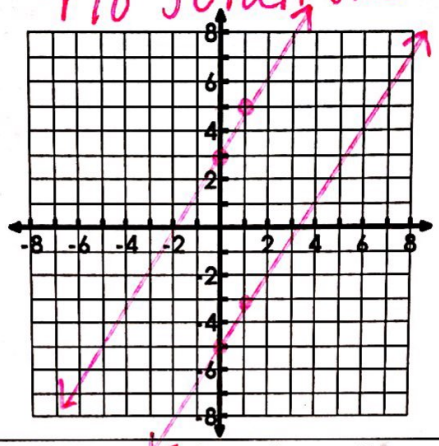
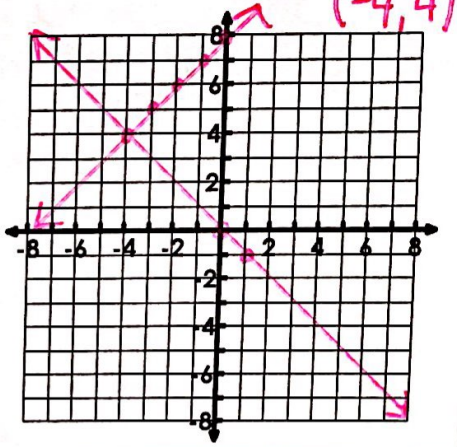
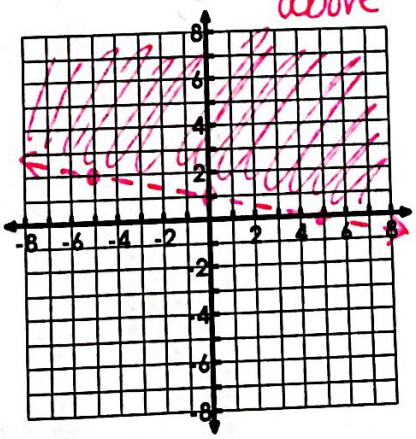
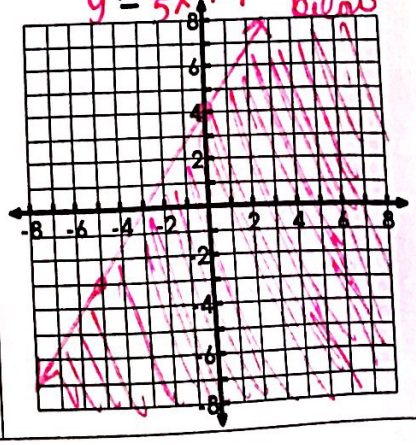
Foundation of Algebra
Unit 6

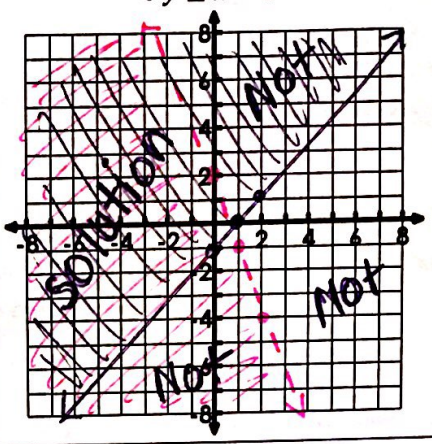
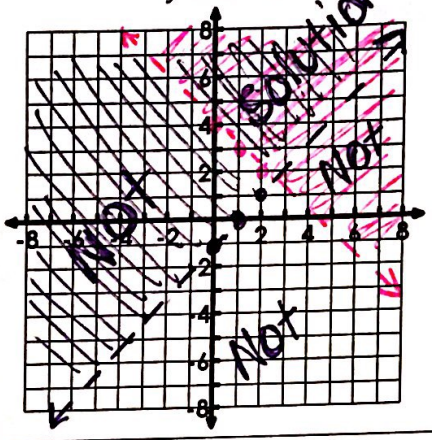
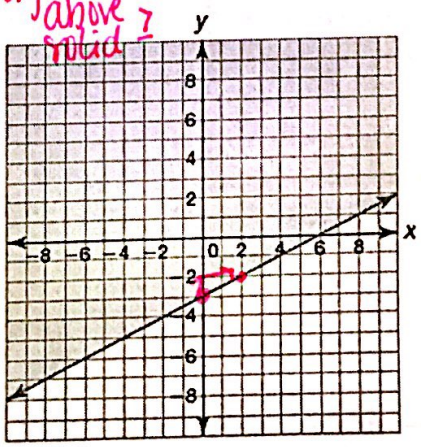
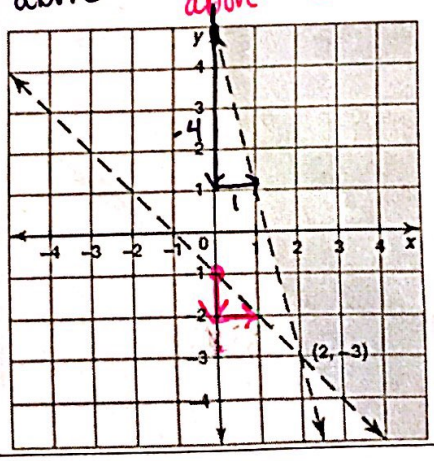
Name: Key
Date: _____ Block: _____

Systems of Equations and Inequalities Unit Review

What you need to know & be able to do	Things to remember	Examples
1. Solve a system of linear equations by **graphing.**	Make sure each equation is solved for y. Graph both equations and find where they intersect.	1. Solve the system. $y = 2x + 3$ $y = 2x - 5$ No Solution 
		2. Solve the system. $x = y - 8$ $+8 \quad +8$ $y = -x$ $y = x + 8$ $(-4, 4)$ 
		3. Solve the system of equations. $y = x - 4$ and $y = -x$ (2, -2)
		4. Solve the system of equations. $y = \frac{2}{5}x$ and $y = -x - 7$ (-5, -2)
2. Solve a system of linear equations using **substitution.**	Use only when one variable isolated	5. Solve the system. $y = -5x + 9$ $10x - 7y = -18$ $10x - 7(-5x + 9) = -18$ $10x + 35x - 63 = -18$ $45x - 63 = -18$ $+63 \quad +63$ $45x = 45$ $x = 1$ $y = -5(1) + 9$ $y = 4$ (1, 4)
		6. Solve the system. $y = -8x - 16$ $y = 3x - 5$ $-8x - 16 = 3x - 5$ $+16 \quad +16$ $-8x = 3x + 11$ $-3x \quad -3x$ $-11x = 11$ $-11 \quad -11$ $x = -1$ $y = 3(-1) - 5$ $y = -8$ (-1, -8)

3. Solve a system of linear equations using **elimination.**	To eliminate a variable using addition or multiplication one coefficient must be positive and one must be negative.	7. Solve the system. $x - y = 11$ $+ 2x + y = 19$ $3x = 30$ $\frac{3x}{3} = \frac{30}{3}$ $x = 10$ $2(10) + y = 19$ $20 + y = 19$ $-20 \quad -20$ $y = -1$ $(10, -1)$	8. Solve the system. $4x = 20 - 8y$ $-4x + 2y = -30$ $+4x + 8y = 20$ $10y = -10$ $\frac{10y}{10} = \frac{-10}{10}$ $y = -1$ $-4x + 2(-1) = -30$ $-4x - 2 = -30$ $+2 \quad +2$ $-4x = -28$ $\frac{-4x}{-4} = \frac{-28}{-4}$ $x = 7$ $(7, -1)$
		9. Solve the system. $2x + 3y = 12$ $3(5x - y = 13)$ $2x + 3y = 12$ $15x - 3y = 39$ $17x = 51$ $\frac{17x}{17} = \frac{51}{17}$ $x = 3$ $2(3) + 3y = 12$ $6 + 3y = 12$ $-6 \quad -6$ $3y = 6$ $\frac{3y}{3} = \frac{6}{3}$ $y = 2$ $(3, 2)$	10. Solve the system. $2(-3x - 8y = 0)$ $-3(-2x - 10y = 14)$ $-6x - 16y = 0$ $+6x + 30y = -42$ $14y = -42$ $\frac{14y}{14} = \frac{-42}{14}$ $y = -3$ $-3x - 8(-3) = 0$ $-3x + 24 = 0$ $-24 \quad -24$ $-3x = -24$ $\frac{-3x}{-3} = \frac{-24}{-3}$ $x = 8$ $(8, -3)$
4. Special Types of Systems	No Solution: • False Equations • Slopes are the same • Y-intercepts are different • Parallel Lines Infinite Solutions: • True Equations • Equations are the same • One Line	11. Solve the system: $y = 2x - 2$ $-2x + y = 1$ $-2x + 2x - 2 = 1$ $-2 \neq 1$ No Solution	12. Solve the system: $-9x - 3y = -18$ $3(3x + y = 6)$ $-9x - 3y = -18$ $+9x + 3y = 18$ $0 = 0$ Infinite Solutions

5. Systems with Real World Scenarios	Define your variables Determine if slope intercept or standard form is best Set up your equations and solve using elimination or substitution. Break Even Point: where the cost equal the income	13. One high speed internet provider has a $50 set up fee and costs $30 per month. Another provider has no set up fee and costs $40 per month. In how many months will both providers costs the same? What will that cost be? $y = 30x + 50$ $y = 40x$ $40x = 30x + 50$ $-30x \quad -30x$ $\frac{10x}{10} = \frac{50}{10}$ $x = 5$ months $y = 40(5) = \$200$ After 5 months, both companies will cost $200.	14. Sam spent $24.75 to buy 12 flowers for his mother. Roses cost $2.50 each and daisies costs $1.75 each. How many of each flower type did he purchase? x: roses y: daisies $-2.50(x + y = 12)$ $-2.50x - 2.50y = -30$ $2.50x + 1.75y = 24.75$ $2.50x + 1.75y = 24.75$ $\frac{-.75y}{-.75} = \frac{-5.25}{-.75}$ $y = 7$ daisies $x = 5$ roses Sam purchased 7 daisies and 5 roses for his mom
		15. Explain what a break-even point is. Costs = Income What will the income and cost always be at the break-even point? the same amount What is the profit at the break-even point? $0	16. As a fundraiser for a band trip, AHS plans to sell hats with the school logo. The company producing the hats charges $240 for the design and set up plus $8 per hat. The band members will sell the hats for $12 each. What is the break-even point? What will the cost and income be? Cost: $y = 8x + 240$ Income: $y = 12x$ x: # of hats $12x = 8x + 240$ $-8x \quad -8x$ $\frac{4x}{4} = \frac{240}{4}$ $x = 60$ hats $y = 12(60)$ $y = \$720$ The break even point is 60 hats and income/costs is $720.
6. Graph a linear inequality	Make sure equation is solved for y Graph the line Determine if dashed or solid Determine whether to shade below or above the line *Golden Rule of Inequalities can apply here.	17. Graph $y > -\frac{1}{5}x + 1$ dashed above 	18. $7x - 5y \geq -20$ ★ Sign flip $-7x \quad -7x$ $\frac{-5y}{-5} \geq \frac{-7x - 20}{-5}$ $y \leq \frac{7}{5}x + 4$ solid below 

7. Solve a system of linear inequalities by **graphing**.	Determine if you have a solid or dashed line Then determine whether to shade above or below. Find the region where the shading overlapped.	19. Solve the system. Label the different regions as solution or not a solution. • $y < -3x + 2$ • $y \geq x - 1$ 	20. Solve the system. Label the different regions as solution or not a solution. • $x + y > 4$ $y > -x + 4$ • $y > x - 1$ 
8. Real World with Systems of Inequalities		21. Write a system to describe: *The maximum capacity for an elevator is 15 people and 3000 pounds. It is estimated that adults weight 200 pounds and children under 16 weight 100 pounds.* x: adults y: children $x + y \leq 15$ $200x + 100y \leq 3000$	22. Write a system to describe: *Megan is selling tickets to Allatoona's production of Footloose. Allatoona's theater holds at most 700 people. Children's tickets are $6.00 and adult tickets are $10.00. She hopes to sell at least $500 worth of tickets.* x: children's tickets y: adults tickets $x + y \leq 700$ $6x + 10y \geq 500$
9. Naming Linear Inequalities and Systems	Identify: *Slope *Y-intercept *Type of Line *Shading	23. Name the inequality. m: 1/2 yint: -3 sign: above solid $y \geq \frac{1}{2}x - 3$ 	24. Name the system of inequalities. m: -4 yint: 5 sign: dashed above m: -1 yint: -1 sign: dashed above $y > -4x + 5$ $y > -x - 1$ 

Multiple Choice Practice

25. Taxi Company A charges $4 plus $0.50 per mile. Taxi Company B charges $5 plus $0.25 per mile. Which system best represents this problem?

y = .5x + 4 y = .25x + 5

(a) Y = 4x + 0.5
Y = 5x + 0.25
(c) Y = 0.5x + 4
Y = 0.25x + 5
(b) Y = 4x + 0.25
Y = 5x + 0.5
(d) Y = 0.5x + 5
Y = 0.25 + 4

26. The Fun Guys game rental store charges an annual fee of $5 plus $5.50 per game rented. The Game Bank charges an annual fee of $17 plus $2.50 per game. For how many game rentals will the cost be the same at both stores? What is the cost?

y = 5.50x + 5
y = 2.50x + 17

(a) Month 10; 550
(c) Month 9; 580
(b) Month 8; 580
(d) Month 11; 550

x = 4 months
y = $27

2.50x + 17 = 5.50x + 5
-5 -5
2.50x + 12 = 5.50x
-2.50x -2.50x
12/3 = 3x/3
x = 4

27. Solve the system of equations:

$$4x - 4y = -16$$
$$-2(x - 2y = -12)$$

4x - 4y = -16
-2x + 4y = 24
2x = 8
x = 4

x - 2y = -12
4 4
-2y = -16
-2 -2
y = 8

(a) (8, -4)
(c) (4, 8)
(b) (-2, 4)
(d) (4, -8)

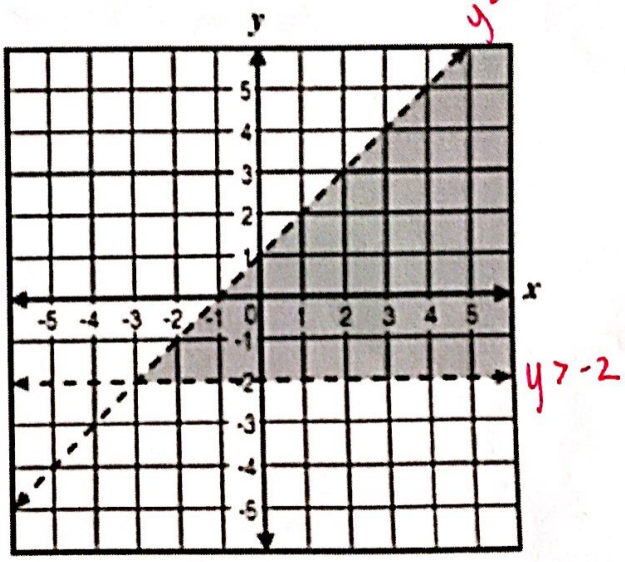
28. Which point is a solution of the system:

$$2x + y \geq 3$$
$$y \geq -2x + 1$$

Test each point

(a) (0, 0) 0 ≥ 3 False
(c) (0, 1) 1 ≥ 3 False
(b) (1, 0) 2 ≥ 3 False
(d) (1, 1) 3 ≥ 3 True
1 ≥ -1 True

29. Which system of inequalities best describes the graph?



(a) y > -2
y > x + 1
(c) y > -2
y < x + 1
(b) y < -2
y > x + 1
(d) y < -2
y < x + 1

30. The graph to the right shows the cost of two phone plans. How many minutes does a person need to call each month so that Plan B is the less expensive plan to use?

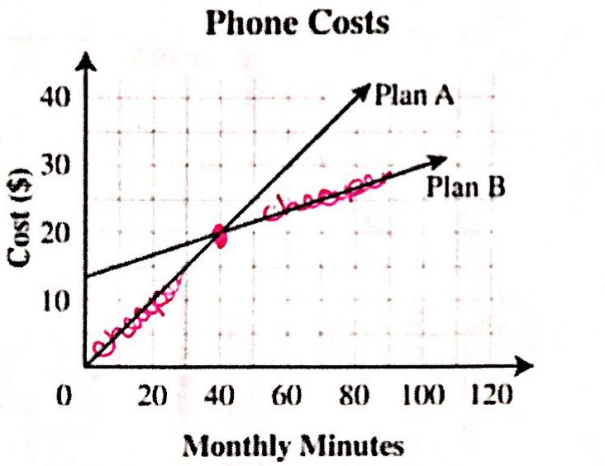
(a) Less than 10 minutes

(b) Less than 40 minutes

(c) More than 40 minutes

(d) More than 30 minutes but less than 40 minutes

Use the graph below to answer the question.



31. A student store sold a total of 55 shirts for $620. The shirts sold were either red or white. If the red shirts sold for $12 each and the white sold for $10 each, how many of each color shirt were sold?

(a) 20 red, 35 white (b) 27 red, 28 white

(c) 28 red, 27 white (d) 35 red, 20 white

$x+y=55 \rightarrow -12x-12y=-660$

$12x+10y=620 \rightarrow +12x+10y=620$

$-2y=-40$

$y=20$ white

32. Consider each system of equations below. Just by looking at the equations, tell how many solutions the system will have and explain why.

a. $\begin{cases} y=4x-3 \\ y=4x+2 \end{cases}$ parallel (same slopes) — No Solution

b. $\begin{cases} y=\frac{1}{3}x+5 \\ y=\frac{1}{3}x+5 \end{cases}$ Same line — Infinite Solutions

c. $\begin{cases} y=-x+2 \\ y=\frac{1}{3}x+6 \end{cases}$ Intersecting (different slopes) — One Solution

d. $\begin{cases} y=-\frac{3}{4}x+5 \\ y=-\frac{3}{4}x-4 \end{cases}$ Parallel (same slopes) — No Solution