Honors Algebra 2 Name____________________________

Guided Worksheet: Slope, Graphing & Writing Equations of Lines, Solving Systems of Linear Equations

Directions: Show work for each problem on your own notebook or graph paper. Refer to the examples to guide you as you do the review work. Ask questions as necessary as well. ☺

I. Slope

1. Make a tiny sketch of the line passing through the given points. Then find the slope of the line.

Example $(-3,-1)\,\&\,(0,-4)$

a) $(-1,2)\,\&\,(3,5)$ b) $(1,-3)\,\&\,(1,4)$ c) $(0,4)\,\&\,(-3,-2)$ d)

2. Name the slope of the given line.

Example $y=-4x-7$ Example $3x+5y=-11$

a) $y=-\frac{3}{4}x+1$ b) $6x-2y=5$

3. Name the slope…

a) of any horizontal line b) of any vertical line

4. Name the slope of the line being described.

Example $\perp to\ y=\frac{2}{3}x-8$ Example $//\ to\ x=-2$

a) $//\ to\ y=6x-5$ b) $\perp to\ x=4$ c) $\perp to\ 3x+2y=7$ d) $//\ to\ y=-1$

5. Are the two lines being described parallel //, perpendicular $\perp$, or simply intersecting? Name the slope of each in order to justify your answer.

Example l_1 : *passes through* $(0,4)$ & $(-2,7)$, $l_2 : 15x + 10y = -1$

a) $l_3 : y = \frac{1}{3}x + 4$, $l_4 : y = 3x - 1$

b) $l_5 : -10x + 8y = 3$, $l_6 : y = \frac{5}{4}x + 2$

c) l_7 : *passes through* $(0,4)$ & $(1,-6)$, $l_8 : 3x - 30y = -6$

6. Name two additional points which must lie on the line. There are many correct answers. Sketching is helpful!

Example *line through* $(3,-2)$, $m = \frac{1}{2}$

a) *line through* $(4,3)$, $m = \frac{-2}{5}$

b) *line through* $(-1,-3)$, $m = 0$

7. Find the missing coordinate.

Example *The line passes through* $(2,a)$ & $(4,-1)$ *and has a slope* $= \frac{1}{3}$.

a) *The line passes through* $(b,4)$ & $(3,-2)$ *and has a slope* $= \frac{6}{5}$.

b) *The line passes through* $(-2,c)$ & $(5,0)$ *and has a slope* $= -2$.

II. Graphing Lines

8. Graph the lines.

a) *through* $(2,3)$ *with a slope* $= \frac{5}{2}$

b) *through* $(2,1)$ *with zero slope*

c) *through* $(-2,3)$ *with undefined slope*

9. Graph the diagonal lines using the method of your choice.

Example $y=-2x+1$ Example $x-4y=4$

a) $y=x$

b) $y=3x-4$

c) $y=-\frac{1}{4}x+2$

d) $-2x+3y=-6$

e) $4x+3y=24$

10. Graph the lines being described. It is helpful to graph both the given line (dotted) and the new line (solid) on the same coordinate plane in order to see the parallel or perpendicular description.

Example *the line through* $(-3,0)$ *that is* $\perp$ *to* $y=2$

Example *the line through* $(1,-1)$ *that is* $//$ *to* $y=\frac{1}{2}x+3$

a) *the line through* $(1,3)$ *that is* $//$ *to* $x=-2$

b) *the line through* $(3,1)$ *that is* $\perp$ *to* $y=5x+4$

c) the perpendicular bisector of the segment with endpoints $(0,6)\ \&\ (8,-4)$

III. Writing Equations of Lines

11. Write the equation of each horizontal or vertical line.
Example $vertical\ line\ through\ (-4,-1)$

a) $horizontal\ line\ through\ (2,-2)$
b) $line\ though\ (-2,-4)\ with\ undefined\ slope$
c) $line\ though\ (-4,-1)\ \&\ (3,-1)$
d) $the\ line\ through\ (1,3)\ that\ is\ //\ to\ x=-2$ (refer to your graph in 10a)

12. Write the equation of each diagonal line.
Example $line\ through\ (4,0)\ \&\ (0,-3)$ Example $line\ through\ (5,-2)\ with\ slope=\frac{2}{7}$

a) $line\ through\ (0,2)\ with\ slope=\frac{-1}{9}$
b) $line\ through\ (-3,4)\ with\ slope=\frac{3}{2}$
c) $line\ through\ (-6,0)\ \&\ (0,9)$
d) $line\ through\ (5,-1)\ \&\ (1,-3)$
e) $the\ line\ through\ (0,-1)\ that\ is\ //\ to\ y=\frac{5}{2}x-3$
f) $the\ line\ through\ (3,1)\ that\ is\ \perp\ to\ y=5x+4$ (refer to your graph in 10b)
g) the perpendicular bisector of the segment with endpoints $(0,6)\ \&\ (8,-4)$
(refer to your graph in 10c)

IV. Challenge problems

13. Determine k so that the given line will have the given slope.

a) $12x-ky=5,\quad m=3$

b) $kx+2y=6,\quad m=k+1$

c) $(-4,k)\ \&\ (-1,3k),\quad m=4$

d) $(k+1,k)\ \&\ (-3,2),\quad m=2$

14. If f(x) and g(x) are linear functions, write the equation for each given:

a) $f(3) = -2, \quad f(2) = 0$

b) $g(4) = 4, \quad g(6) = -9$

V. Systems of Linear Equations

Information To solve a system of linear equations means to determine the point at which the two lines intersect. There are three types of linear systems:

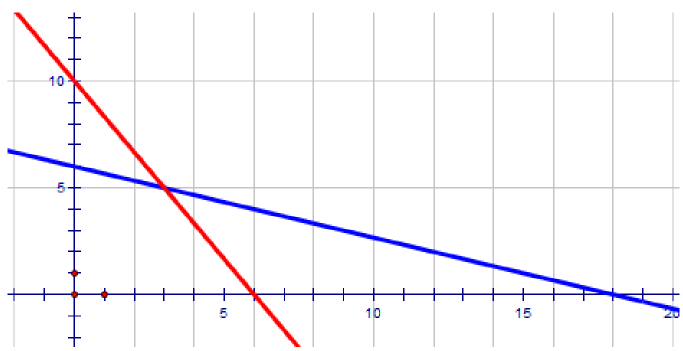
1. A system of intersecting lines has *one solution.*
2. A system of parallel lines has *no solution.*
3. A system of overlapping lines has *infinitely many solutions.*

There are 3 basic ways to solve systems:

1. Graphing
2. Substitution
3. Elimination

Examples

1) Solve by graphing: $\begin{cases} 5x + 3y = 30 \\ x + 3y = 18 \end{cases}$



2) Solve by substitution: $\begin{cases} 3x - 5y = -71 \\ -8x + 4y = 68 \end{cases}$

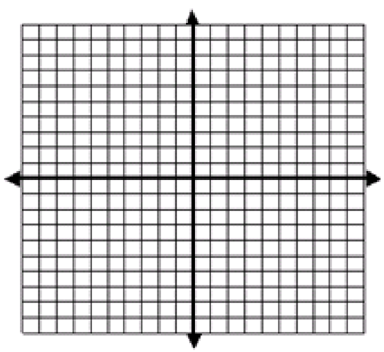
3) Solve by elimination: $\begin{cases} \dfrac{4}{5}x - \dfrac{2}{3}y = 18 \\ 3y = 4x - 87 \end{cases}$

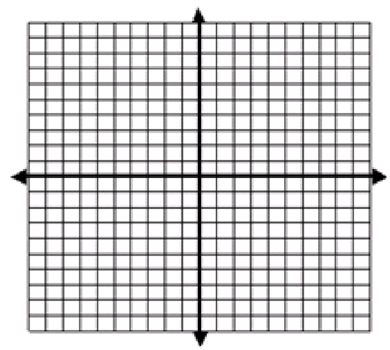
Practice Problems

I. **Solve by graphing.** If the lines intersect, name the point of intersection. If the lines are parallel, clearly state "no solution". If the lines overlap, clearly state "many solutions".

15. $\begin{cases} 5x - 2y = 8 \\ y = \dfrac{5}{2}x + 1 \end{cases}$

16. $\begin{cases} 2x - y = 1 \\ 3x + 4y = -15 \end{cases}$





II. **Solve by substitution.** If the lines intersect, state the solution as an ordered pair.

18. $\begin{cases} y = 3x - 37 \\ 4x + 2y = 26 \end{cases}$

19. $\begin{cases} 3x - 8y = -47 \\ 4x + 2y = -12 \end{cases}$

III. **Solve by elimination.** If the lines intersect, state the solution as an ordered pair.

20. $\begin{cases} 5x + 3y = 6 \\ 4x - 9y = -75 \end{cases}$

21. $\begin{cases} 5x + 35y = -5 \\ -11x + 6y = -72 \end{cases}$

22. $\begin{cases} y = -2x - 11 \\ 2x - \frac{22}{7}y = \frac{-222}{7} \end{cases}$

IV. **Applications!** Read each scenario and set up two equations with two variables for each one. Solve each system by the method of your choice. Be sure to answer the "word problems" with clearly stated "word answers", not as ordered pairs. **(For example, don't write (3,4). Instead write "3 elephants and 4 rhinos live at the zoo.")**

23. A body building team is made up of 15 competitors. On average, the female competitors can bench press 120 lbs, while the male competitors can bench press 225 lbs. At one competition, the team benches a total of 2745 lbs. How many female and male competitors are on the team?

24. The male competitors on the body building team can generally squat about 50 lbs less than twice the females' squatting weight. In a co-ed partner squat event, the male/female squat partners squatted a total of 475 lbs. What, then, is the average squatting weight for male and female competitors?

25. The cheerleading team sells sun products as a fundraiser to defray camp expenses. Kara sells 31 bottles of sunscreen and 16 tubes of lip balm and raises $69.45. Macy sells 24 bottles of sunscreen and 20 tubes of lip balm and raises $61. How much profit is raised from the sale of a single sunscreen and a single lip balm?

3x3 Systems

26. $x + 2y + z = 4$
$3y + z = 8$
$z = -1$

27. $5x - 3y - 4z = -12$
$3x - 5y + 4z = 4$
$-4x - 10y - 8z = -1$

Solve the following equations (Hint: Check to make sure your answers work out in the original!)

28. $|-7x+4| = 18$

29. $|7y-3| + 1 = 0$

30. $|4-3m| = m+10$

31. $2|4w-5| = 12w-18$

Solve the following absolute value inequalities:

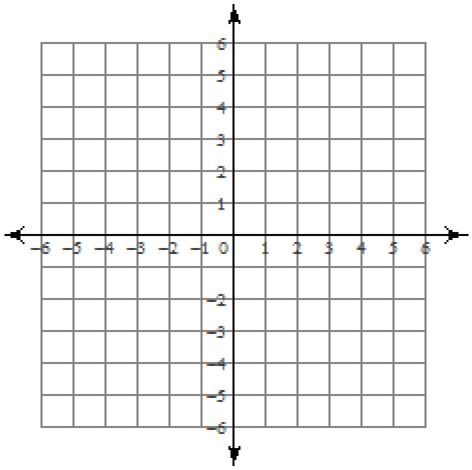
32. $|2t-3| \le 5$

33. $|4b| - 3 > 9$

34. $|-2x+4| \ge 4$

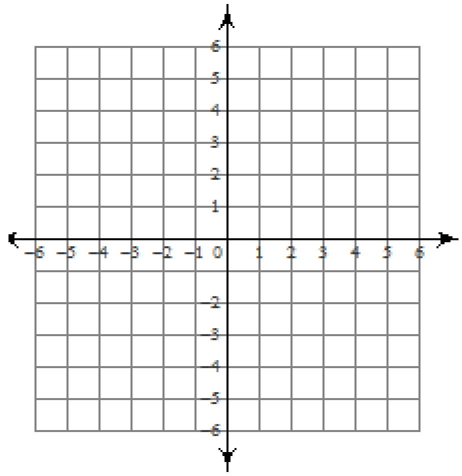
35. $-3|2t+1| < 9$

$y = |x| - 2$



Graph the following absolute value

$y = -|x - 2| - 3$

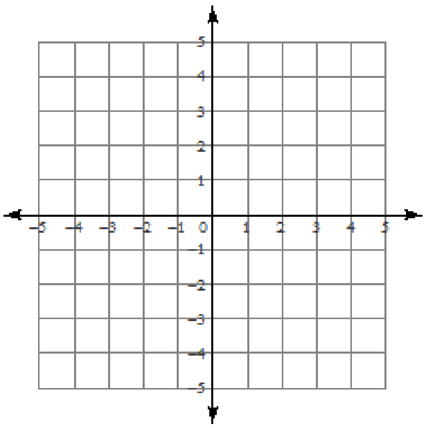


inequalities:

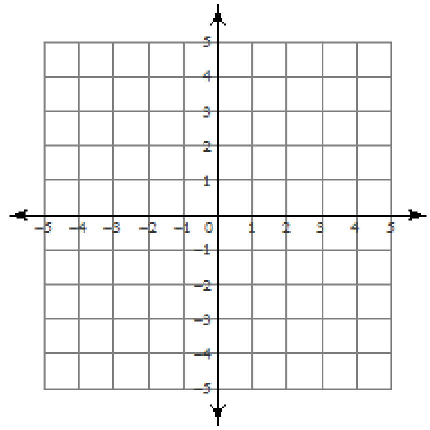
36. 37.

Sketch the solution to each system of inequalities.

49) $2x - y > -3$
$2x - y < 1$



50) $5x + 3y \geq 6$
$y \geq -3$



Honors Algebra 2 **NAME:**
Practice: QUADRATICS

Directions: Please review the following concepts of quadratics equations and quadratic functions. Your first unit in honors algebra 2 will challenge you in all aspects of quadratics. Please use this document to help you refresh the basic skills you will need to be successful in the first unit.

PART I: Factoring (includes greatest common factor, AC method for factoring trinomials, and difference of squares).
Directions: Factor each completely

1. $4x^2 - 20x$ 2. $-36x^4y^3 - 9xy$ 3. $x^8 - 9x^6$

4. $x^2 + 10x + 16$ 5. $x^2 - 2x - 24$ 6. $x^2 - 14x +$
33

7. $6x^2 - 11x - 35$ 8. $4x^2 + 16x - 33$ 9. $10x^2 +$
$43x - 9$

10. $25x^2 - 49$ 9. $100x^2 - 81$ 10. $36x^2y^2 -$
1

CHALLENGE FACTORING:

a) $14x^4 + 19x^2 - 40$ b) $6x^8 - x^4 - 1$ c) $64a^{10}b^{12} -$
$36c^{100}$

PART II: Solving (includes square root method, factoring, and quadratic formula). Consider completing the square as a method if you remember it. At the bottom of this document, you will have two problems that require you to complete the square.
Directions: Solve and show all work. Remember that quadratic equations will produce either two real solutions (either rational or irrational) or two imaginary solutions. When you obtain real solutions, use your graphing calculator to confirm.

1. Use Square Root method: $x^2 = 121$

2. Use Square Root method: $5x^2 = 75$

3. Use Square Root method: $-2x^2 - 50 = 0$

4. Use Square Root method: $(x-2)^2 + 7 = 0$

4. Use Factoring: $4x^2 + 20x = 0$

5. Use Factoring: $x^2 = 10x$

6. Use Factoring: $x^2 + 10x = -9$

7. Use Factoring: $2x^2 + 5x - 12 = 0$

8. Use Factoring: $4x^2 - 121 = 0$

9. Use Quadratic Formula: $x^2 + 2x = -10$

10. Use Quadratic Formula: $3x^2 - 14x + 25 = 0$

11. Use Quadratic Formula: $x^2 + 5x = 11$

CHALLENGE SOLVING:

a) $x^4 - 13x^2 + 36 = 0$ b) $x^4 + 29x^2 + 100$ c) $\frac{3}{5}x^2 = -\frac{6}{25}$

PART III: Converting forms of equations (convert from standard form to vertex form and vice versa).

1. Convert to Standard Form from Vertex Form: $f(x) = 2(x-3)^2 + 4$

2. Convert to Vertex Form from Standard Form: $f(x) = -2x^2 + 8x - 3$

More PART III: Completing the Square.

Directions: complete the square as a method of converting from standard form to vertex form (realize that you can perform this method in the solving section and then use the square root method).

1. Complete the Square: $x^2 + 6x + 1$

2. Complete the Square: $2x^2 - 12x - 6$