Algebra 2 Skills Review Packet

Name _____
Date _____

Make sure you look at the reminders or examples before each set of problems to jog your memory!

I. Solving Linear Equations

1. Eliminate parentheses 2. Combine like terms 3. Eliminate terms by + or – 4. Isolate variable by * or ÷	$5(2x-2) = 4-2x+10$ $10x-10 = 4-2x+10$ → Eliminate parenthesis $10x-10 = 14-2x$ → Combine like terms $+2x \quad +2x$ $12x-10 = 14$ $+10 \quad +10$ → Eliminate terms by + or - $\frac{12x}{12} = \frac{24}{12}$ → Isolate variable by ÷ $x = 2$

Solve	
1. $\frac{2}{3}x-1=x+7$	2. $5x-2(3-x) = -(4-x)$
3. $6(2x-1)+3 = 6(2-x)-1$	4. $\frac{2}{3}x-2=\frac{3}{4}x+5$
5. A stockbroker earns a base salary of \$40,000 plus 5% of the total value of the stocks, mutual funds, and other investments that the stockbroker sells. Last year, the stockbroker earned \$71,750. What was the total value of the investments the stockbroker sold?	

II. Solving Inequalities

Follow same procedure as in solving equations *EXCEPT in the last step.
If you multiply or divide by a negative number,
Be sure to reverse the direction of the inequality signs.

Example 1: $\frac{3x}{3} > \frac{-18}{3}$ $x > -6$	Example 2: $\frac{-3x}{-3} > \frac{18}{-3}$ $x < -6$

Solve	
6. $-6 - x \geq -7x + 12$	7. $5(2x - 3) \geq -15 + 20x$
8. You have \$50 and are going to an amusement park. You spend \$25 for the entrance fee and \$15 for food. You want to play a game that costs \$0.75. Write and solve an inequality to find the possible numbers of times you can play the game. If you play the game the maximum number of times, will you have spent the entire \$50? Explain.	

III. Solving Absolute Value Equations and Inequalities

1. Isolate the Absolute Value 2. Set up 2 equations/inequalities 3. Solve each equation/inequality 4. Write your final answer in { } or as a compound inequality.	$2\lvert x-6\rvert+3\leq 11$ $2\lvert x-6\rvert\leq 8$ } Isolate the absolute value $\lvert x-6\rvert\leq 4$ $x-6\leq 4$ and $x-6\geq -4$ → Set up 2 inequalities $x\leq 10$ and $x\geq 2$ → Solve each inequality $2\leq x\leq 10$ → Write your final answer as a compound inequality

Solve	
9. $\lvert 2x-5\rvert-4=5$	10. $-3\left\lvert\frac{2}{3}x-9\right\rvert=-54$
11. $4\lvert 10-3x\rvert+5\geq 73$	12. $\left\lvert\frac{1}{4}x+10\right\rvert<18$

IV. Graphing Linear Equations

To graph a linear equation:

(1) Put the equation in slope-intercept form

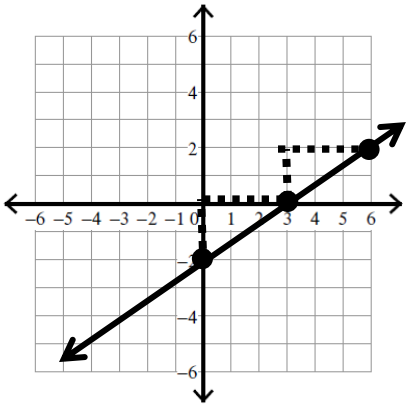
(2) Plot the y-intercept on the y-axis

(3) Rise and run with the slope from the y-intercept across the entire graph

(ex1) $2x - 3y = 6$ Subtract x from both sides of the equation

$-3y = -2x + 6$ Divide both sides of the equation by the coefficient of y

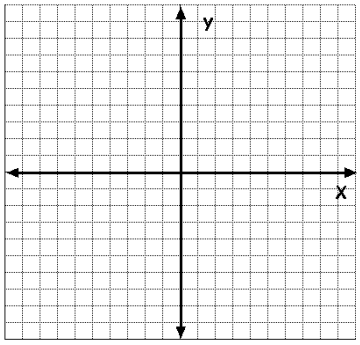
$y = \frac{2x}{3} - 2$ Use this equation to graph the line



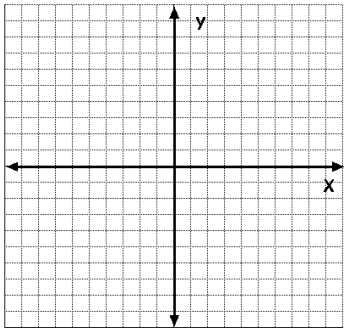
The "b" (y-intercept) is -2 so graph this point first on the y - axis

The "m" (slope) is $\frac{2}{3}$ so "rise" 2 and "run" 3 from the y-intercept

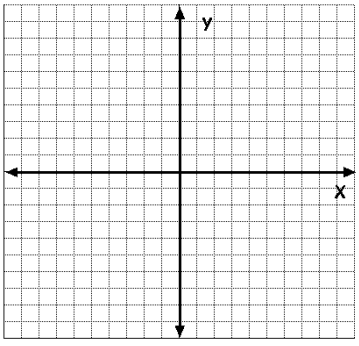
13. $y = 3x - 6$



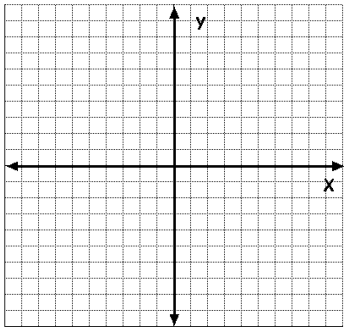
14. $4x + 6y = 5$



15. $y = -2x + 2$



16. $3y = 2x + 3$



17. The cost C (in dollars) of placing a color advertisement in a newspaper can be modeled by $C = 7n + 20$ where n is the number of lines in the ad. Graph the equation. What do the slope and C-intercept represent?

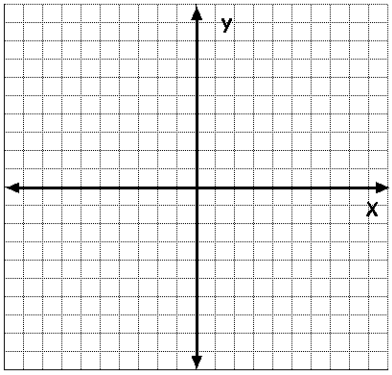
V. Graphing Linear Inequalities

Steps:

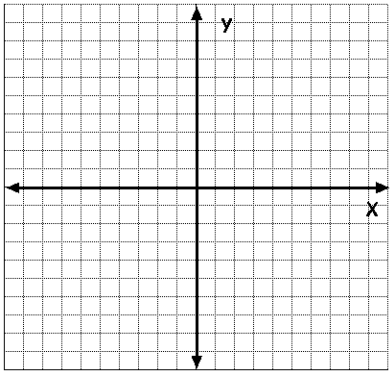
1. Write the inequality in Slope-Intercept Form
2. Graph the line associated with the inequality (Solid or Dashed)
3. Shade the appropriate region (Test an ordered pair)

Graph the following inequalities

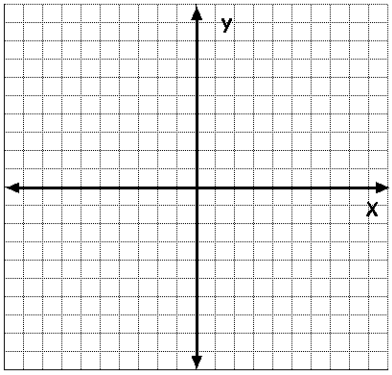
18. $y < 2x + 3$



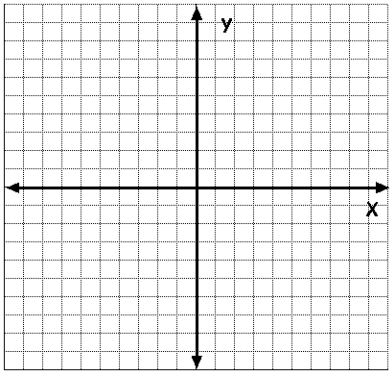
19. $x + 3y \leq 15$



20. $\frac{x}{4} - \frac{y}{2} \leq \frac{3}{2}$



21. $2x > 6$



22. You have relatives living in both the US and Mexico. You are given a prepaid phone card worth $50. Calls within the US cost $0.16 per minute and calls to Mexico cost $0.44 per minute.

a) Write a linear inequality in two variables to represent the number of minutes you can use for calls within the US and for calls to Mexico.

b) Graph the inequality and discuss 3 possible solutions in the context of the real-life situation.

VI. Writing Equations of Lines

Slope intercept form of the equation of a line: $y = mx + b$

$m\ is\ slope\ and\ b\ is\ the\ y\ intercept$

To write an equation of the line:

(1) Determine the slope

(2) Substitute an ordered pair in for x and y to find b

(3) Write the equation using $y = mx + b$

23. Find the slope and the y – intercept of $y = -2x + 4$	24. Find the slope and y-intercept of $2x - 3y = -12$
25. Write an equation of the line with slope = 4 and y-intercept is -3	26. Write an equation of the line with m = -2 and goes through the point (-2, 6)
27. Write an equation of the line that goes through the points (0, 2) and (2, 0).	28. Parallel to the line $y = -2x + 3$ and contains the point (-2, -1)
29. Perpendicular to the line $y = -2x + 3$ and contains the point (-2, -1)	30. Slope = 0 and contains the point (-10, 17)

31. The table gives the price p (in cents) of a first-class stamp over time where t is the number of years since 1970. Plot the points onto a coordinate plane. State whether the correlation is positive or negative. Then, write the equation of the Best-Fitting Line.

t	1	4	5	8	11	11	15	18	21	25	29
p	8	10	13	15	18	20	22	25	29	32	33

VII. Relations/Functions

Relation:
A relation is a mapping, or pairing of input values with output values.

Domain: The set of input values
Range: The set of output values

Example: (0, -4), (1, 4), (2, -3), (4, -1), (4, 2)

Domain: {0, 1, 2, 4}
Range: {-4, 4, -3, -1, 2}

Function: The relation is a function if there is exactly one output for each input.

Is the relation a function?
(0, -4), (1, 4), (2, -3), (4, -1), (4, 2)
Answer: No, because the input 4 has more than one output: -1 and 2

Evaluate the function when x = -3:

a) $f(x) = x - 4$
$f(-3) = -3 - 4$
$= -7$

b) $g(x) = x^2 - 2x + 5$
$g(-3) = (-3)^2 - 2(-3) + 5$
$= 9 + 6 + 5$
$= 20$

32. {(-5, 5), (-5,-5), (0,3), (0, -3), (5, 0)} a. State the domain. b. State the range. c. Is the relation a function? Why or why not?	33. {(-4, 2), (-3, -3), (-2, 0), (4, 2), (2, 4)} a. State the domain. b. State the range. c. Is the relation a function? Why or why not?
34. $f(x) = \frac{6}{x^2-4}$ a) find f(4) b) find f(-7)	35. $g(x) = x^2 + 5$ a) find g(-6) b) find $g\left(\frac{-1}{2}\right)$

VIII: Solving Systems of Equations

Solving Systems of Equations

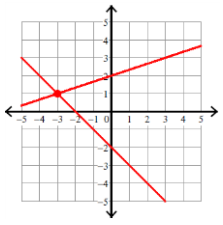
Solving Systems of Equations by Graphing

1. Put each equation in slope-intercept form (y = mx + b)
2. Graph each equation on the same graph
3. Find where the lines intersect. This is your solution.
   a. If the lines are parallel → "no solution"
   b. If the lines are the same → "infinitely many solutions".

Example: Solve by graphing **x – 3y = –6**
x + y = –2

Step 1: Put each equation in slope-intercept form:
x – 3y = –6 → y = $^1/_3$x + 2 → m = $^1/_3$, b = 2
x + y = –2 → y = –x – 2 → m = –1, b = –2

Step 2:



Step 3: Solution: (–3, 1)

Solving Systems of Equations using Substitution

1. Solve one of the equations for one of its variables
2. Substitute the expression from Step 1 into the other equation and solve for the other variable
3. Substitute the value from Step 2 into the revised equation from Step 1 and solve.

Example: Solve 3x + 4y = –4 using substitution
x + 2y = 2

***Step 1*: The "x" in x + 2y = 2 will be easy to solve for:**
x + 2y = 2 → subtract 2y from both sides → x = –2y + 2

***Step 2*: Substitute x = –2y + 2 into the *other* original equation**
3**x** + 4y = –4
3**(–2y + 2)** + 4y = –4
–6y + 6 + 4y = –4
–2y = –10
y = 5

***Step 3*: Insert the value from Step 2 (y = 5) into x = –2y + 2**
x = –2(5) + 2 → x = –10 + 2 → x = –8

Solution: x = –8, y = 5, which we write as (–8, 5)

Solving Systems of Equations using Elimination (aka Linear Combinations)

1. Line up the like terms and the equal signs vertically
2. Multiply one or both of the equations by a constant to obtain coefficients that differ only in sign for one of the variables.
3. Add the revised equations from Step 2. Combining all like terms will eliminate one of the variables. Solve for the remaining variable.
4. Substitute your answer from Step 3 into either of the original equations and solve for the other variable.

Example: Solving using Elimination $2x - 6y = 19$, $-3x + 2y = 10$

***Step 2*: Multiply in constants to make the coefficients of x become opposites (6x and –6x)**

$2x - 6y = 19 \rightarrow$ multiply by $3 \rightarrow$ **$6x - 18y = 57$**

$-3x + 2y = 10 \rightarrow$ multiply by $2 \rightarrow$ **$-6x + 4y = 20$**

***Step 3:* Add the two revised equations**

$(6x - 18y = 57)$

$+ (-6x + 4y = 20)$

$-14y = 77 \rightarrow$ divide by $-14 \rightarrow y = -\frac{77}{14} = -\frac{11}{2}$

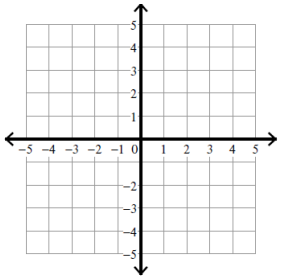
***Step 4*: Substitute $y = -\frac{11}{2}$ into an original eqn: i.e. $2x - 6y = 19$**

$2x - 6(-\frac{11}{2}) = 19 \rightarrow 2x + 33 = 19 \rightarrow 2x = -14 \rightarrow x = -7$

Solution: $x = -7$ and $y = -\frac{11}{2}$, which we write as $(-7, -\frac{11}{2})$

Solve

36. Solve by graphing: $-4x + y = -1$, $3x + 3y = 12$



37. Solve using substitution $3x - y = 4$, $5x + 3y = 9$

38. Solve using elimination $5x + 6y = -16$, $2x + 10y = 5$

39. Solve using substitution or elimination: $-2x + y = 6$, $4x - 2y = 5$

40. ***Set-up and solve a system of equations for this problem***: You are selling tickets for a high school concert. Student tickets cost $4 and general admission tickets cost $6. You sell 450 tickets and collect $2340. How many of each type of ticket did you sell?

Graphing Systems of Inequalities

Graphing Systems of Inequalities

1. Put each inequality into slope-intercept form and graph the boundary line for each inequality.
2. Use a dashed line for <,> and a solid line for ≤, ≥.
3. Shade the region that is true for each inequality.
4. The solutions are all of the ordered pairs in the region that is shaded by all of the inequalities.

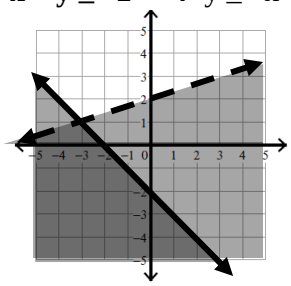
Example: Solve by graphing $\mathbf{x - 3y > -6}$
$\mathbf{x + y \leq -2}$

Step 1: Put each equation in slope-intercept form:

$\mathbf{x - 3y > -6}$ → $y < {}^{1}/_{3}x + 2$ → $m = {}^{1}/_{3}$, $b = 2$

$\mathbf{x + y \leq -2}$ → $y \leq -x - 2$ → $m = -1$, $b = -2$

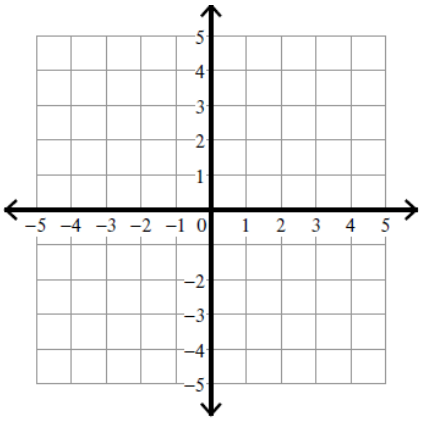
Step 2:



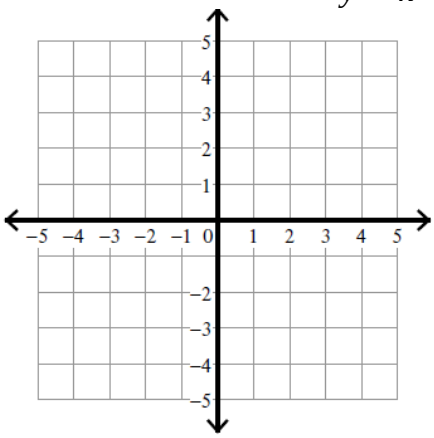
Step 3: The solution includes all points that are in the darkly shaded region of the graph. Ex. (- 4, -2) is a solution.

Graph

41. Graph the solution: $-x - y \leq -4$
$2x - y > 3$



42. Graph the solution: $3x - 2y < 6$
$y < -x - 3$



IX. Simplifying exponential expressions Properties are listed below. There should be no negative exponents in your answer.

Examples: **1**. $x^2 \bullet x^3 = x^5$ **2**. $(x^2)^3 = x^6$ **3**. $x^{-2} = \frac{1}{x^2}$ **4**. $\frac{x^5}{x^3} = x^2$

43. $3(x^2 y^{-3})^4 =$	44. $\frac{3xy^2}{4x^{-2}y^3} =$
45. $\frac{4^0 x^3 y}{-3xy^6} =$	46. $\frac{(3x^3y^4)(-2x^{-2}z^5)}{4x^{-4}} =$

X. Combine like terms

47. $(2x^2+1)+(3x^2+6x-2) =$	48. $(2x^2y-6y)-(4x^2+2y) =$

XI. Multiply

Monomial * Binomial or Trinomial – Use Distributive Property

Binomial * Trinomial – Use Distributive Property

Binomial * Binomial – Use FOIL

49. $3x(x^3-6x+7)$	50. $x(x+2)(x^2+1) =$
51. $(2x+6)(3x+4y+6) =$	52. $(x^2y-3y)(2xy+3y) =$

XII. Factor Completely

53. $x^3 - x^2 - 4x + 4$	54. $4x - 28x^2$
55. $x^4 + 5x^2 - 6$	56. $3x^2 - 2x - 8$
57. $x^2 - 64$	58. $x^2 + 25$