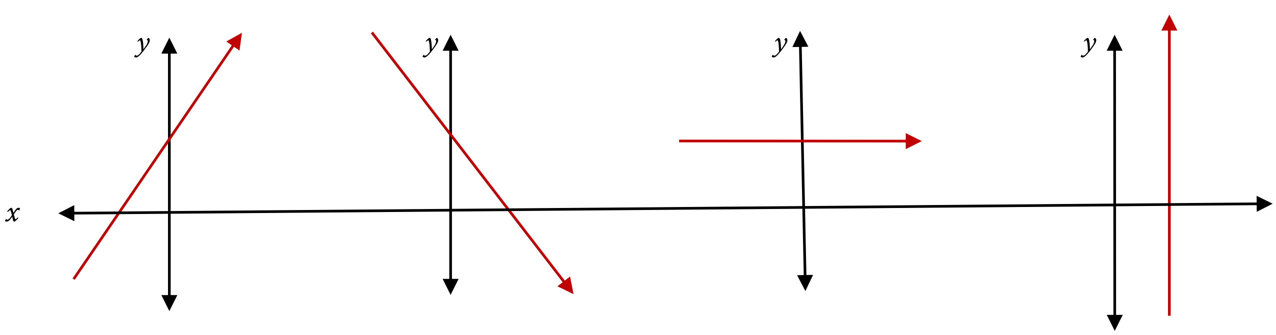
- **Write the Point-Slope form of the Equation of Line: ______________________________**
- *State the appropriate slope for each of the following cases:*

  Vertical Line ______________________________

  Horizontal Line______________________________

11. Fill in the appropriate slope for each of the lines below:

Tilts Upward **Tilts Downward** **Horizontal** **Vertical**



m *m* *m* *m*

Practice: For the each of the following find the slope of the line through the points:

12. (-2,-5) ,(0, -2), (4,4), (10, 13)

13. (-2,1), (3,5)

14. State the slope of each of the lines given by the equations below:

a. $y = 3x - 5$ b. $y = -\frac{x}{7} + 4$

m =________________ m =________________

15. Find the equation of the line that goes through the points (-2,3) and (-5, -1).

Class 5: Average Rate of Change and Transformations

Objectives:

~ Calculate Average Rate of Change
~ Calculate the Difference Quotient
~ Recognize Graphs of Common Functions
~ Use transformations to graph Functions

- **Average Rate of Change**:____

Practice: For each of the following functions, find the average rate of change.

1. $f(x) = x^2 - 2x + 2 \quad x_1 = 3 \ to \ x_2 = 6$

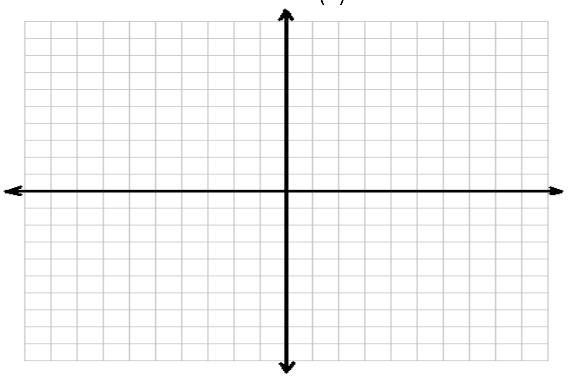
Difference Quotient

- **Difference Quotient** ____

Example: Calculate the difference quotient for the function $f(x) = 2x^2 - 7x - 11$

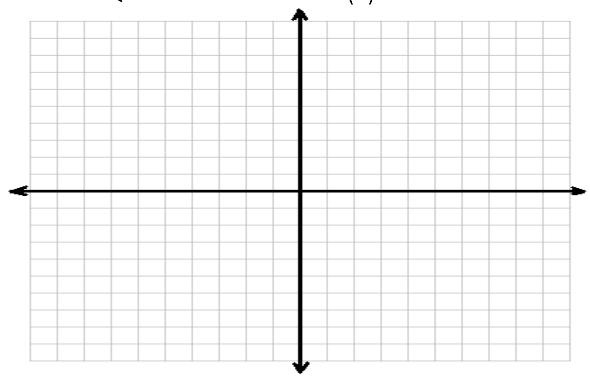
Basic Functions

- Linear f(x)=



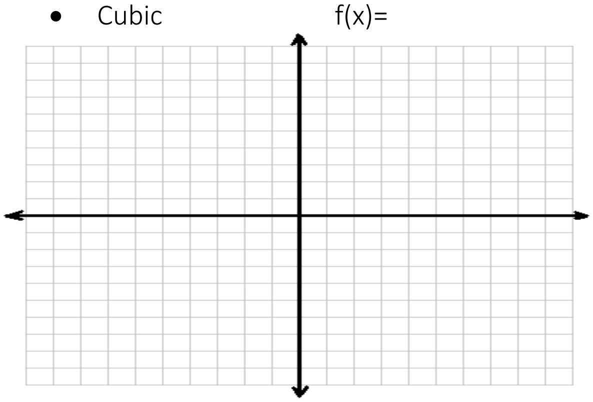
Domain:
Range:

- Quadratic f(x)=



Domain:
Range:

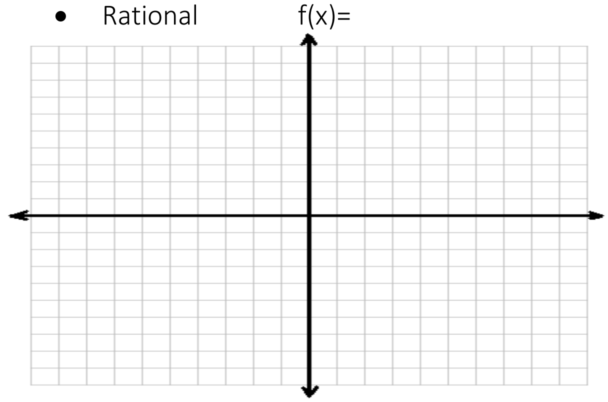
- Cubic f(x)=



Domain:

Range:

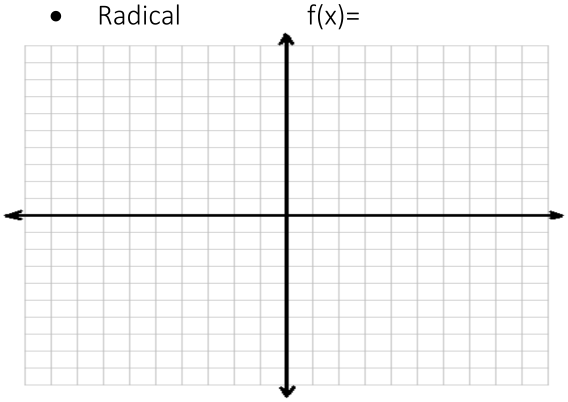
- Rational f(x)=



Domain:

Range:

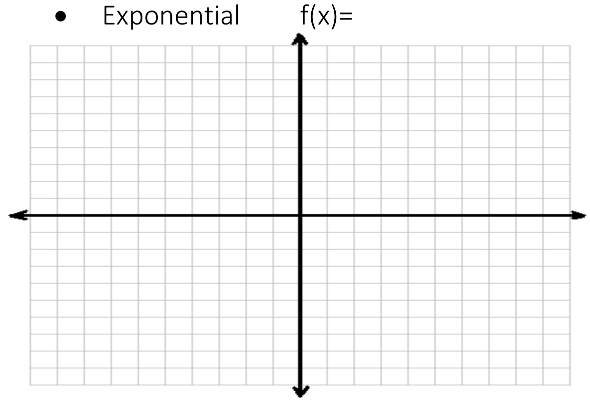
- Radical f(x)=



Domain:

Range:

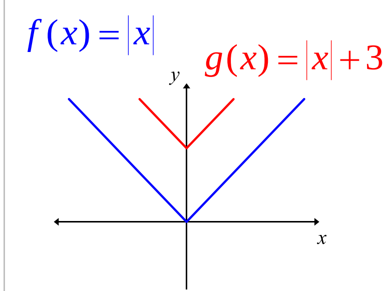
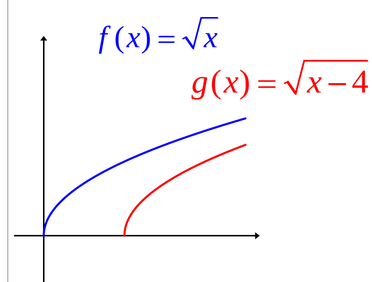
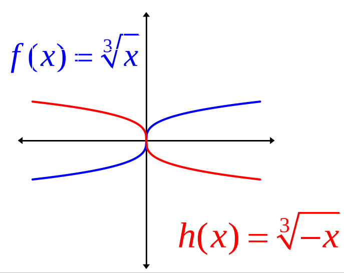
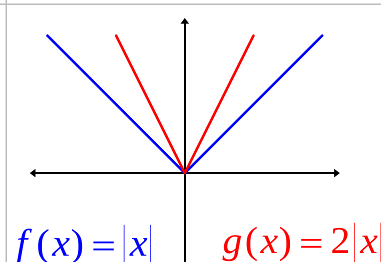
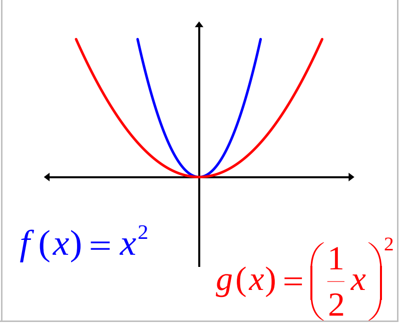
- Exponential f(x)=



Domain:

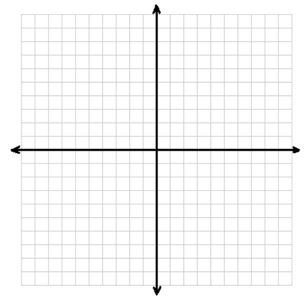
Range:

Transformations of Functions

Transformation	Equation	Description	
Vertical translation	$y = f(x) + c$ $y = f(x) - c$	____________________ ____________________	
Horizontal translation	$y = f(x + c)$ $y = f(x - c)$	____________________ ____________________	
Reflections	$y = -f(x)$ $y = f(-x)$	____________________ ____________________	
Vertical Stretching/ Shrinking	$y = cf(x)$	____________________ ____________________	
Horizontal Stretching/Shrinking	$y = f(cx)$	____________________ ____________________	

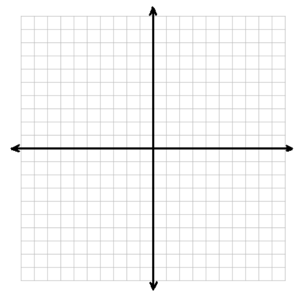
Practice: Describe the change in the graph of the function $f(x) = x^2$ for each of the following transformation, and then graph it.

a. $f(x) = x^2 + 2$ ______________________________



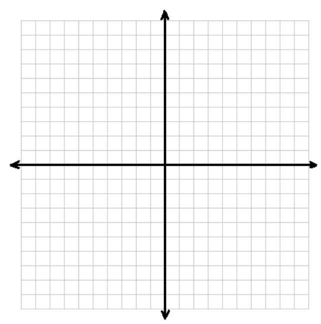
b. $f(x) = 2x^2$ ______________________________

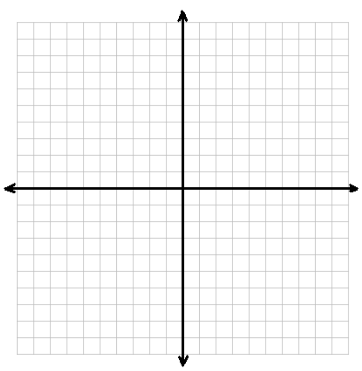
c. $f(x) = -x^2$ ______________________________

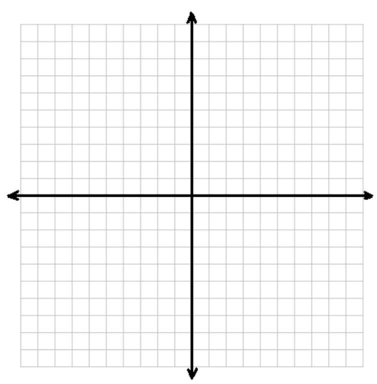


d. $f(x) = (x+2)^2$ ______________________________

e. $f(x) = \left(\frac{1}{2}x\right)^2$ ______________________________







Class 6: Composition and Inverse Functions

Objectives:

- ~ Combine functions using the algebra of functions
- ~ Determine domain of Functions and of composite functions
- ~ Write Functions as Compositions
- ~ Verify inverse functions
- ~ Find the Inverse of a Function
- ~ Determine if a function has an inverse
- ~ Graph a Function and its Inverses

➢ Domain of Functions

- **Domain:** ____

____

Practice: For each of the following functions, find the domain.

2. $f(x) = 6x^4 - 3x^2 + 2x - 41$

3. $h(x) = \dfrac{5-2x}{3x^2 - 19x + 6}$

4. $k(t) = \sqrt{2x-16}$

Algebraic Operations with Functions

Four algebraic operations that we do with polynomial functions are:

____

Practice: Perform the indicated operations for the following functions.

$f(x) = x - 3,$ $g(x) = 2x^2 + 3x - 2,$ $h(x) = 2x^3 - 5x^2 + 6,$

5. f(x)+h(x)=

6. h(x)-g(x)=

7. f(x)·g(x)=

8. $\frac{g(x)}{f(x)} =$

Composition of Functions

- **The Composition of the function**____

  ____

Practice: *Perform the indicated operations for the following functions.*

$f(x) = x + 4 \qquad g(x) = x^2 - 3x - 4$

9. Compose $f(x) \circ g(x)$

10. Compose $g\left(f\left(x\right)\right)(1)$

Inverses

- The Inverse of a function f ____

____

Example: Determine if $f(x) = 2x + 6$ and $g(x) = \frac{x}{2} - 3$ are inverse functions

- **Finding Inverse Functions**

Steps To find Inverse Functions
1.
2.
3.
4.
5.

Example: Find the inverse of $f(x) = 3x + 1$

- **Existence of Inverse Functions**

Does every function have an inverse? ________________________________

How do we determine if a function has an inverse? ______________________

- **Algebraically**: ____

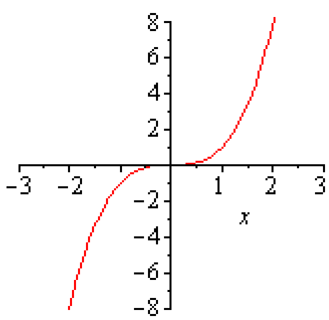
  Example: ______________________________________

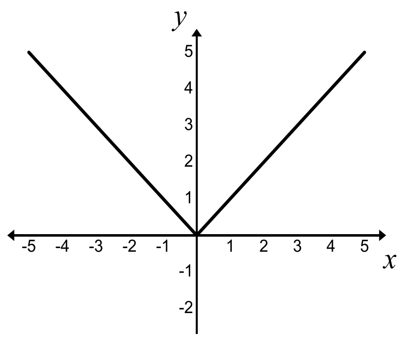
- **Graphically**: ____

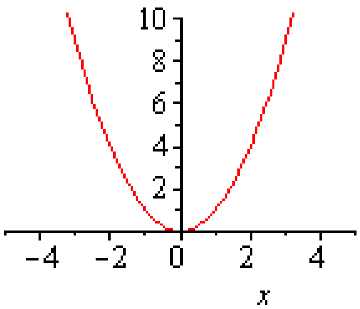
The horizontal Line Test: ____

____

Practice: Determine if the following functions have an inverse







Class 7: Distance and Midpoint Formulas; Circles

Objectives:

~ Find the Distance between two points.
~ Find the midpoint of a line segment
~ Write the standard form of a circle's equation
~ Give the center and radius of a circle whose equation is in standard form
~ Convert the general form of a circle's equation to standard form

- **The Distance Formula** ______________________________________

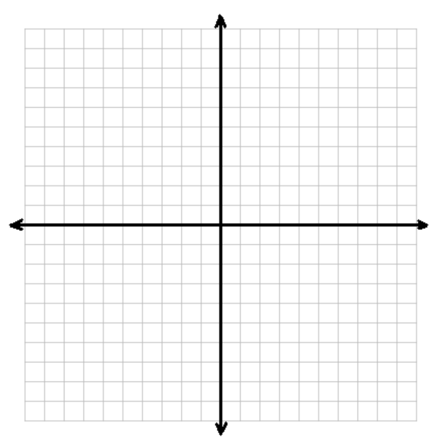
____

- **The midpoint Formula** ______________________________________

____

1. Plot the points A(4, 6), B(-3, 2), and C (1,-5) on a coordinate system and connect them in order to find a triangle.

   a) Calculate the lengths of the three sides of the triangle.



Circles

- **A Circle is**____
- **Radius is** ____
- **The Standard Equation of a circle is** _____________________________________
- **The General Form of the Equation of a Circle is** __________________________

Practice: Write the standard equation for the circle in each of the following cases;

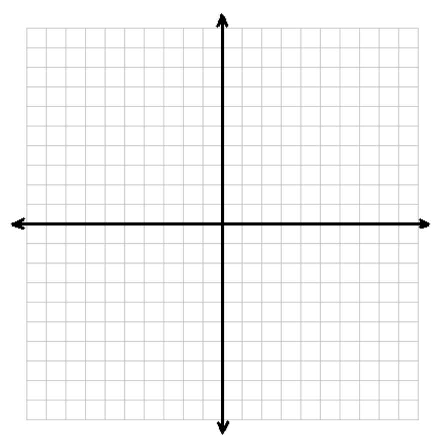
2. Center (-3, 5), $r = 3$ ____

Practice: Give the center and radius of the circle described by the following equations:

3. $(x+5)^2+(y-4)^2=6$ ____

Practice: Complete the square and write the equation in standard form, then graph it and use it to identify the domain and range.

4. $x^2+y^2+8x+4y+16=0$



Class 8 & 9 – Review and Test 1

Summary/Questions

Class 10: Angles and Their Measurements

Objectives:

~ Define and draw angles
~ Convert angles from Degrees to Radians
~ Convert angles form Radians to Degrees
~ Use Right Triangles to Evaluate Trigonometric Functions

❖ Definitions:

Draw each of the following:

Line: **Line Segment**: **Ray** :

- **Angle**: ____

- **Standard Position**: ____

- **Positive Angles** ____

- **Negative Angles** ____

- **Quadrantal Angles** ____

- **Measuring Angles**

We measure angles by ____

- **By Degrees (°)**

  - **One Revolution** ____

We can classify angles by degrees:

- Acute angle ____

- Right angle ____

- Obtuse Angle ____

- Straight angle ____

Practice: Classify the following angles:

1. 125° -
2. 160° -
3. 65° -
4. 90° -
5. 45° -
6. 180° -

- **By Radians**

- **Central Angle**: ____

- **One Radian** ____

- **Radian Measure** ____

Example: Find the measure of the angle θ that intercepts an arc of length 15 inches in a circle of radius 6 in.

Relationship between Degrees & Radians

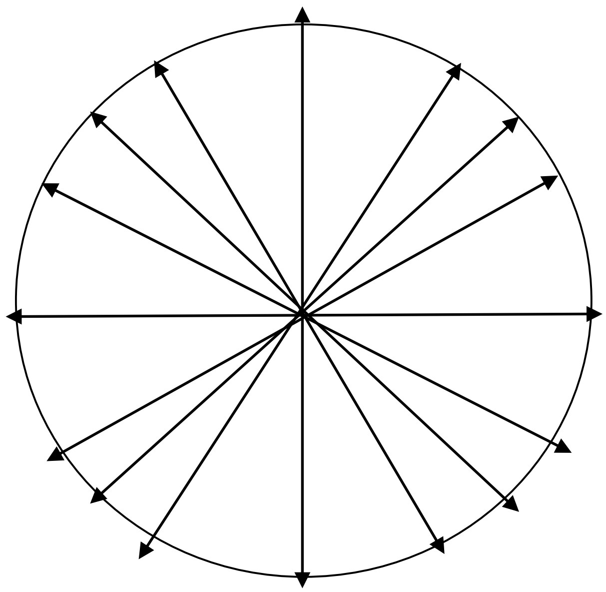
Conversions:
▪ **To convert degrees to radians, ______________________________________**   ▪ **To convert from radians to degrees,**

Practice: Convert from radians to degree or degrees to radians as necessary

7. $30° =$

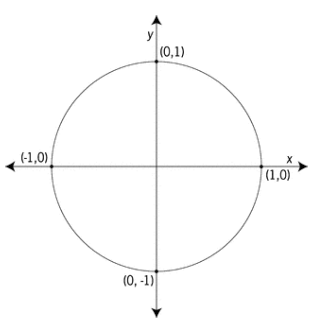
8. $-\frac{5\pi}{3}\, radians =$

Fill the circle with the degree and radian measure

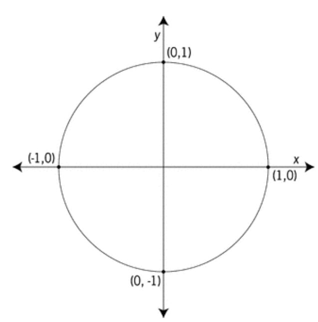


Practice: State the quadrant each angle is and then draw the angle in standard position.

9. $\frac{3\pi}{5}$



10. $-\frac{3\pi}{4}$



Trigonometric Functions

- **Trigonometric Functions** ______________________________

____

Sin θ =

Csc θ =

Cos θ =

Sec θ =

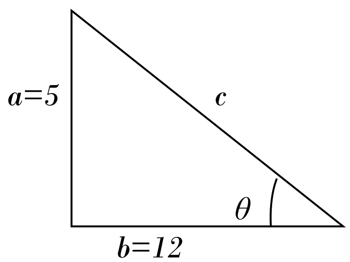
Tan θ =

Cot θ =

Do the values of the trigonometric functions depend on the length of the sides of a triangle?

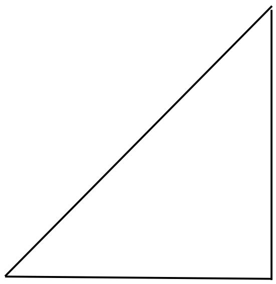
____

11: Find the value of each of the six trigonometric functions of θ for the following triangle.



- **Special Angles** 30°, 45°, 60° **or** $\frac{\pi}{6}$, $\frac{\pi}{4}$, $\frac{\pi}{3}$

45° *or* $\frac{\pi}{4}$ ____________________



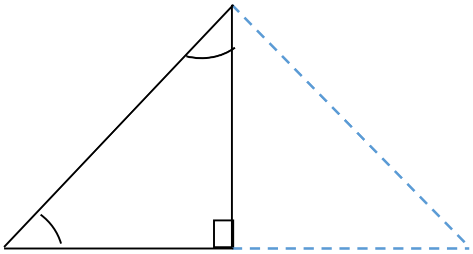
$\sin\frac{\pi}{4} =$ $\csc\frac{\pi}{4} =$

$\cos\frac{\pi}{4} =$ $\sec\frac{\pi}{4} =$

$\tan\frac{\pi}{4} =$ $\cot\frac{\pi}{4} =$

- 30° *or* $\frac{\pi}{6}$ *and* 60° *or* $\frac{\pi}{3}$ ____________________

Example:



$\sin\frac{\pi}{3} =$ $\sin\frac{\pi}{6} =$

$\cos\frac{\pi}{3} =$ $\cos\frac{\pi}{6} =$

$\tan\frac{\pi}{3} =$ $\tan\frac{\pi}{6} =$

Special Identities

Reciprocal Identities:

$\sin\theta =$	$\cos\theta =$	$\tan\theta =$
$\csc\theta =$	$\sec\theta =$	$\cot\theta =$

- ***Pythagorean Identities:***

____

____

____

Example: Given that $\sin\theta = \frac{1}{2}$ and θ is acute, find $\cos\theta$

Practice: Use identities to find the trigonometric function.

12. Find $\sin\theta$ if $\cos\theta = \frac{7}{8}$

13. Find $\tan\theta$ if $\sin\theta = \frac{6}{7}$

Co-terminal Angles

Co-terminal angles ____

____

Example:

Practice: Find a positive angle less than 2π that is co-terminal with each of the following.

14. $400°$

15. $-135°$

Class 11: Trigonometric Functions of any Angle

Objectives:

- Trigonometric functions of any angle/Definition
- Use the signs of the trigonometric functions
- Reference Angle
- Applications of Trigonometric Functions

Definition of Trigonometric Functions of any Angle: ______________________________

Sin θ = Csc θ =

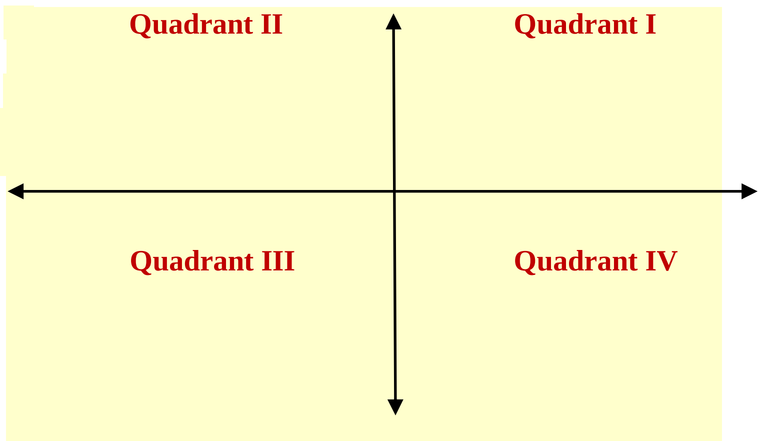
Cos θ = Sec θ =

Tan θ = Cot θ =

Example: Let $P = (-3, -4)$ be a point in the terminal side of θ. Find the value of the six trig. functions.

The Signs of the Trigonometric Functions

The table summarizes the signs of the trigonometric functions

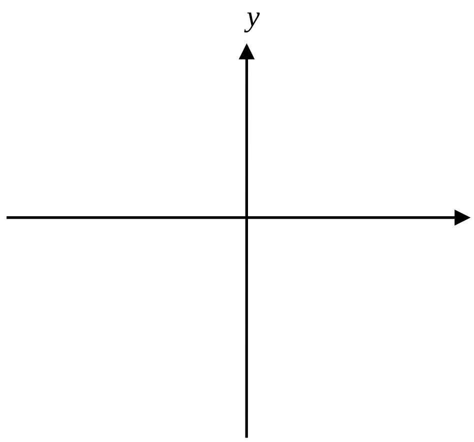


Here is an easy way to remember:

I	II	III	IV

Example: Given $\tan\theta = -\frac{1}{3}$ and $\cos\theta < 0$, find $sin\theta$ and $sec\theta$.

Quadrantal Angles: Lets find the values of trigonometric functions for the quadrantal angles.



θ	**0** **2π**	**90°** **π/2**	**180°** **π**	**270°** **3π/2**
sinθ				
cosθ				
tanθ				

Values of Special Angles

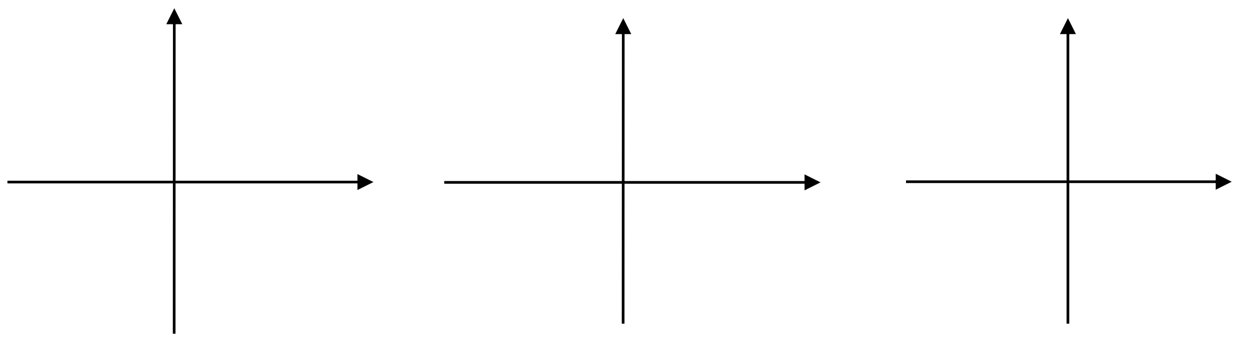
θ	0° 2π	30° $\frac{\pi}{6}$	45° $\frac{\pi}{4}$	60° $\frac{\pi}{3}$	90° $\frac{\pi}{2}$	180° π	270° $\frac{3\pi}{2}$
sin θ							
cos θ							
tan θ							

Reference Angles

- Reference Angles ____

____

Example:



Finding Reference Angles:

If

______________ ______________ ______________

Example: Find the reference angle of

$\theta = 210°$

$$\theta = \frac{7\pi}{4} \rightarrow \theta' =$$

Why do we need to know Reference Angles?

Example: Find the exact value of $\cos\frac{4\pi}{3}$

Practice: **Use identities to find the trigonometric function.**

1. Find the exact value of $\tan(-210^\circ)$

2. Find the exact value of $\csc\frac{11\pi}{4}$

Class 12: Trig Functions of Real Numbers & their Graphs

Objectives:

- Trigonometric functions of real numbers
- Recognize Domain and Range of Sin and Cos functions
- Use of Even and Odd trigonometric Functions
- Use of Periodic Properties
- Graph the sine and cosine functions and their transformations

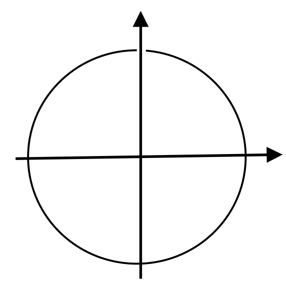
➢ Trigonometric Functions of Real Numbers

Cycles govern many aspects of our lives such as sleep patterns, seasons, tides etc. All follow regular, predictable cycles.

In this section we are going to see why trigonometric functions are used to modes such phenomena.

Until now we have considered trigonometric functions of angles. To define trigonometric functions of real numbers rather than angles we use a unit circle.

Unit Circle: ____

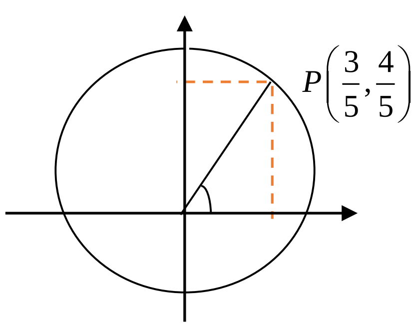


Definition of Trigonometric: ____

Sin θ = 	Cos θ = 	Tan θ =

Csc θ = 	Sec θ = 	Cot θ =

Example:



The Graph of Sine

$$y = \sin x$$

To graph a function ____

x	**0**	$\frac{\pi}{6}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{5\pi}{6}$	π	$\frac{7\pi}{6}$	$\frac{4\pi}{3}$	$\frac{3\pi}{2}$	$\frac{5\pi}{3}$	$\frac{11\pi}{6}$	2π
Y = sinx													

Sketch a neat plot of the graph you got below:

<u>Characteristics of the basic function y = sinx</u>

Domain: ________________________ **Range:** ________________________

Period: ________________________ **Odd/Even:** ______________________

x-intercepts: ____________________ **Max/Min:** ______________________

General Equation of Sine Function: ______________________________________

Amplitude ____

Period ____

Phase Shift ____

Vertical Shift ____

Example: Determine the period, phase shift, and amplitude for $y = 3\sin\left(2x - \frac{\pi}{3}\right)$ and graph it.

The Graph of Cosine

$$y = \cos x$$

We are going to graph y = cosx also by listing some points on the graph.

To graph a function ____

x	0	$\frac{\pi}{6}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{5\pi}{6}$	π	$\frac{7\pi}{6}$	$\frac{4\pi}{3}$	$\frac{3\pi}{2}$	$\frac{5\pi}{3}$	$\frac{11\pi}{6}$	2π
Y = cosx													

Sketch a neat plot of the graph you got below:

<u>Characteristics of the basic function y = cosx</u>

Domain: ________________________ **Range:** ________________________

Period: ________________________ **Odd/Even:** ______________________

x-intercepts: ____________________ **Max/Min:** _______________________

General Equation of Cosine Function: ____

Example: Determine the period, phase shift, and amplitude for $y = 4\cos(2x - \pi)$ and graph the function.

Practice: Graph the function $y = -2\cos(4\pi x + \pi) + 3$

The Graph of Tangent

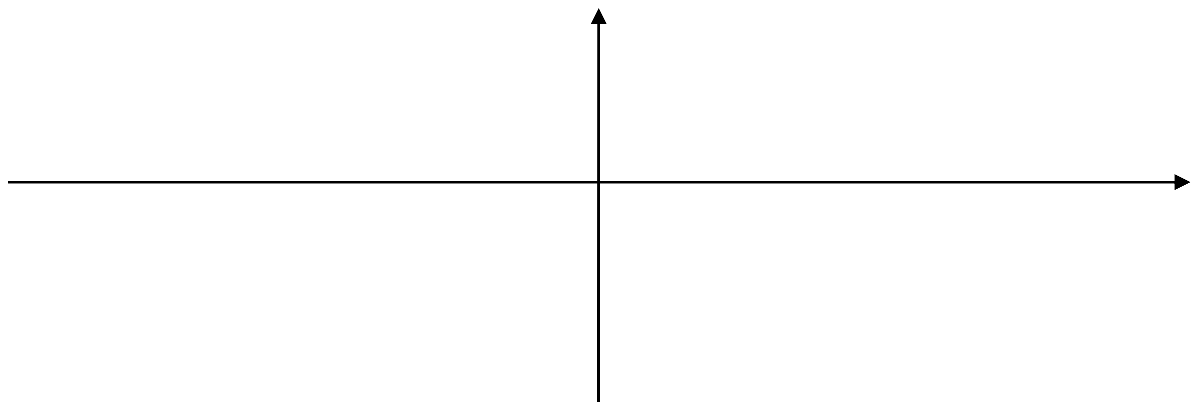
$$y = \tan x$$

We are going to graph y = tanx also by listing some points on the graph.

To graph a function ____

x	0	$\frac{\pi}{6}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{5\pi}{6}$	π	$\frac{7\pi}{6}$	$\frac{4\pi}{3}$	$\frac{3\pi}{2}$	$\frac{5\pi}{3}$	$\frac{11\pi}{6}$	2π
Y = tanx													

Sketch a neat plot of the graph you got below:



<u>Characteristics of the basic function y = tan x</u>

Domain: ______________________ **Range:** ______________________

Period: ______________________ **Odd/Even:** ______________________

x-intercepts: ______________________ **Max/Min:** ______________________

General Equation of Tangent Function: ______________________________

Class 13: Inverse Trigonometric Functions & Applications

Objectives:

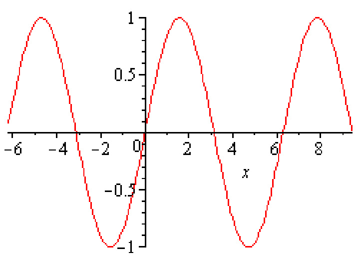
~ Understand and use the inverse Sine, Cosine and Functions
~ Use calculators to evaluate inverse trigonometric functions
~ Find exact values of composite functions with inverse trigonometric functions
~ Solve a Right Triangle
~ Application Of Trigonometric Functions

RECALL:

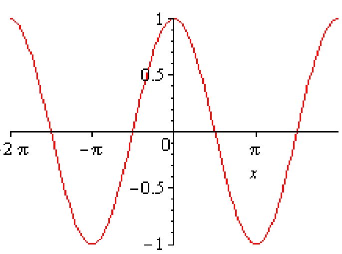
-
-
-

The graph of the trigonometric functions are below:

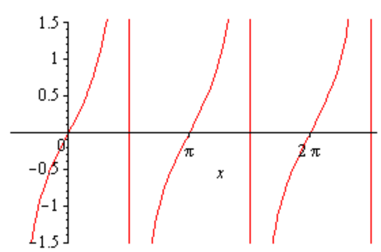
Sine



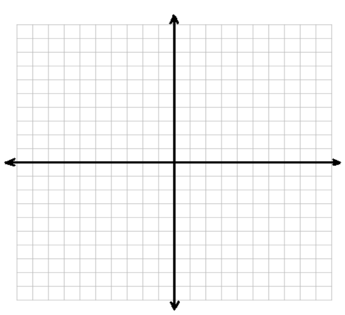
Cosine

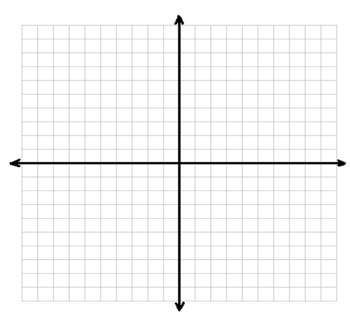


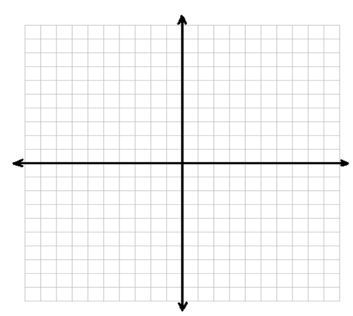
Tangent



If we restrict the domain of these functions we will get the following graphs:



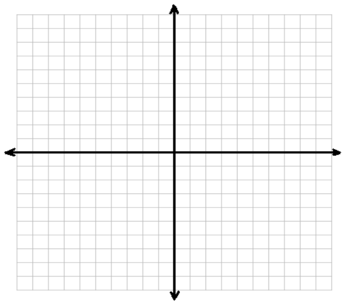
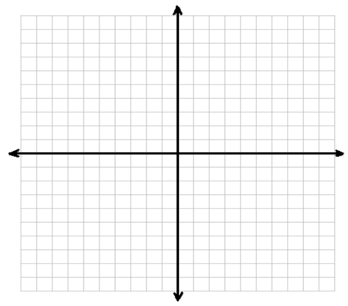
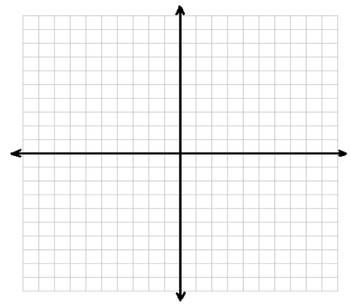




Domain: ______________ ________________ __________________

Range ________________ ________________ __________________

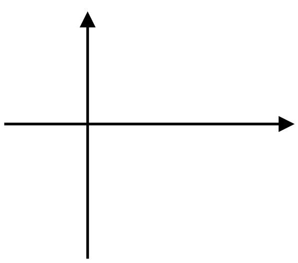
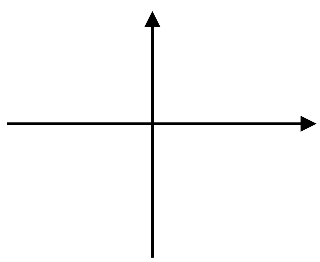
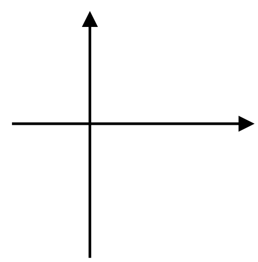
The graph of the inverse trigonometric functions are below:

Arcsine	**Arcosine**	**Arctangent**
		

Function: ______________ ______________ ______________

Domain: ______________ ______________ ______________

Range ______________ ______________ ______________

Example: Find the exact value of each of the following:

$\sin^{-1}\frac{\sqrt{2}}{2} =$ $\arccos\frac{\sqrt{3}}{2} =$ $\sin^{-1} 3 =$

$\cos^{-1}(-1) =$ $\tan^{-1}(0) =$ $\arctan\left(-\frac{\sqrt{3}}{3}\right) =$

Properties of Inverse Functions

- $\sin(\sin^{-1} x) =$ ________________
  $\sin^{-1}(\sin x) =$ ________________

- $\cos(\cos^{-1} x) =$ ________________
  $\cos^{-1}(\cos x) =$ ________________

- $\tan(\tan^{-1} x) =$ ________________
  $\tan^{-1}(\tan x) =$ ________________

Using Inverse Properties:

Evaluate

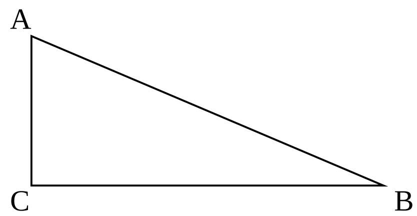
$$\sin^{-1}\left(\sin\frac{\pi}{4}\right) =$$

$$\tan(\tan^{-1}(-5)) =$$

$$\cos(\cos^{-1}\pi) =$$

Solving Right Triangles

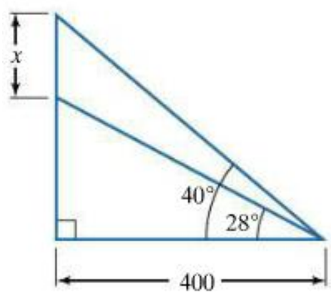
Solving a Triangle means ____



1. Let A = 62.7° and a = 8.4. Solve the right triangle shown below rounding to two decimal place

Find x to the nearest whole unit

2.



Angle of Elevation and Angle of Depression

- **Angle of Elevation** is ____

- **Angle of Depression is ____**

Example : From a point on a level ground 80 ft from the base of Eiffel Tower, the angle of elevation is 85.4°. Approximate the height of the Eiffel Tower to the nearest foot.

Class 14 – Trigonometric Identities

Objectives:

~ Use various methods to verify Trigonometric Identities

1. ______________________________

2. ______________________________

3. ______________________________

4. ______________________________

Example: Verify $\csc x \tan x = \sec x$

Class 15 – Trigonometric Equations

- **Trigonometric Equation** ____

Steps in Solving Trigonometric Equations

1. ____

2. ____

3. ____

4. ____

Practice: Solve the following equations:

1. $5\sin x = 3\sin x + \sqrt{3}$

2. $2\sin^2 x - 3\sin x + 1 = 0 \qquad 0 \le x \le 2\pi$

3. $\sin x \tan x = \sin x \qquad 0 \le x \le 2\pi$

4. $2\sin^2 x - 3\cos x = 0 \qquad 0 \le x \le 2\pi$

Class 16: The Law of Sines & The Law of Cosines

Objectives:

- Use the Law of Sines and Cosines to solve oblique triangles
- Solve applied problems using the Law of Sines and Cosines

- **Oblique Triangle** ____

Note: ____

- **The Law of Sines:** ____

____

Example: Solve the triangle ABC if A = 40°, C = 22.5° and b=12.

Practice:

1. Solve the triangle ABC if A = 57°, a = 33 and b = 26.

2. Solve the triangle ABC if A = 35°, a = 12 and b = 16.

- **The Law of Cosines ____**

  ____

  ____

  ____

When given all three sides ____

____

Example: Solve the triangle with A=120°, b=7 and c=8.

Example: Solve the triangle ABC if a = 8, b = 10 and c = 5.

Class 17 & 18 – Review and Test 2

Summary/Questions

Class 19: Quadratic Functions

Objectives:

- Recognize Characteristics of Parabolas
- Graph Parabolas
- Determine a Quadratic Function's Max/Min Value
- Solve problems involving a quadratic function's max/min value.

- **Basic quadratic function** ____
- **Vertex** ____
- **Standard Form of a Quadratic Equation**____
  - ____
  - ____
  - ____

Practice: Identify the vertex and axis of symmetry of each parabola below.

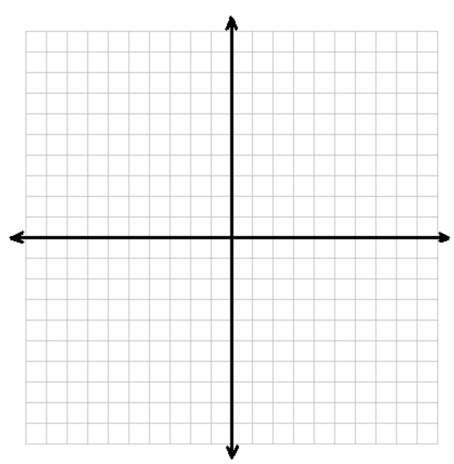
1. $f(x) = 3(x-2)^2 + 5$ ____

- To graph a quadratic Function in Standard form ______________________________

____

Practice: Graph the following quadratic functions

a. $f(x) = 2(x-3)^2 + 1$

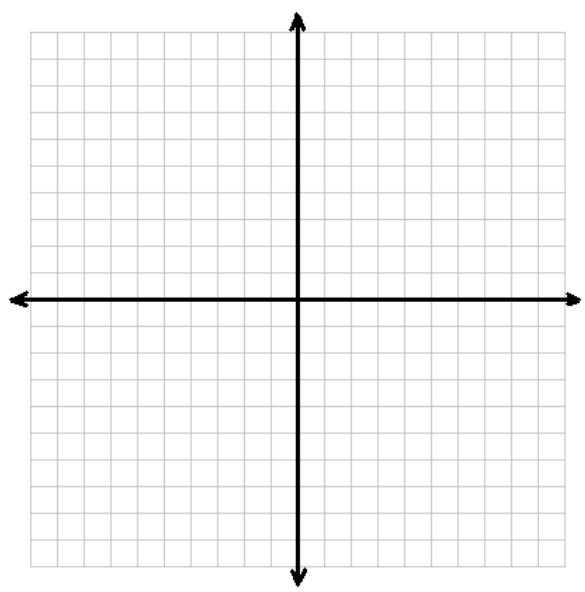


- **General Form of a Quadratic Equation** ________________________________

- **Vertex** ____

Practice: Find the vertex for $f(x) = x^2 + 3x - 10$

Practice: Graph the following quadratic functions $f(x) = 2x^2 + 4x - 3$



Class 20: Polynomial Functions & Division of Polynomials

Objectives:

- Identify polynomial functions
- Recognize characteristics of graphs of Polynomial Functions
- Determine end behavior
- Identify zeroes and their multiplicities
- Use synthetic division to divide polynomials
- Use the Rational Zero Theorem to find possible rational zeros
- Find zeros of Polynomial Functions

- **Polynomial Functions**____

Practice: Which of the following functions are polynomial functions?

a. $f(x) = 3x^7 + 5x^3 + x^2 - 2$

b. $f(x) = -2x^4 + 5x^{-2} + 8x$

c. $f(x) = x^{2/3} + 7x^3 + \sqrt{x} - 2$ ________________________

- **Graphs of Polynomial Functions**______________________________________

- **Smooth**____

- **Continuous**____

- **End Behavior** ____

  - **If the degree is odd**____
  - **If the degree is even**____
  - **If the leading coefficient is positive**___________________________
  - **If the leading coefficient is negative**__________________________

Example: Determine the end behavior of $f(x) = 5x^3 + 7x^2 - x + 5$

Practice: Determine the end behavior of $f(x) = -x^6 + 2x^5 + 7x^2 - 1$

- **Zeroes of Polynomial Functions**

  - ____
  - ____
  - ____
  - ____
  - ____

Example: Find the zeros of the polynomial functions below

$f(x) = 2(x-3)^2(x+1)$

$f(x) = x^3 + 7x^2 - 4x - 28$

Synthetic Division

2. $\left(3x^2-5x+5\right)\div\left(x-5\right)$

3. $\dfrac{\left(6x^5-2x^3+4x^2-5x+5\right)}{x-2}$

Use synthetic division to evaluate $f(1)$ for $f(x)=4x^3-12x^2+7x-2$

Zeros of Polynomial Functions

- **Rational Roots of Polynomial Functions**____

  ____

Example: List all the possible rational zeroes of $f(x)=3x^4-11x^3-x^2+19x+6$

____

Practice: Find all possible rational zeros and use long/synthetic division to test then and find the actual ones for $f(x)=x^3+x^2-4x-4$

Class 21: Rational Functions

Objectives:

- Find the Domain of Rational Functions
- Identify Vertical Asymptotes
- Identify Horizontal Asymptotes
- Applications of Rational Functions

- **Rational Function** ____

Give at least two Examples ____

- **Domain** ____

- **To find the domain** ____

____

Example: Find the domain of $f(x)=\frac{x^2+2x+9}{(x-3)(x^2-16)}$

____

- The Basic Rational Function is ______________________________

Domain :

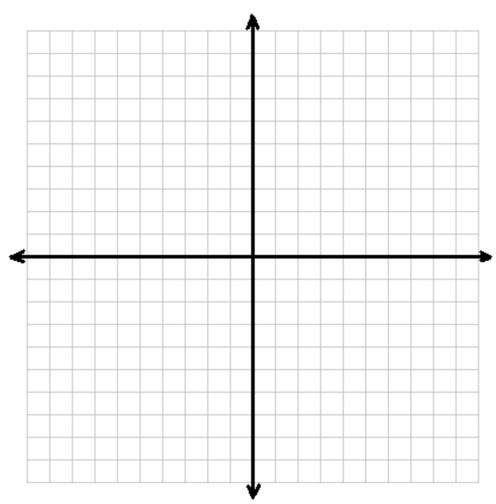
Range :

$Y-\text{int}$:

$X-\text{int}$:

Asymptotes :

Directional Limits :



Asymptotes

- **An Asymptote is** ____

  ____

- **Finding Asymptotes:**

  - **Vertical**____

  - **Horizontal**____

  - **Slant**____

Practice: Find all Asymptotes for each of the following functions

1. $f(x) = \dfrac{x+2}{x^2+x-6}$

   ____

2. $f(x) = \dfrac{x^3-27}{x-3}$

   ____

3. $f(x) = \dfrac{2x^3+1}{3x^3+2x}$

   ____

Characteristics and Graphs of Rational Functions

What do we need to know about R.F. ?

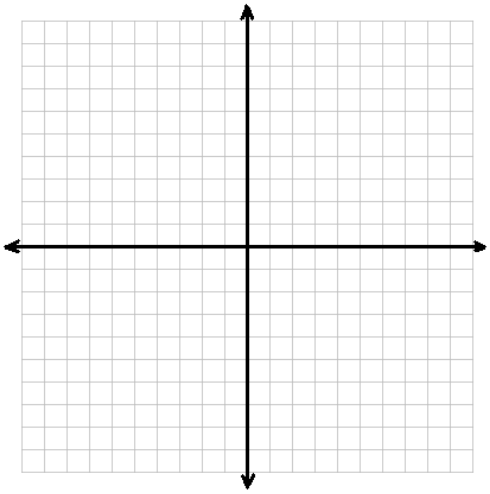
- ____
- ____
- ____
- ____
- ____

Example Give the characteristics and sketch a graph for each of

4. $f(x)=\dfrac{2x+1}{x+1}$

- Domain:
- Range:
- x-int:
- y-int:
- HA:
- VA:
- SA:

D. Limits:



Variation

- **Direct Variation: ____**
- **Inverse Variation____**
- **Joint Variation____**

1. The amount of gas that a helicopter uses is directly proportional to the number of hours spent flying. The helicopter flies for 3 hours and uses 24 gallons of fuel. Find the number of gallons of fuel that the helicopter uses to fly for 6 hours.

2. The weight of a body above the Earth's surface varies inversely with the square of the distance from the center of the Earth. If a certain body weighs 55 pounds when it is 3960 miles from the center of the Earth, then how much will it weigh when it is 3965 miles from the center of the Earth?

Class 22: Exponential and Logarithmic Functions

Review:

Basic Laws of Exponents: Write the exponential rules for each of the following (See pg. 4)

- $a^x \cdot a^y =$ ________ $(ab)^x =$ ________ $a^1 =$ ________
- $\dfrac{a^x}{a^y} =$ ________ $\left(\dfrac{a}{b}\right)^x =$ ________ $a^0 =$ ________
- $\left(a^x\right)^y =$ ________ $a^{-x} =$ ________ $a^{x/y} =$ ________

Simplify the following:

$\dfrac{2^{27}}{2^{24}} =$

$(5)^{-3} =$

$(2^2)^3 =$

$(16)^{3/2} =$

$(2x^3y^4)^5 =$

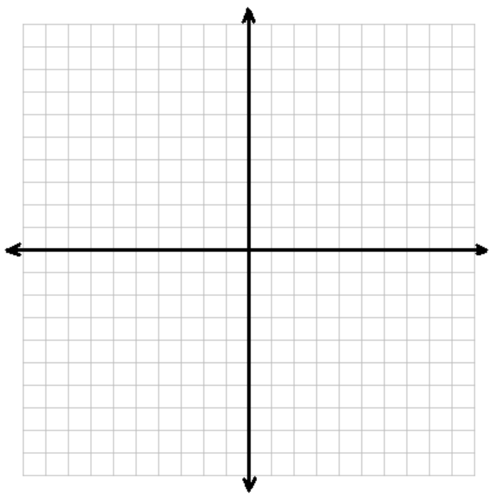
$\left(\dfrac{1}{3}\right)^{-3} =$

$\sqrt[5]{(32)^3} =$

$(27)^{1/3} =$

Exponential Functions

- The exponential function ____



- **y-intercept**: ______________________
- **Domain**: ______________________
- **Range**: ______________________
- **Asymptotes**?______________________
- **Inverse**______________________

In college, we study large volumes of information that, unfortunately we do not often retain for very long. The function $f(x) = 80e^{-0.5x} + 20$ describes the percentage of information that a person can be expected to remember x weeks after learning it.

a. Let x = 0 and give the value of f(0)

b. Let x = 52 and determine the value of f(52) accurate to the nearest ten thousandth

Compounding

- **Simple Interest** ____

- **Compound Interest** ____

____

- **The Natural Base *e*** : ____

- **Continuous Compounding:** ____

Laura borrows $2500 at a rate of 10.5%. Find how much Laura owes at the end of 4 years if:

a. The interest is compounded yearly

b. The interest is compounded quarterly

c. The interest is compounded monthly

d. The interest is compounded continuously

e. Which option would yield the most interest, 10.5% compounded monthly for 4 years or 9% compounded continuously?

Logarithmic Functions

- **The Logarithmic Function** ____

____

A logarithm as an exponent: ____

Write the Basic Laws of Logarithms below:

____________________ ____________________

____________________ ____________________

Write the following in its equivalent exponential form:

1. $4 = \log_2 16$ ____________________
2. $6 = \log_2 64$ ____________________
3. $\log_6 216 = y$ ____________________
4. $\log_5 125 = y$ ____________________

Write the following in its equivalent logarithmic form:

5. $\sqrt[3]{8} = 2$ ____________________
6. $13^2 = x$ ____________________
7. $5^{-3} = \frac{1}{125}$ ____________________
8. $7^y = 200$ ____________________

Natural Logarithm

- The Natural Logarithmic Function ____

- **Properties of ln(*x*).**

Write the properties of the natural logarithm below:

______________________________ ______________________________

______________________________ ______________________________

Simplify the following

1. $\ln e^6$

2. $\log 10^7$

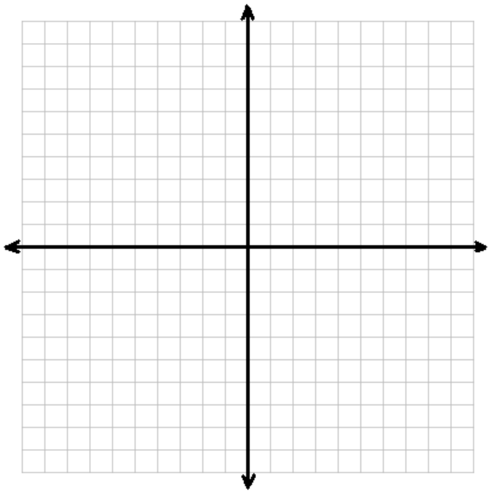
3. $\ln \frac{1}{e^6}$

4. $10^{\log 53}$

5. $e^{\ln 125}$

6. $e^{\ln 7x^2}$

Logarithmic Functions



- **y-intercept**: ______________________
- **Domain**: ______________________
- **Range**: ______________________
- **Asymptotes**?______________________
- **Inverse**______________________

Example: Find the domain of the following functions:

a. $f(x) = \ln(x-2)$

b. $f(x) = \log(3x+6)$

______________________ ______________________

The percentage of adult height attained by a girl who is x years old can be model $f(x) = 62 + 35\log(x-4)$ where x represents the girl's age and f(x) represents the percentage of her adult height.

a. Approximately what percentage of her adult height has a girl attained at age 13?

b. Approximately what percentage of her adult height has a girl attained at age 16?

Class 23: Exponential and Logarithmic Equations and Logistic Growth

- **Exponential Equation** ____

Give at least two example: ____________________________________

Examples: Solve the following equations

1. $4^{2x-1} = 64$

2. $3^{x-1} = \frac{1}{27}$

3. $e^{x+4} = \frac{1}{e^{2x}}$

Steps in Solving Exponential Equations

1.____

2. ____

3.____

4.____

Example: Solve for x $3e^{5x} - 2 = 1977$

4. $5e^{0.002x} - 9 = 12$

Logistic Growth

- Logistic Model ____

____

7. The logistic growth function $f(t) = \dfrac{100,000}{1 + 500e^{-t}}$ describes the number of people, f(t), who have become ill with influenza t weeks after its initial outbreak in a particular community.

a. How many people became ill with the flu when the epidemic began?

____

b. How many people were ill by the end of the fourth week?

____

c. What is the limiting size of the population that becomes ill?

____

Properties of Logarithms

- **Product Rule**: ______________________________

Example: $\log\left[(x+2)(x+3)\right] = \log(x+2) + \log(x+3)$

- **Quotient Rule**: ______________________________

Example: $\log\left[\frac{(2x+3)}{(x-5)}\right] = \log(2x+3) - \log(x-5)$

- **Power Rule**: ______________________________

Example: $7\log(x-3) = \log(x-3)^7$

Class 24 & 25 – Review and Test 3

Summary/Questions