Required Summer Packet

Intermediate Algebra F 1–2A
&
Advanced Algebra F 1–2A

MATH SUMMER PACKET

INSTRUCTIONS

Attached you will find a packet of exciting math problems for your enjoyment over the summer. The purpose of the summer packet is to review the topics you have already mastered in math and to make sure that you are prepared for the class you are about to enter.

The packet contains a brief summary and explanation of the topics so you don't need to worry if you don't have your math book. You will find many sample problems, which would be great practice for you before you try your own problems. The explanations are divided into sections to match the sample problems so you should be able to reference the examples easily.

This packet will be **due the second day of class.** All of your hard work will receive credit. The answers are provided in the back of the packet; *however,* you must show an amount of work appropriate to each problem in order to receive credit. If you are unsure of how much work to show, let the sample problems be your guide. You will have an opportunity to show off your skills during the first week when your class takes a quiz on the material in the packet.

This packet is to help you maximize your previous math courses and to make sure that everyone is starting off on an even playing field on the first day of school. If you feel that you need additional help on one or two topics, you may want to try math websites such as: www.mathforum.org or www.askjeeves.com. Math teachers will be available for assistance at the high school the week before school. Check the marquee or the school website for specific times, which are to be determined.

Enjoy your summer and don't forget about the packet. August will be here before you know it! If you lose your packet the OPRFHS Bookstore will carry extra copies. You will also be able to access the packets on line at the school website, www.oprfhs.org.

See you in August!

The OPRFHS Math Department

SUMMER PACKET
For Students Entering IAF or AAF

Name ____

Welcome to Algebra! This packet contains the topics that you have learned in your previous courses that are most important to this class. This packet is meant as a REVIEW. Please read the information, do the sample problems and be prepared to turn this in when school begins again.

**** Denotes problems for AAF students only.**

Enjoy your summer!

I. Using your graphing calculator:

(A TI-83 Plus or TI-84 is required for this class. You may purchase these at the high school bookstore with a 3 year warrantee.)

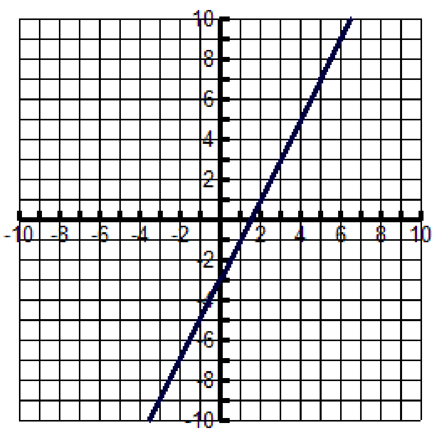
- Be able to perform basic operations on a graphing calculator including addition, subtraction, multiplication and division.
- Have an understanding of the order of operations and use parenthesis correctly.

  To enter $(-2)^2 = 4$ your keystrokes **must** include the parenthesis.

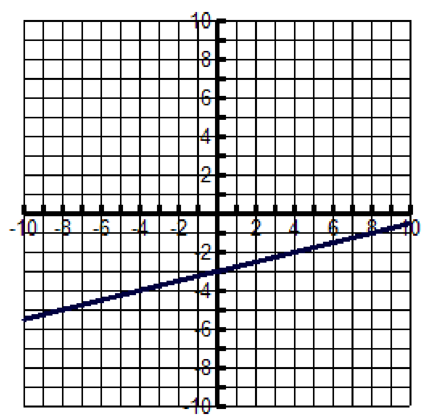
  $$(-3)^2 = 9 \qquad where\ \ as \qquad -3^2 = -9$$

- Be able to graph lines on the graphing calculator.

1. Use the *y=* button and enter the line $Y_1 = 2x - 3$. Your graph should look like the one below.



2. When graphing lines with slope equal to a fraction be sure to enter the equation, using parenthesis. Graph $Y_1 = \frac{1}{4}x - 3$ by entering $Y_1 = (1/4)x - 3$



II. Solving equations and inequalities

Be able to use the Addition Property of Equality: $If\ \ a=b\ \ then\ \ a+c=b+c$

Be able to use the Multiplication Property of Equality: $If\ \ a=b\ \ then\ \ a\cdot c=b\cdot c$

- Solve linear equations and inequalities

Problem: Solve the following equation using the Addition and Multiplication Property of Equality.

$$3x-4=13$$

$$3x-4+4=13+4 \qquad \text{Addition Property of Equality}$$

$$3x=17$$

$$\left(\frac{1}{3}\right)\cdot 3x=\left(\frac{1}{3}\right)\cdot 17 \qquad \text{Multiplication property of Equality}$$

$$x=\frac{17}{3} \qquad \text{Simplify}$$

Problem: Solve the following inequality using the Addition and Multiplication Property of Equality.

$$16-7y\geq 10y-4$$

$$-16+16-7y\geq -16+10y-4 \qquad \text{Add } -16$$

$$-7y\geq 10y-20$$

$$-10y-7y\geq -10y+10y-20 \qquad \text{Add -10y}$$

$$-17y\geq -20$$

$$-\left(\frac{1}{17}\right)(-17y)\leq -\left(\frac{1}{17}\right)(-20)$$

Multiply by $-\frac{1}{17}$ and **reverse** the sign OR divide by -17

$$y\leq \frac{20}{17}$$

- Solve Absolute Value equations **

$$|x|=x\ if\ \ x\ is\ nonnegative,\ and$$

$$|x|=-x\ (the\ inverse\ of\ \ x)\ if\ \ x\ is\ negative$$

$$|5|=5$$

$$|-8|=8$$

Problem: Solve the following:

1. $|x|=4$ so $x=4\ or\ x=-4$

2. $|5x-4|=11$

$5x-4=11 \quad or \quad 5x-4=-11$ Separate into two equations using plus and minus.

$5x=15 \quad or \quad 5x=-7$ Add 4 to both sides

$x=3 \quad or \quad x=-\frac{7}{5}$ Multiply by $\frac{1}{5}$

III. Functions

- Be familiar with function notation. Know that $y = x$ can be written in function notation as $f(x) = x$. Given a function, be able to find the values of $f(x)$.

  Problem: Given $f(x) = 2x^2 - 3$, find each of the following:

  $a)$ $f(0) = 2 \cdot 0^2 - 3 = 3$

  $b)$ $f(2) = 2 \cdot 4 - 3 = 9 - 3 = 5$

  $c)$ $f(-3) = 2 \cdot (-3)^2 - 3 = 18 - 3 = 15$

- Be able to identify the domain and range from a set of ordered pairs or from a graph. The **domain** is the set of all first members in a relation and the **range** is the set of all second members in a relation.

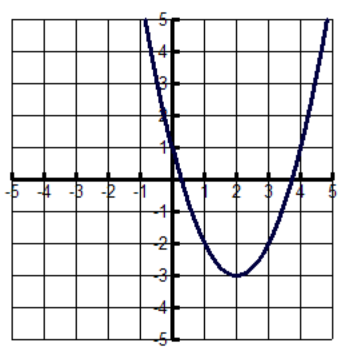
  Problem: List the domain and range of the following relation:

  $\{ (5,2),(6,4),(8,6) \}$

  Domain $\{5,6,8\}$ Range $\{2,4,6\}$

  Problem: List the domain and range of the following relation:

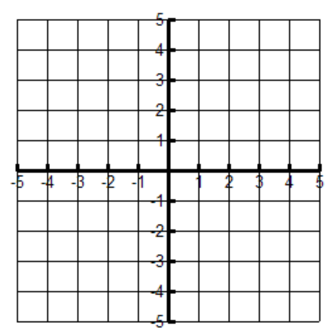
1.



Domain: All real numbers

Range: $y \geq -3$

2.



Domain: $\{-2,3,4\}$

Range: $\{3,-1,4\}$

- Be familiar **with linear functions** and inequalities and their graphs.
  1. The graph of any linear equation is a straight line. $y = mx + b$ is the **slope intercept form** of a linear equation. The **y-intercept** of a graph is the y-coordinate of the point where the graph intersects the y-axis and is represented by b. The **slope** of the line is represented by m.
  2. Determine the equation of a line using the point slope equation. **Error! Objects cannot be created from editing field codes.**
  3. To determine the slope of a line use the equation $m = \dfrac{y_2 - y_1}{x_2 - x_1}$

Problem: Find a linear function with a slope of $\frac{2}{3}$ and a y-intercept of -7.

$$m = \frac{2}{3} \ \ and \ \ b = -7 \text{ so the equation is } y = \frac{2}{3}x - 7$$

Problem: Given the points $(6,-4)$ *and* $(-3,5)$ find the equation of the line

a) In slope intercept form: **Step 1**: Use equation above to determine slope

$$m = \frac{5-(-4)}{-3-6} = \frac{9}{-9} = -1$$

Step 2: Use one of the two given points and the slope from above in the point-slope equation.

$x_1 = 6$

$y_1 = -4$ $\qquad (y-(-4)) = -1(x-6)$

$m = -1$

Step 3: Simplify

$y + 4 = -1x + 6$

$y = -x + 2$

b) In standard form: $x + y = 2$

Problem: Graph the following line using the slope and y-intercept.

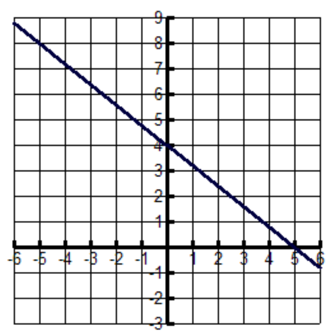
$$4x + 5y = 20$$

First put equation into slope-intercept form.

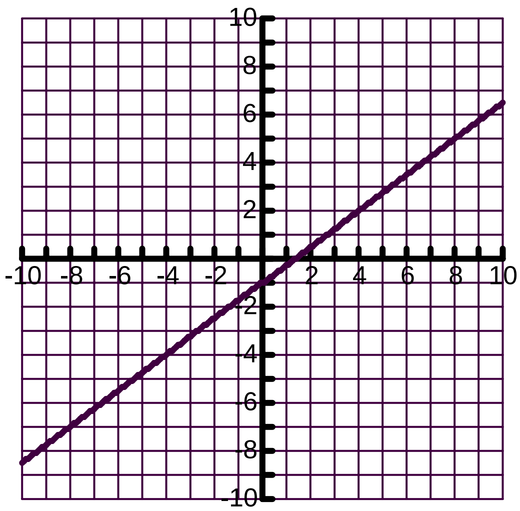
$$y = -\frac{4}{5}x + 4$$

Using: $m = -\frac{4}{5},\ b = 4$:

1) Plot the y-intercept $(0,4)$.
2) Use the slope and move down 4 units and right 5 units to plot the point $(-5,8)$ OR move up 4 units and left 5 units to plot the point $(5,0)$.
3) Your graph should look like the to the right.



Problem: Given the graph below, determine the equation of the line.



1) The y-intercept is –1, so $b = -1$
2) Starting with the y-intercept of –1, move up 3 units and right 4 units to the next **exact** point on the graph. This would be the point $(4, 2)$
3) The change in the y value is 3 in the positive direction and the change in the x value is 4 in the positive direction. Therefore the slope is $m = \frac{3}{4}$
4) Using the slope intercept equation and substituting the values of m *and* b into

$$y = mx + b \quad \longrightarrow \quad y = \frac{3}{4}x - 1$$

- Graph absolute value functions using a table of values or by splitting the equation into it's two parts. $\begin{matrix} x \geq 0, & f(x) = x \\ x \leq 0, & f(x) = -x \end{matrix}$

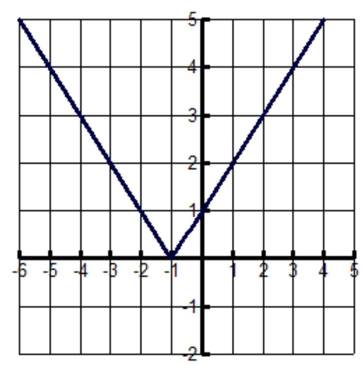
Problem: Be able to graph the absolute value equation $y = |x+1|$ by making an x-y table and plotting points AND by graphing the 2 separate equations below.

Making a table of values and plotting points:

x	y
-4	3
-3	2
-2	1
-1	0
0	1
1	2
2	3

$y = x + 1, \ for \ all \ y \geq 0$

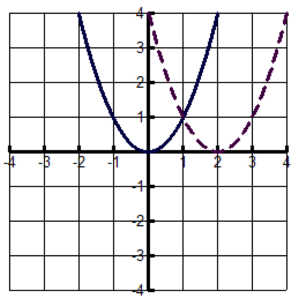
$y = -x - 1, \ for \ all \ y \geq 0$



- Graph parabolic functions and absolute value functions and be able to **translate** (or shift) the graph of $f(x)=x^2$

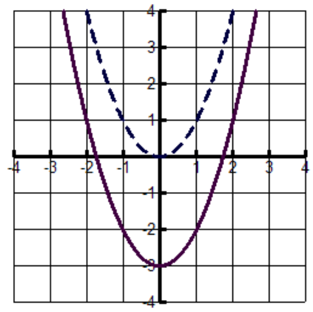
  Problem: Given the parent function $f(x)=x^2$ **translate** the given functions accordingly.

** $f(x)=(x-2)^2$



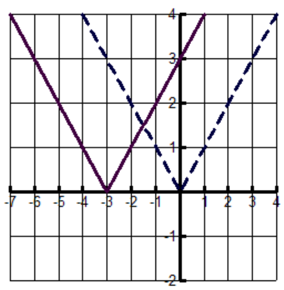
Where the graph shifted 2 units *to the right*.

** $f(x)=x^2-3$

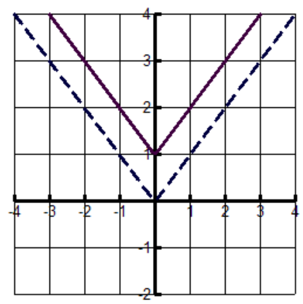


Where the graph shifted 3 units *down*.

** $f(x)=|x+3|$



** $f(x)=|x|+1$

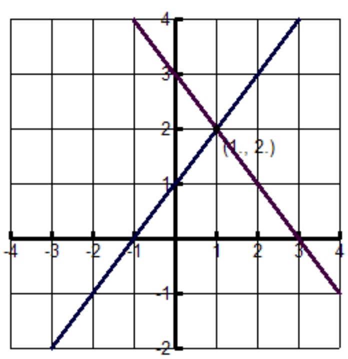


IV. Systems of Equations

- Solve systems of equations by **graphing**.

  Problem: Solve graphically: $\begin{aligned} y-x&=1 \\ y+x&=3 \end{aligned}$

  Solving both equations for y and graphing yields:



Solving for y $\quad \begin{aligned} y&=x+1 \\ y&=-x+3 \end{aligned}$

Graph (see graph on right)

The solution to the system is $(1,2)$, which is the point where the two lines intersect.

Solve systems of equations by **substitution**. In the substitution method you must get one variable of either equation by itself. Then **substitute** its value into the second equation.

Problem: Solve using substitution. $$\begin{aligned}2x+y&=6\\3x+4y&=4\end{aligned}$$

Solve the first equation for y. $y=6-2x$

Since y and $6-2x$ are equivalent, substitute $6-2x$ for y into the second equation.

$$3x+4(6-2x)=4$$

Use the distributive property. $3x+24-8x=4$

Solve for x. $x=4$

Substitute 4 for x in either equation and solve for y.

$$\begin{aligned}&2x+y=6\\&2\cdot 4+y=6\\&y=-2\end{aligned}$$

The solution is the ordered pair $(4,-2)$

- Solve systems of equations by **linear combination,** which is a combination of linear equations that will eliminate a variable. When using this method, first put the equation in the form of $Ax+By=C$. Make sure the coefficients of either variable are opposites of each other. Add both equations together.

Problem: Solve using linear combination:

$$\begin{aligned}-4y&=-3x-1\\2y&=3x\end{aligned} \qquad \textit{Put in } Ax+By=C \textit{ form}$$

$$\begin{aligned}&3x-4y=-1\\+\quad &-3x+2y=0\\ \hline &-2y=-1\end{aligned} \qquad \textit{Add the } x\textit{'s and add the } y\textit{'s}$$

Solving for y yields: $y=\frac{1}{2}$.

Substitute $y=\frac{1}{2}$ into either of the two original equations: $-3x+2\left(\frac{1}{2}\right)=0$

Solve for : $x=\frac{1}{3}$

The solution is the ordered pair $\left(\frac{1}{3},\frac{1}{2}\right)$

V. Properties of Exponents

- Be able to multiply **same bases** using properties of exponents, divide **same bases** and raise a power to a power. Know the following properties of exponents:
  For any real number a and integers m and n

$$a^m a^n = a^{m+n} \qquad \frac{a^m}{a^n} = a^{m-n},\ a \neq 0$$

$$\left(a^m\right)^n = a^{m \cdot n}$$

$$\left(a^m b^n\right)^p = a^{mp} b^{np} \qquad \left(\frac{a^m}{b^n}\right)^p = \frac{a^{mp}}{b^{np}}$$

$$a^1 = a \qquad ^{**}\ a^0 = 1$$

$$^{**}a^{-m} = \frac{1}{a^m} \qquad ^{**}\ \frac{1}{a^{-m}} = a^m$$

Simplify exponents using the order of operations.
Problems:

$a)$ $\left(-3x^4\right)\left(5x^7\right) = -15x^{11}$

$b)$ $\dfrac{16x^4y^{11}}{-8x^3y^9} = -2xy^2$

$c)$ $\left(3x^2y^3\right)^4 = 81x^8y^{12}$

** $d)$ $\left(\dfrac{x^{-3}}{y^4}\right)^{-3} = \left(\dfrac{x^{-3(-3)}}{y^{4(-3)}}\right) = \dfrac{x^9}{y^{-12}} = x^9y^{12}$

VI. Factoring

- Be able to factor **without** using your calculator.
- Factor terms with a **greatest common factor** (GCF).
  Problem: Factor $5x^4 - 20x^3 = 5x^3 \cdot x - 5x^3 \cdot 4$ $5x^3$ is the GCF
  $5x^3\left(x-4\right)$
- Factor trinomials of the form $x^2 + bx + c$
  Problem: Factor $x^2 - 3x - 10$
  One way to do this is to:
  Look for pairs of integers whose product is -10 and whose sum is -3.

Pairs of factors **whose product is -10**	Sum of factors **whose sum is -3**
-2 ,5	3
2, -5	-3
10, -1	9
-10, 1	-9

The desired integers are 2 and -5.
$x^2 - 3x - 10 = \left(x+2\right)\left(x-5\right)$

- Factor trinomials of the form ax^2+bx+c

  Problem: Factor $3x^2+5x+2$

  Look for pairs of numbers who product is 3 and then for pairs of numbers whose product is 2. Trial and error yields: $3x^2+5x+2=(3x+2)(x+1)$

- Factor the **difference of two squares**.

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

  Problem: Factor $x^2-16=(x+4)(x-4)$

  Factor $4x^2-9=(2x+3)(2x-3)$

- Factor **perfect trinomial squares**

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

  Problem: Factor $x^2-10x+25=(x-5)^2$

  Factor $2^2+14x+49=(x+7)^2$

VII. Solving quadratic equations

- Solve quadratic equations by factoring (you need to be able to do this **without** using your calculator) and be able to use the quadratic formula.

Problem: Solve the following quadratic by factoring.

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

$$(x-7)(x+2)=0 \qquad \textit{Factor}$$

$$x-7=0 \quad or \quad x+2=0 \qquad \textit{Set equal to zero}$$

$$x=7 \quad or \quad x=-2 \qquad \textit{Solve}$$

Problem: Solve using the quadratic formula: $x=\dfrac{-b\pm\sqrt{b^2-4ac}}{2a},\ \ a\neq 0$

$$3x^2+5x+1=0$$

$$a=3,\ b=5,\ c=1$$

Using the quadratic formula and simplifying:

$$x=\frac{-5\pm\sqrt{5^2-4\cdot3\cdot1}}{2\cdot3}$$

The solutions are:

$$x=\frac{-5+\sqrt{13}}{6} \quad and \quad x=\frac{-5-\sqrt{13}}{6}$$

VIII. Simplifying radicals

- Simplify radicals.
  Know how to use the following theorems:

$$\sqrt{a}\cdot\sqrt{b}=\sqrt{a\cdot b}$$

$$\frac{\sqrt{a}}{\sqrt{b}}=\sqrt{\frac{a}{b}}$$

  Problem:

$$a)\qquad \sqrt{50}=\sqrt{25\cdot 2}=\sqrt{25}\cdot\sqrt{2}=5\sqrt{2}$$

$$b)\qquad \sqrt{147a^2}=\sqrt{7^2\cdot 3\cdot a^2}=7|a|\sqrt{3}$$

- Add, subtract, multiply and divide radicals

  Add and subtract **like** terms.
  Problems:

$$a)\qquad \sqrt{3}\sqrt{6}=\sqrt{3\cdot 6}=\sqrt{18}=3\sqrt{2}$$

$$b)\qquad \sqrt{3x^2y}\sqrt{18x}=\sqrt{3\cdot 18\cdot x^2\cdot x\cdot y}=\sqrt{54x^3y}=3|x|\sqrt{6xy}$$

$$c)\qquad \frac{\sqrt{80}}{\sqrt{5}}=\sqrt{\frac{80}{5}}=\sqrt{16}=4$$

$$d)\qquad \sqrt{\frac{4a^3}{b^4}}=\frac{2|a|\sqrt{a}}{b^2}$$

$$e)\qquad 6\sqrt{3}+2\sqrt{3}=8\sqrt{3}$$

$$f)\qquad 14\sqrt{2}-6\sqrt{2}=8\sqrt{2}$$

- Rationalize the denominator. It is standard procedure to write a radical expression without radicals in the denominator. This process is called **rationalizing the denominator**.
  Problem:

$$\sqrt{\frac{2}{3}}=\frac{\sqrt{2}}{\sqrt{3}}\cdot\frac{\sqrt{3}}{\sqrt{3}}\qquad\qquad \textit{Multiply by } 1 \textit{ in form of } \frac{\sqrt{3}}{\sqrt{3}}$$

$$=\frac{\sqrt{6}}{\sqrt{3^2}}\qquad\qquad \textit{Simplify}$$

$$=\frac{\sqrt{6}}{3}$$

Sample Problems

Complete the problems below, showing work where necessary. Feel free to do your work on separate sheets of paper which you should attach. Remember you will be required to turn this in. An answer key is provided for you, but in math class, the work is equally as important than the answer!

II. **Solve the following equations and inequalities**. Graph the solution to the inequalities on the number line.

1. $9y - 7y = 42$

2. $27 = 9(5y - 2)$

3. $5 + 2(x - 3) = 2[5 - 4(x + 2)]$

4. $-\frac{3}{4}x + \frac{1}{8} = -2$

5. $\frac{3x}{2} + \frac{5x}{3} - \frac{13x}{6} - \frac{2}{3} = \frac{5}{6}$

6. $-9x + 3x \geq -24$

7. $4(3y-2) \geq 9(2y+5)$

8. $|5x+2| = 7$

9. $7|z|+2 = 16$

**10. $5-2|3x-4| = -5$

11. $|x| \geq 3$

12. $|x| < 2$

**13. $|x-3|<5$

**14. $|3a-4|+2\geq 8$

III. Functions

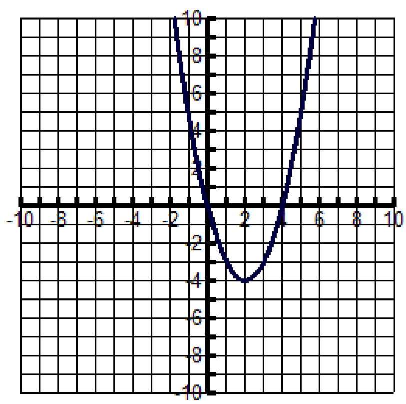
15. Determine whether the following are functions. If the relation **is** a function, state the domain and range:

a) $\{(2,-3),(7,9),(-11,13),(2,6)\}$ ________________________________

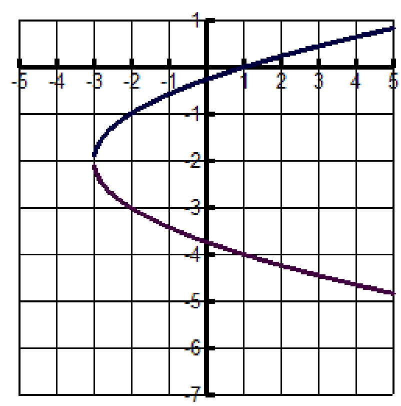
b) $\{(1,19),(-2,11),(6,-9),(7,11)\}$ ________________________________

16. State whether the following are functions. *If* they are the graphs of a function, determine the domain and range.

a)



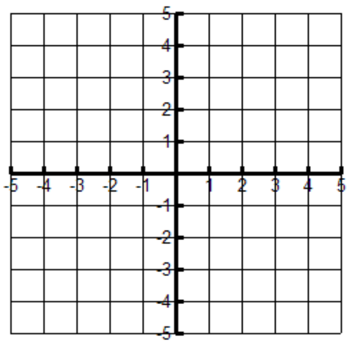
b)



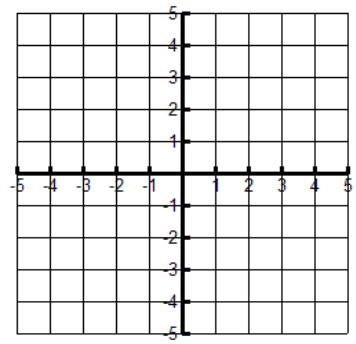
Using your knowledge of **linear functions,** answer the following questions.

17. Graph the following using the slope and y-intercept.

a) $y = \frac{4}{5}x + 2$



b) $2x + 3y = 6$



18. Find the slope of the line containing the following points. $(8,7)$ *and* $(2,-1)$

19. Find a linear function whose graph has the given slope and y-intercept.

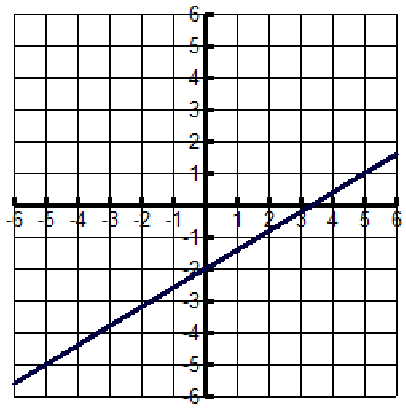
Slope of $-\frac{3}{4}$, and a y-intercept of $(0,9)$

20. Given the points $(-3,3)$ *and* $(3,7)$ find the following:

a) the equation of the line in slope-intercept form.

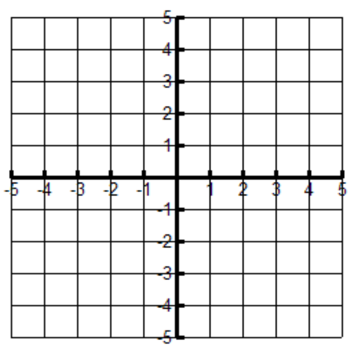
b) the equation of the line in standard form

21. What is the equation in slope-intercept form of the line graphed below.

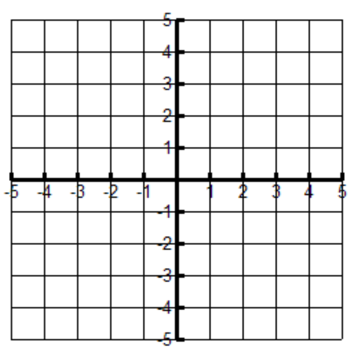


Using your knowledge of functions, answer the questions below.
22-24 graph on the axis provided

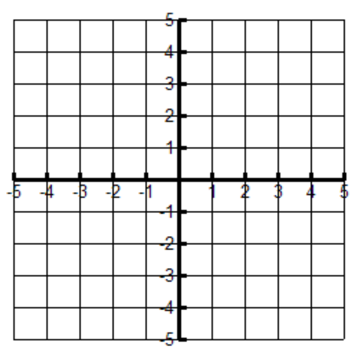
22. $f(x) = |x|$



23. $f(x) = x^2$



** 24. $f(x) = -(x+1)^2 + 4$



25. Evaluate the following for $f(x) = 2x^2 - 3$.

a) $f(3)$

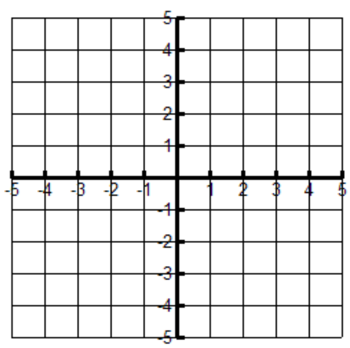
b) $f(0)$

c) $f(-2)$

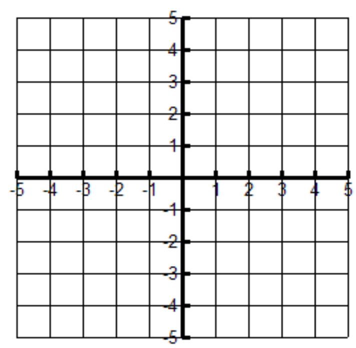
IV. Systems of equations

Solve the following systems of equations by **graphing**.

26. $x - y = 3$
$x + y = 5$



27. $y = -\frac{1}{3}x - 1$
$4x - 3y = 18$



Solve the following by **substitution**.

28. $y = 5 - 4x$
$2x - 3y = 13$

29. $9x - 2y = 3$
$3x - y = 6$

Solve the following using **linear combination.**

30. $x + 3y = 7$
$-x + 4y = 7$

31. $5x - 7y = -16$
$2x + 8y = 26$

V. Properties of Exponents

32. Multiply the following:

a) $x^3 \cdot x^5$

b) $4a^3 \cdot 7a^9$

c) $\left(-2a^5\right)\left(7a^4\right)$

d) $\left(m^6n^5\right)\left(m^4n^7p^3\right)$

33. Divide the following:

a) $\frac{a^9}{a^3}$

b) $\frac{12t^7}{4t^2}$

c) $\frac{m^{12}n^9}{m^4n^6}$

d) $\frac{18x^8y^6z^7}{-3x^2y^3z}$

34. Simplify the following:

a) $\left(x^2\right)^5$

b) $\left(3x^2y^3\right)^2$

c) $\left(9m^3n^5p^3\right)^3$

d) $\left(-2a^2bc^4\right)^5$

VI. Factoring

Factor the following:

35. $3x^3 - 12x$

36. $6x^4y^2 - 12x^3y^3 + 20x^2y^5$

37. $x^2+2x-63$

38. $x^2+8x+12$

39. $2x^2-16x+32$

40. x^3-x^2-72x

41. $3x^2-16x-12$

42. $6x^2-x-15$

43. x^2-49

44. $x^2-16x+64$

VII. Solve the following quadratic equations.

Solve by factoring:

45. $x^2 + 8x + 15 = 0$

46. $2x^2 - 8x = 0$

47. $3x^2 - 8x + 4 = 0$

48. $x^2 - 4x = 45$

Solve using the quadratic formula:

49. $x^2 + 6x - 1 = 0$

50. $2x^2 - 5x = 4$

VIII. Simplifying radicals

Simplify the following:

51. $\sqrt{20}$

52. $\sqrt{27}$

53. $\sqrt{12}$

54. $3\sqrt{7}+2\sqrt{7}$

55. $8\sqrt{2}-6\sqrt{2}+5\sqrt{2}$

56. $8\sqrt{27}-3\sqrt{3}$

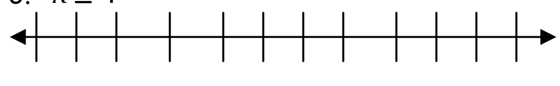
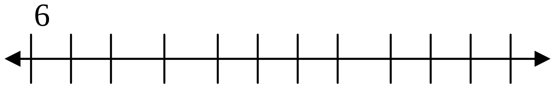
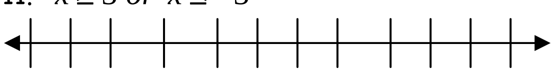
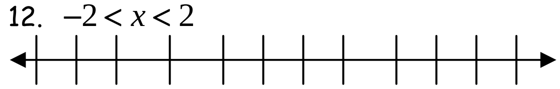
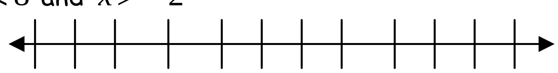
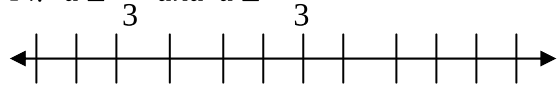
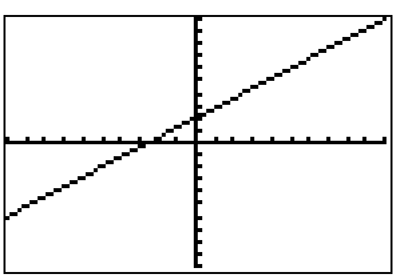
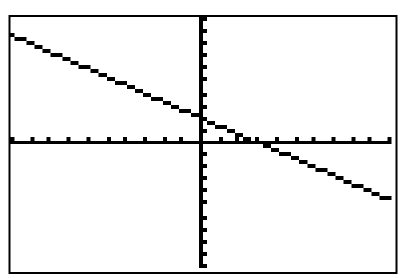
57. $9\sqrt{50}-4\sqrt{2}$

Rationalize the denominator

*58. $\dfrac{3}{\sqrt{2}}$

*59. $\dfrac{3\sqrt{6}}{\sqrt{3}}$

Answers:

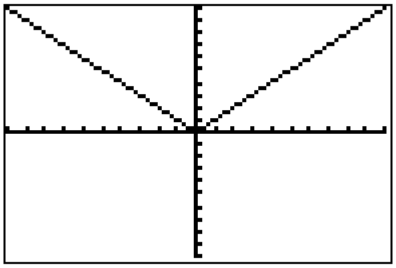
<table>
<tr><td>1. $y = 21$</td><td>2. $y = 1$</td></tr>
<tr><td>3. $x = -\frac{1}{2}$</td><td>4. $x = \frac{17}{6}$</td></tr>
<tr><td>5. $x = \frac{3}{2}$</td><td>6. $x \le 4$

</td></tr>
<tr><td>7. $y \le -\frac{53}{6}$

</td><td>8. $x = 1 \text{ or } x = -\frac{9}{5}$</td></tr>
<tr><td>9. $z = \pm 2$</td><td>10. $x = -\frac{1}{3} \text{ or } x = 3$</td></tr>
<tr><td>11. $x \ge 3 \text{ or } x \le -3$

</td><td>12. $-2 < x < 2$

</td></tr>
<tr><td>13. $x < 8$ and $x > -2$

</td><td>14. $a \ge \frac{10}{3} \text{ and } a \le -\frac{2}{3}$

</td></tr>
<tr><td>15. a) Relation is NOT a function
b) Relation IS a function</td><td>16. a) Function $D: x \in \mathbb{R}(all\ real\ numbers)$
$R: y \ge -4$
b) NOT a function</td></tr>
<tr><td>17. a)
</td><td>17. b)
</td></tr>
<tr><td>18. $m = \frac{4}{3}$</td><td>19. $y = -\frac{3}{4}x + 9$</td></tr>
</table>

20. a) $y=\frac{2}{3}x+5$

 b) $2x-3y=-15$

21. $y=\frac{2}{3}x-2$

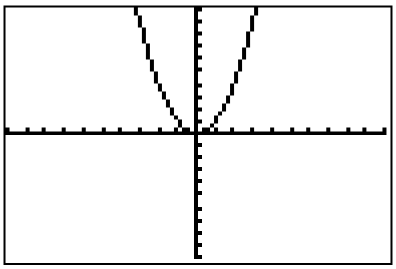
22.



X	Y1	
-4	4	
-3	3	
-2	2	
-1	1	
0	0	
1	1	
2	2	

X= -4

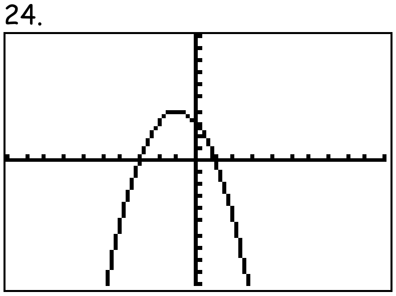
23.



X	Y1	
-4	16	
-3	9	
-2	4	
-1	1	
0	0	
1	1	
2	4	

X= -4

24.



X	Y1	
-4	-5	
-3	0	
-2	3	
-1	4	
0	3	
1	0	
2	-5	

X= -4

25. a) 15

 b) -3

 c) 5

26. $(4,1)$

27. $(3,-2)$

28. $(2,-3)$

29. $(-3,-15)$

30. $(1,2)$

31. $(1,3)$

32. a) x^8

 b) $28a^{12}$

 c) $-14a^9$

 d) $m^{10}n^{12}p^3$

33. a) a^6

 b) $3t^5$

 c) m^8n^3

 d) $-6x^6y^3z^6$

34. a) x^{10}

 b) $9x^4y^6$

 c) $729m^9n^{15}p^9$

 d) $-32a^{10}b^5c^{20}$

35. $3x\left(x^2-4\right)$ $3x\left(x+2\right)\left(x-2\right)$	36. $2x^2y^2\left(3x^2-6xy+10y^3\right)$
37. $\left(x+9\right)\left(x-7\right)$	38. $\left(x+6\right)\left(x+2\right)$
39. $2\left(x^2-8x+16\right)$ $2\left(x-4\right)^2$	40. $x\left(x^2-x-72\right)$ $x\left(x-9\right)\left(x+8\right)$
41. $\left(3x+2\right)\left(x-6\right)$	42. $\left(2x+3\right)\left(3x-5\right)$
43. $\left(x+7\right)\left(x-7\right)$	44. $\left(x-8\right)^2$
45. $x=-3,-5$	46. $x=0,4$
47. $x=\frac{2}{3},2$	48. $x=9,-5$
49. $x=-3\pm\sqrt{10}$	50. $x=\frac{5\pm\sqrt{57}}{4}$
51. $2\sqrt{5}$	52. $3\sqrt{3}$
53. $2\sqrt{3}$	54. $5\sqrt{7}$
55. $7\sqrt{2}$	56. $21\sqrt{3}$
57. $41\sqrt{2}$	58. $\frac{3\sqrt{2}}{2}$
59. $3\sqrt{2}$	