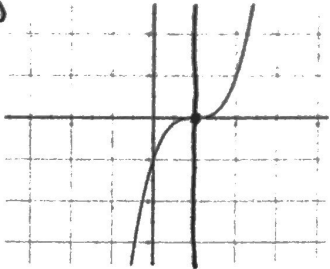


Unit 6 Review - Study Guide

Linear Functions

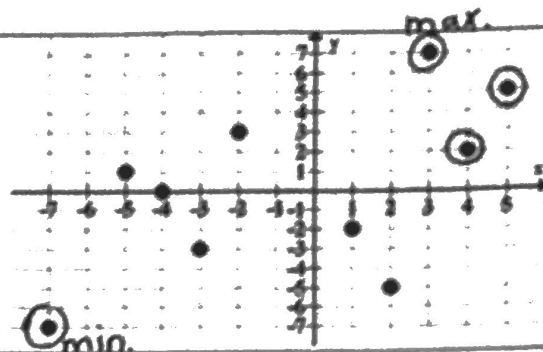
What you need to know & be able to do	Things to remember	Examples																									
<p>1. Determine if a relation is a function.</p> <p>Day 1</p>	<p>Every input only has one output (each 'x' only has one 'y')</p> <p>Use the vertical line test on graphs.</p>	<p>1. Determine if the graph is a function.</p> <p>yes</p> 	<p>2. Determine if the table represents a function.</p> <table border="1"> <thead> <tr> <th>x</th> <th>y</th> </tr> </thead> <tbody> <tr> <td>-1</td> <td>4</td> </tr> <tr> <td>0</td> <td>5</td> </tr> <tr> <td>2</td> <td>6</td> </tr> <tr> <td>-1</td> <td>7</td> </tr> </tbody> </table> <p>NO</p>	x	y	-1	4	0	5	2	6	-1	7														
x	y																										
-1	4																										
0	5																										
2	6																										
-1	7																										
<p>2. Create an input-output table for a function.</p> <p>Day 1</p>	<p>"x-y chart" - choose the x-values &amp; plug them in</p>	<p>3. Create an input-output table for the function <math>f(x) = 2x - 3</math>. Use <math>x = -2, -1, 0, 1,</math> and <math>2</math>.</p> <table border="1"> <thead> <tr> <th>x</th> <th>y</th> </tr> </thead> <tbody> <tr> <td>-2</td> <td><math>f(-2) = 2(-2) - 3 = -7</math></td> </tr> <tr> <td>-1</td> <td><math>f(-1) = 2(-1) - 3 = -5</math></td> </tr> <tr> <td>0</td> <td><math>f(0) = 2(0) - 3 = -3</math></td> </tr> <tr> <td>1</td> <td><math>f(1) = 2(1) - 3 = -1</math></td> </tr> <tr> <td>2</td> <td><math>f(2) = 2(2) - 3 = 1</math></td> </tr> </tbody> </table>	x	y	-2	$f(-2) = 2(-2) - 3 = -7$	-1	$f(-1) = 2(-1) - 3 = -5$	0	$f(0) = 2(0) - 3 = -3$	1	$f(1) = 2(1) - 3 = -1$	2	$f(2) = 2(2) - 3 = 1$	<p>4. Create an input-output table for the function <math>f(x) = 6</math>. Use <math>x = -2, -1, 0, 1,</math> and <math>2</math>.</p> <table border="1"> <thead> <tr> <th>x</th> <th>y</th> </tr> </thead> <tbody> <tr> <td>-2</td> <td>6</td> </tr> <tr> <td>-1</td> <td>6</td> </tr> <tr> <td>0</td> <td>6</td> </tr> <tr> <td>1</td> <td>6</td> </tr> <tr> <td>2</td> <td>6</td> </tr> </tbody> </table>	x	y	-2	6	-1	6	0	6	1	6	2	6
x	y																										
-2	$f(-2) = 2(-2) - 3 = -7$																										
-1	$f(-1) = 2(-1) - 3 = -5$																										
0	$f(0) = 2(0) - 3 = -3$																										
1	$f(1) = 2(1) - 3 = -1$																										
2	$f(2) = 2(2) - 3 = 1$																										
x	y																										
-2	6																										
-1	6																										
0	6																										
1	6																										
2	6																										
<p>3. Evaluate functions.</p> <p>Day 1</p>	<p><math>f(x)</math> function notation <math>f(2)</math> means you must substitute a '2' for every 'x' in the function!</p>	<p>5. Evaluate <math>f(4)</math>.</p> $f(x) = x^2 + 3x - 1$ $f(4) = 4^2 + 3(4) - 1$ $= 16 + 12 - 1$ $= 28 - 1$ $= \boxed{27}$	<p>6. Find the value of <math>f(x) = 4x - 2</math> when <math>x = -1</math>.</p> $f(-1) = 4(-1) - 2$ $= -4 - 2$ $= \boxed{-6}$																								

7. a. Find  $f(5)$ . When  $x=5$ ,  
 $y=5$

b. Find the value of  $x$  for  $f(x)=2$ .  
When  $y=2$ ,  $x=4$

c. What is the maximum and minimum? Write in function notation.

$f(x) = 7$  MAX  
 $f(x) = -7$  MIN



4. Write a function.

Day 2

8.

Time Worked (h)	1	2	3	4
	$\times 5$	$\times 5$	$\times 5$	$\times 5$
Amount Earned $f(h)$	5	10	15	20

$$f(x) = 5x$$

9.

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

$$f(x) = x - 3$$

5. Create a function & use it to solve a problem.

Day 2

10. You join a kickboxing class at a local gym. The cost is \$5 per class plus \$30 for the initial membership fee. Write a rule for the total cost of the class as a function of  $x$ . How much will it cost if you attend 7 classes?

$$\begin{aligned} f(x) &= 5x + 30 \\ f(7) &= 5(7) + 30 \\ &= 35 + 30 \\ &= \$65 \end{aligned}$$

11. Air Force One can travel 630 miles per hour. Let  $h$  be the number of hours traveled. Write a function rule that represents the total number of miles traveled. Then, determine how many miles Air Force One can travel in 4 hours.

$$\begin{aligned} f(h) &= 630h \\ f(4) &= 630(4) \\ &= 2,520 \text{ hours} \end{aligned}$$

6. Calculate the average rate of change (slope).

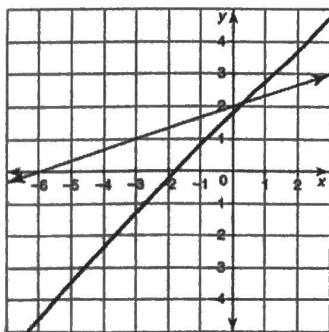
Day 3 & 9

"slope"

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$\frac{\text{Change in } y}{\text{Change in } x}$$

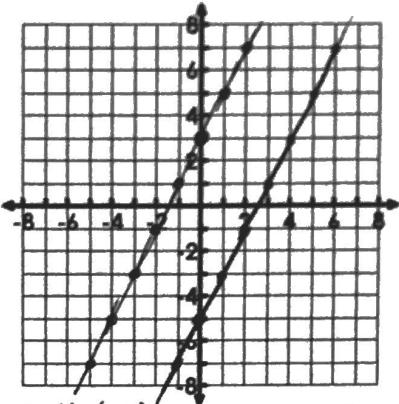
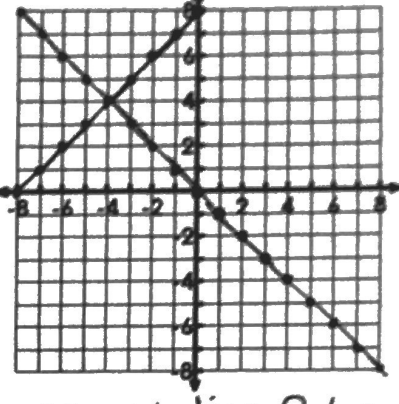
12. Calculate the slope. Then write the equation of the line.



13. Calculate the average rate of change between the following points on a line.

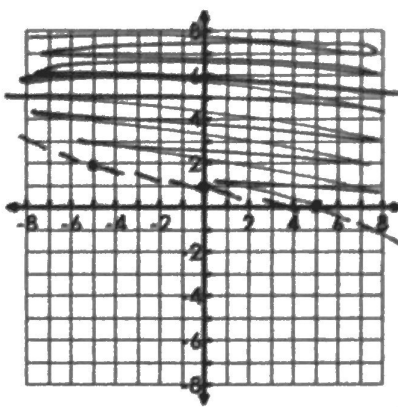
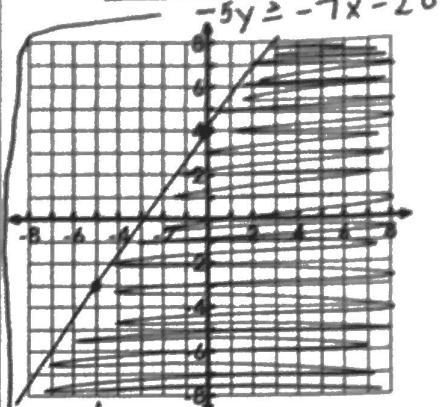
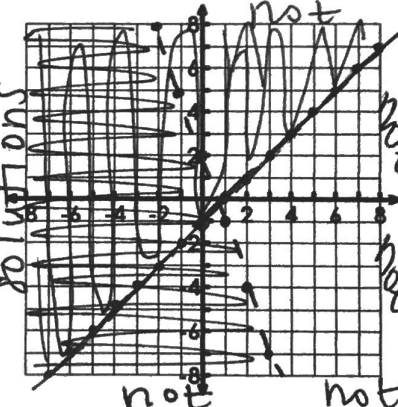
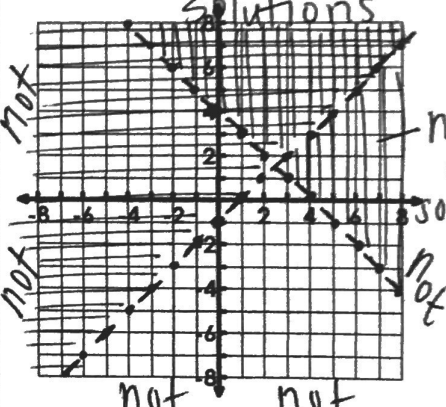
$(0, 4)$  &  $(-3, 10)$

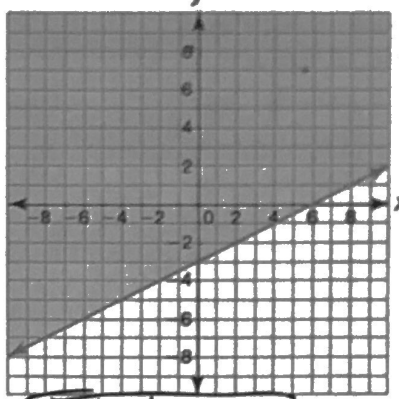
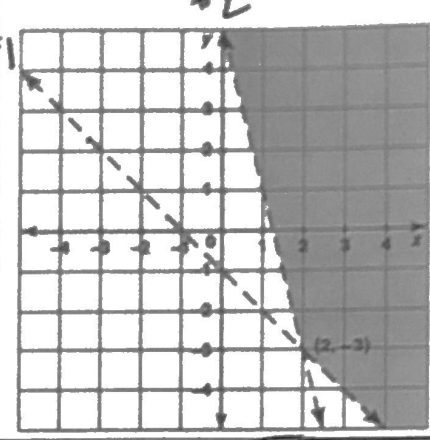
# Systems of Equations and Inequalities

What you need to know & be able to do	Things to remember	Examples																															
<p>1. Solve a system of linear equations by <b>graphing</b>.</p>	<p>Make sure each equation is solved for <math>y</math>.</p> <p>Graph both equations and find where they intersect.</p>	<p>1. Solve the system.</p> $y = 2x + 3$ $y = 2x - 5$  <p>parallel lines = same slope = NO SOLUTION</p> <p>3. Solve the system of equations.</p> <table border="1"> <thead> <tr> <th><math>x</math></th> <th><math>y = x - 4</math></th> <th><math>y = -x</math></th> </tr> </thead> <tbody> <tr> <td>0</td> <td>-4</td> <td>0</td> </tr> <tr> <td>1</td> <td>-3</td> <td>-1</td> </tr> <tr> <td>2</td> <td>-2</td> <td>-2</td> </tr> <tr> <td>3</td> <td>-1</td> <td>-3</td> </tr> </tbody> </table> <p><math>(2, -2)</math></p>	$x$	$y = x - 4$	$y = -x$	0	-4	0	1	-3	-1	2	-2	-2	3	-1	-3	<p>2. Solve the system.</p> <p><i>solve for y:</i></p> $x = y - 8$ $y = -x$ $\frac{x = y - 8}{+8} \quad \frac{y = -x}{+8}$ $y = x + 8$  <p>one solution @ <math>(-4, 4)</math></p> <p>4. Solve the system of equations.</p> <table border="1"> <thead> <tr> <th><math>x</math></th> <th><math>y = \frac{2}{5}x</math></th> <th><math>y = -x - 7</math></th> </tr> </thead> <tbody> <tr> <td>-10</td> <td>-4</td> <td>3</td> </tr> <tr> <td>-5</td> <td>-2</td> <td>-2</td> </tr> <tr> <td>0</td> <td>0</td> <td>-7</td> </tr> <tr> <td>5</td> <td>2</td> <td>-12</td> </tr> </tbody> </table> <p><math>(-5, -2)</math></p>	$x$	$y = \frac{2}{5}x$	$y = -x - 7$	-10	-4	3	-5	-2	-2	0	0	-7	5	2	-12
$x$	$y = x - 4$	$y = -x$																															
0	-4	0																															
1	-3	-1																															
2	-2	-2																															
3	-1	-3																															
$x$	$y = \frac{2}{5}x$	$y = -x - 7$																															
-10	-4	3																															
-5	-2	-2																															
0	0	-7																															
5	2	-12																															
<p>2. Solve a system of linear equations using <b>substitution</b>.</p>	<p>Use only when one variable is isolated</p>	<p>5. Solve the system.</p> $y = -5x + 9$ $10x - 7y = -18$ <p>①</p> $10x - 7(-5x + 9) = -18$ $10x + 35x - 63 = -18$ $45x - 63 = -18$ $+63 \quad +63$ <hr/> $45x = 45$ $\frac{45x}{45} = \frac{45}{45}$ $x = 1$ <p>②</p> $y = -5(1) + 9$ $y = -5 + 9$ $y = 4$ <p><math>(1, 4)</math></p>	<p>6. Solve the system.</p> $y = -8x - 16$ $y = 3x - 5$ <p>①</p> $-8x - 16 = 3x - 5$ $+8x \quad +8x$ <hr/> $-16 = 11x - 5$ $+5 \quad +5$ <hr/> $-11 = 11x$ $\frac{-11}{11} = \frac{11x}{11}$ $-1 = x$ <p>②</p> $y = 3(-1) - 5$ $y = -3 - 5$ $y = -8$ <p><math>(-1, -8)</math></p>																														

			$x = 12 - y$ $x = 12 - 7$ $x = 5$ roses
<p>5. Systems with Real World Scenarios</p>	<p>Define your variables</p> <p>Determine if slope intercept or standard form is best</p> <p>Set up your equations and solve using elimination or substitution.</p> <p>Break Even Point: where the cost equal the income</p>	<p>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? <math>x = \text{months}</math></p> $y = 50 + 30x$ $y = 0 + 40x$ <p>Substitution Method:</p> $\begin{array}{r} 50 + 30x = 40x \\ -30x \quad -30x \\ \hline 50 = 10x \\ 5 = x \\ \boxed{5 = x} \\ \text{months} \end{array}$	<p>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?</p> $x + y = 12$ $2.5x + 1.75y = 24.75$ <p>Substitution Method:</p> <p>rearrange: <math>x + y = 12</math> <math>x = 12 - y</math></p> $2.5(12 - y) + 1.75y = 24.75$ $30 - 2.5y + 1.75y = 24.75$ $30 - 0.75y = 24.75$ $-0.75y = -5.25$ $y = 7 \text{ daisies}$
	<p><math>y = 0 + 40(5)</math> <math>y = 0 + 200</math> <math>y = \\$200</math></p>	<p>15. Explain what a break-even point is.</p> <p>What will the income and cost always be at the break-even point?</p> <p>What is the profit at the break-even point?</p>	<p>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?</p>

<p>3. Solve a system of linear equations using elimination.</p>	<p>To eliminate a variable using addition or multiplication one coefficient must be positive and one must be negative.</p>	<p>7. Solve the system.</p> $\begin{array}{r} x - y = 11 \\ + 2x + y = 19 \\ \hline 3x = 30 \\ \frac{3x}{3} = \frac{30}{3} \\ x = 10 \end{array}$ <p>~~~~~</p> $\begin{array}{r} 2(10) + y = 19 \\ 20 + y = 19 \\ -20 \quad -20 \\ \hline y = -1 \end{array}$ <p><b>(10, -1)</b></p>	<p>8. Solve the system.</p> $\begin{array}{r} 4x = 20 - 8y \\ -4x + 2y = -30 \end{array} \quad (7, -1)$ <p>rearrange:</p> $\begin{array}{r} 4x = 20 - 8y \\ +8y \quad +8y \\ \hline 4x + 8y = 20 \\ + -4x + 2y = -30 \\ \hline 10y = -10 \\ \frac{10y}{10} = \frac{-10}{10} \\ y = -1 \end{array}$ <p>~~~~~</p> $\begin{array}{r} -4x + 2(-1) = -30 \\ -4x - 2 = -30 \\ +4x \quad +4x \\ \hline -4x = -28 \quad x = 7 \end{array}$
<p>4. Special Types of Systems</p>	<p>No Solution:</p> <ul style="list-style-type: none"> <li>• False Equations</li> <li>• Slopes are the same</li> <li>• Y-intercepts are different</li> <li>• Parallel Lines</li> </ul> <p>Infinite Solutions:</p> <ul style="list-style-type: none"> <li>• True Equations</li> <li>• Equations are the same</li> <li>• One Line</li> </ul>	<p>9. Solve the system.</p> $\begin{array}{r} 2x + 3y = 12 \\ 3(5x - y = 13) \\ \hline 15x - 3y = 39 \\ + 2x + 3y = 12 \\ \hline 17x = 51 \\ \frac{17x}{17} = \frac{51}{17} \\ x = 3 \end{array}$ <p>~~~~~</p> $\begin{array}{r} 2(3) + 3y = 12 \\ 6 + 3y = 12 \\ -6 \quad -6 \\ \hline 3y = 6 \\ y = 2 \end{array} \quad (3, 2)$	<p>10. Solve the system.</p> $\begin{array}{r} -2(-3x - 8y = 0) \\ 3(-2x - 10y = 14) \\ \hline 6x + 16y = 0 \\ -6x - 30y = 42 \\ \hline -14y = 42 \\ y = -3 \end{array}$ <p>~~~~~</p> $\begin{array}{r} -2x - 10(-3) = 14 \\ -2x + 30 = 14 \\ -30 \quad -30 \\ \hline -2x = -16 \\ x = 8 \end{array} \quad (8, -3)$
		<p>11. Solve the system:</p> $\begin{array}{r} y = 2x - 2 \\ -2x + y = 1 \\ \hline -2x + 2x - 2 = 1 \\ \hline -2 = 1 \end{array}$ <p>FALSE = No Solutions</p>	<p>12. Solve the system:</p> $\begin{array}{r} -9x - 3y = -18 \\ 3(3x + y = 6) \\ \hline 9x + 3y = 18 \\ + -9x - 3y = -18 \\ \hline 0 = 0 \end{array}$ <p>TRUE = INFINITE SOLUTIONS</p>

<p>6. Graph a linear inequality</p>	<p>Make sure equation is solved for y</p> <p>Graph the line</p> <p>Determine if dashed or solid</p> <p>Determine whether to shade below or above the line</p> <p>*Golden Rule of Inequalities can apply here.</p>	<p style="text-align: center;">dashed, shade above</p> <p>17. Graph <math>y &gt; -\frac{1}{5}x + 1</math></p>  <p><math>m = \frac{-1}{5}</math> down 1 right 5 OR up 1 left 5</p>	<p style="text-align: center;">solid, shade below</p> <p>18. <math>\frac{7x - 5y}{-7x} \geq \frac{-20}{-7x}</math></p> <p><math>-5y \geq -7x - 20</math></p>  <p><math>-\frac{5y}{-5} \geq \frac{-7x - 20}{-5}</math></p> <p><math>y \leq \frac{7}{5}x + 4</math> *Flip sign!</p>
<p>7. Solve a system of linear inequalities by graphing.</p>	<p>Determine if you have a solid or dashed line</p> <p>Then determine whether to shade above or below.</p> <p>Find the region where the shading overlapped.</p>	<p>19. Solve the system. Label the different regions as solution or not a solution.</p> <p>dashed <math>y &lt; -3x + 2</math> below solid <math>y \geq x - 1</math> above</p> 	<p>20. Solve the system. Label the different regions as solution or not a solution.</p> <p>dashed <math>x + y &gt; 4</math> above dashed <math>y &gt; x - 1</math> above</p> 
<p>8. Real World with Systems of Inequalities</p>		<p>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.</p> <p><math>x + y \leq 15</math> <math>\begin{cases} x = \text{children} \\ y = \text{adults} \end{cases}</math></p> <p><math>100x + 200y \leq 3000</math></p>	<p>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.</p> <p><math>x + y \leq 70</math> <math>\begin{cases} x = \text{children} \\ y = \text{adults} \end{cases}</math></p> <p><math>6x + 10y \geq 500</math></p>

<p>9. Naming Linear Inequalities and Systems</p>	<p>Identify:          *Slope          *Y-intercept          *Type of Line          *Shading</p>	<p>23. Name the inequality.          solid line shaded above = <math>\geq</math>  <math>b = -3</math> <math>m = \frac{1}{2}</math></p>  <p><math>y \geq \frac{1}{2}x - 3</math></p>	<p>24. Name the system of inequalities.          #1: dashed shaded above <math>b = -1</math> <math>m = -1</math>          #2: dashed shaded above <math>b = 5</math> <math>m = -4</math></p>  <p>#1: <math>y &gt; -x - 1</math> #2: <math>y &gt; -4x + 5</math></p>
--	---	---	--

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?

- (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)  $Y = 0.5x + 5$   
 $Y = 0.25 + 4$

(+)  
 $4 + 0.5x$

(+)  
 $5 + 0.25x$

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? 4 months, \$27

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

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

---

$5 + 5.5x = 17 + 2.5x$   
 $-2.5x \quad -2.5x$

---

$5 + 3x = 17$   
 $3x = 12$   
 $x = 4$

---

$y = 5 + 5.50(4)$   
 $y = 27$

27. Solve the system of equations:

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

$4x - 4y = -16$   
 $-4(x - 2y = -12)$   
 $-4x + 8y = 48$   
 $4x - 4y = -16$   


---

 $4y = 32$   
 $y = 8$

28. Which point is a solution of the system:  
 $2x + y \geq 3$   
 $y \geq -2x + 1$

- (a) (0, 0)  
 (b) (1, 0)

$2(0) + 0 \geq 3$   
 $0 \geq 3x$

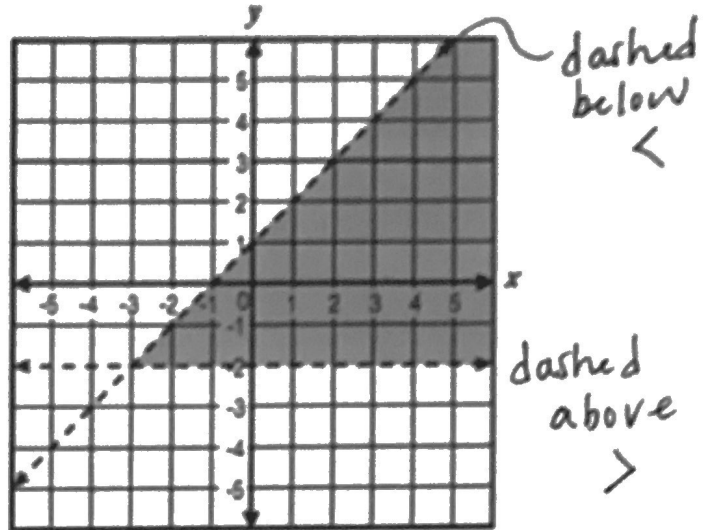
$2(1) + 0 \geq 3$   
 $2 + 0 \geq 3$   
 $2 \geq 3x$

~~(a)~~  $(0, 1)$   $2(0) + 1 \geq 3$   
 $0 + 1 \geq 3$

(d)  $(1, 1)$   $2(1) + 1 \geq 3$   $1 \geq -2(1) + 1$   
 $2 + 1 \geq 3$   $1 \geq -2 + 1$   
 $3 \geq 3 \checkmark$   $1 \geq -1 \checkmark$

29. Which system of inequalities best describes the graph?

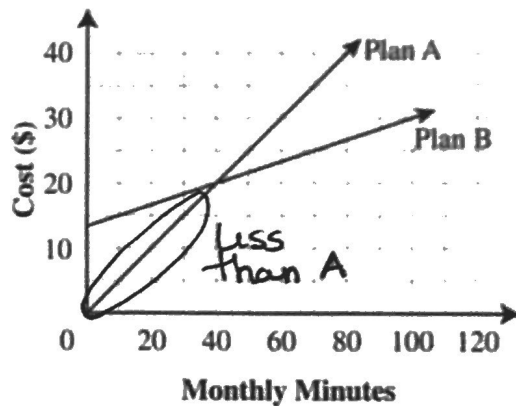
- (a)  $y > -2$   
 $y > x + 1$   
 (c)  $y > -2$   
 $y < x + 1$   
 (b)  $y < -2$   
 $y > x + 1$   
 (d)  $y < -2$   
 $y < x + 1$



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.  
**Phone Costs**



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  
 (c) 28 red, 27 white  
 (b) 27 red, 28 white  
 (d) 35 red, 20 white
- $x = \text{red}$   
 $y = \text{white}$
- $x + y = 55$   
 $12x + 10y = 620$   
 $12(55 - y) + 10y = 620$   
 $660 - 12y + 10y = 620$   
 $-2y = -40$   
 $y = 20$

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.  $\begin{cases} y = 4x - 3 \\ y = 4x + 2 \end{cases}$   
 same slope + diff. y-int = parallel lines = no solutions
- b.  $\begin{cases} y = \frac{1}{3}x + 5 \\ y = \frac{1}{3}x + 5 \end{cases}$   
 same slope + same y-intercept = same line = infinite
- c.  $\begin{cases} y = -x + 2 \\ y = \frac{1}{3}x + 6 \end{cases}$   
 diff. slope + diff. y-int. = one solution
- d.  $\begin{cases} y = -\frac{3}{4}x + 5 \\ y = -\frac{3}{4}x - 4 \end{cases}$   
 same slope + diff. y-int = parallel lines = no solutions