**Algebra 1**
**Review for Test – UNIT 2A**

Name Answer Key

## I. Solving & Justifying Linear Equations

*#1 - 4: Solve each equation.*

1. $4r - 8 = -32$

$+8 \quad +8$

$4r = -24$

$\boxed{r = -6}$

2. $\frac{x}{5} + 2 = 9$

$5 \cdot \frac{x}{5} = 7 \cdot 5$

$\boxed{x = 35}$

3. $-2(5k - 6) = -3k$

$-10k + 12 = -3k$

$12 = 7k$

$\boxed{k = \frac{12}{7}}$

4. $3(1 - 5c) = -6(c - 8)$

$3 - 15c = -6c + 48$

$-9c = 45$

$\boxed{c = -5}$

**#5 - 10: Write & solve an equation to represent each scenario.**

5. Twice a number increased by eight is forty.

$2x + 8 = 40$

$2x = 32$

$\boxed{x = 16}$

6. Kelli has 12 more M&Ms than Katherine. If they have a total of 158 M&Ms, how many does Katherine have?

Kelli: $k + 12$

Katherine: $k$

$k + k + 12 = 158$

$2k + 12 = 158$

$2k = 146$

$\boxed{k = 73}$

7. Jaqueline earns $15 per ~~hour~~ x as a math tutor on her college campus. In one week, she pays 12% of her earnings in state and federal taxes. Her take-home pay for the week is $105.60. How many hours did she work?

$15x - .12(15x) = 105.60$

$15x - 1.8x = 105.60$

$13.2x = 105.60$

$\boxed{x = 8 \text{ hours}}$

8. The difference of three times a number and twelve is 72.

$3x - 12 = 72$

$3x = 84$

$\boxed{x = 28}$

9. The sum of three consecutive integers is 105. What are the integers?

$x + x + 1 + x + 2 = 105$

$3x + 3 = 105$

$x = 34$

$\boxed{34, 35, 36}$

or her math class, Whitney has earned the following test grades for the semester: 87, 88, and 91. What grade must she earn on the last test to earn a test average of a 90 for the semester?

Must earn a 94

$$\frac{87+88+91+x}{4} = 90$$

$$4 \cdot \frac{266+x}{4} = 90 \cdot 4$$

$$266 + x = 360$$

$$x = 94$$

**#11 – 14: Solve each equation for the indicated variable.**

11. $ax + by = c$ (y)

$$\frac{by}{b} = \frac{c-ax}{b}$$

$$y = \frac{c-ax}{b}$$

12. $A = \frac{1}{2}bh$ (h)

$$\frac{2A}{b} = \frac{bh}{b}$$

$$h = \frac{2A}{b}$$

13. $P = IRT$ (R)

$$\frac{P}{IT} = \frac{IRT}{IT}$$

$$R = \frac{P}{IT}$$

14. $A = 2(L + W)$ (L)

$$\frac{A}{2} = L + W$$

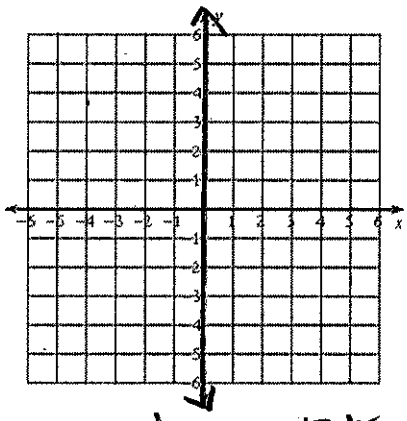
$$W = \frac{A}{2} - W$$

**II. Slope & Graphing Linear Equations**

**Graph the following equations.**

$$\frac{4y}{4} = \frac{-6x}{4} - \frac{4}{4}$$

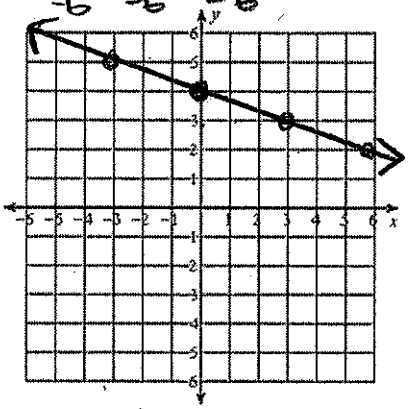
1. $x = 0$



m = Und. b = DNE

2. $-6y = 2x - 24$

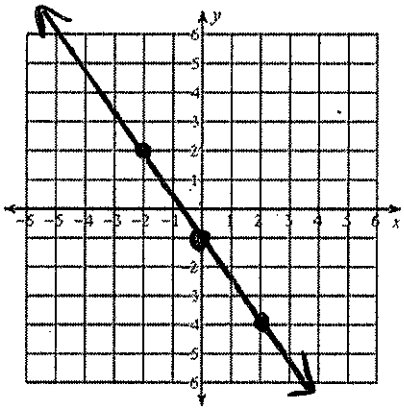
$$\frac{-6y}{-6} = \frac{2x}{-6} - \frac{24}{-6}$$



m = $-\frac{1}{3}$ b = 4

$$y = -\frac{1}{3}x + 4$$

3: $4y + 4 = -6x$



m = $-3/2$ b = $-1$

$$y = -\frac{3}{2}x - 1$$

**Find the slope of the following points, equations, tables, and graphs.**

4. (10, -1) & (-2, 6) **m =** $-7/12$

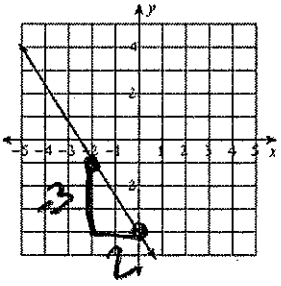
$$m = \frac{6+1}{-2-10} = \frac{7}{-12}$$

5. $4x + 6y = 10$ **m =** $-2/3$

$$\frac{6y}{6} = \frac{-4x}{6} + \frac{10}{6}$$

$$y = -\frac{2}{3}x + \frac{5}{3}$$

6.



**m =** $-3/2$

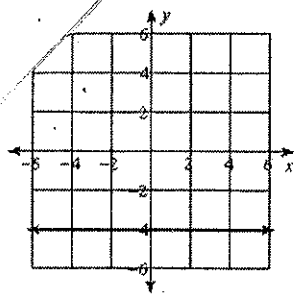
7.

| x | y |
|---|---|
| -4 | 1 |
| -2 | 4 |
| 0 | 7 |
| 2 | 10 |
| 4 | 13 |

+2, +2, +3, +3

**m =** $3/2$

$$\frac{\text{Change } y}{\text{Change } x} = \frac{3}{2}$$



m = 0

9.

| x | y |
|---|---|
| 12 | -1 |
| 10 | -2 |
| 8 | -3 |
| 6 | -4 |
| 4 | -5 |

-2 -2 -2 -1 -1 -1

m = $\frac{1}{2}$

$\frac{\text{change } y}{\text{change } x} = \frac{-1}{-2}$

**Remember → point-slope form: $(y - y_1) = m(x - x_1)$**

7. through (1, 5), m = 8

$x_1$ $y_1$

$(y-5)=8(x-1)$

Equation in point-slope:

$(y-5)=8(x-1)$

Equation in slope-int: (simplify for y)

$y-5=8x-8$
$+5 \quad +5$

$\boxed{y=8x-3}$

8. (-4, -1) (-5, 4)

$x_1$ $y_1$

$m=\frac{4+1}{-5+4}=\frac{5}{-1}=-5$

m = -5

Equation in point-slope:

$(y+1)=-5(y+4)$

Equation in slope-int:

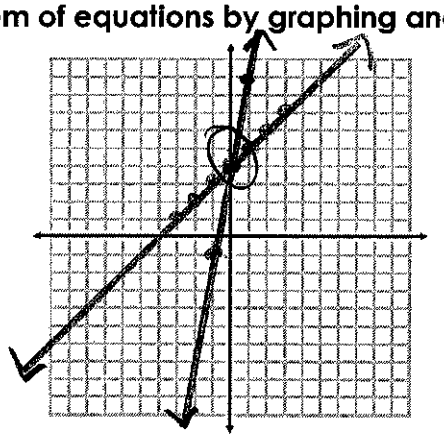
$y+1=-5y-20$

$\boxed{y=-5y-21}$

**III. Systems of Equations**

**Solve the system of equations by graphing and state the solution.**

1. $y = x + 4$
   $y = 5x + 4$

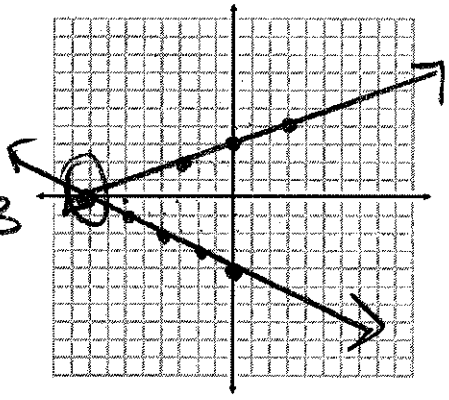


(0, 4)

2. $y = -2x - 4$
   $x - 3y = -9$

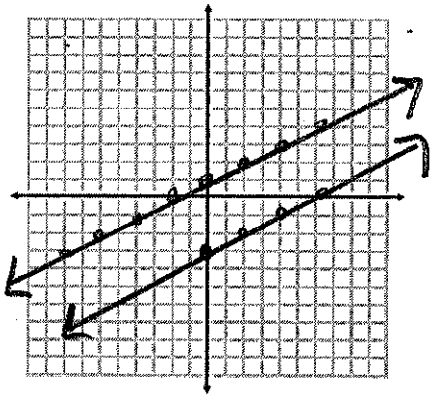
$\frac{-3y}{3}=\frac{-x}{3}-\frac{9}{-3}$

$y=\frac{1}{3}x+3$



(-8, 0)

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



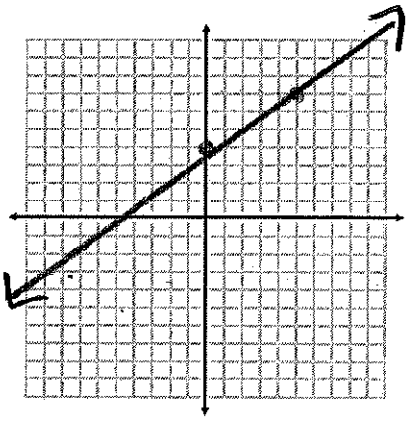
no solution

4. $5y - 20 = 3x$

$-3x + 5y = 20$

$y=\frac{3}{5}x+4$

$y=\frac{3}{5}x+4$



inf. sol.

**e each system of equations algebraically (use elimination).**

5. $\begin{cases} 4x+8y=20 \\ -4x+2y=-30 \end{cases}$ $\boxed{(3,-1)}$

$10y=-10$
$y=-1$
$4x+8(-1)=20$
$4x=12$
$x=3$

6. $\begin{cases} 8x+y=-16 \\ -3x-y=11 \end{cases}$ $\boxed{(-1,-8)}$

$5x=-5$
$x=-1$
$-3(-1)-y=11$
$-y=8$
$y=-8$

7. $\begin{cases} y=6x-11 \\ -2x-3y=-7 \end{cases}$ $\boxed{(2,1)}$

$3(-6x+y=-11)$
$-2x-3y=-7$
$-18x+3y=-33$
$-20x=-40$
$x=2$, $y=1$

8. $\begin{cases} -3x+3y=9 \\ 3(x+y=7) \end{cases}$ $\boxed{(2,5)}$

$-3x+3y=9$
$3x+3y=21$
$6y=30$
$y=5$
$x=2$

9. $\begin{cases} 2x+8y=6 \\ -4x-16y=-12 \end{cases}$ $)2$

$4x+16y=12$
$0=0$ ✓

$\boxed{\text{All Real Solutions}}$

10. $\begin{cases} 5x+4y=-14 \\ 3x+6y=6 \end{cases}$ $)-3$ $)5$ $\boxed{(-6,4)}$

$-15x-12y=42$
$15x+30y=30$
$18y=72$
$y=4$
$3x+6(4)=6$
$x=-6$

**Write a system that could be used to solve each problem. Then, solve the system and answer the question.**

11. Caroline and Rachel are selling flower bulbs for a school fundraiser. Customers can buy bags of windflower bulbs and bags of daffodil bulbs. Caroline sold 6 bags of windflower bulbs and 12 bags of daffodil bulbs for a total of $324. Rachel sold 6 bags of windflower bulbs and 8 bags of daffodil bulbs for a total of $244. What is the cost each of one bag of windflower bulbs and one bag of daffodil bulbs?

$6x+12y=324$
$-6x+8y=244$
$4y=80$
$y=20$

$6x+12(20)=324$
$6x=84$
$x=14$

$\boxed{\text{14 windflower, 12 daffodil}}$

12. A sold-out movie theater will seat 60 people. At a premiere, tickets were $8 for adults and $5 for children. If the theater made $420 on premiere night, how many children bought a ticket?

$-5(x+y=60)$
$8x+5y=420$
$-5x-5y=-300$

$3x=120$
$x=40$
$y=20$

$\boxed{\text{20 children, 40 Adults}}$

13. A boat traveled downstream with the current at a speed of 48 meters per second. During the trip back, traveling against the current, the boat traveled at a speed of 32 meters per second. What is the speed of the boat in still water? What is the speed of the current?

Without graphing the equations, is the point (2, -1) the solution to the system $\begin{cases} y = x - 3 \\ y = -x + 1 \end{cases}$?

$-1 = 2 - 3$ $\quad$ $-1 = -2 + 1$

Yes ⇒ ✓ $-1 = -1$ $\quad$ $-1 = -1$ ✓

15. Without graphing the inequalities, is the point (-1, 4) a solution to the system $\begin{cases} y \le -2x + 3 \\ y \le 4x - 3 \end{cases}$?

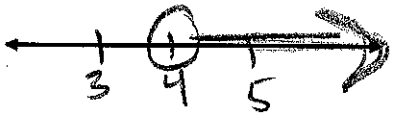
$4 \le -2(-1) + 3$ $\quad$ $4 \le 5$ Yes

NO ⇒ $4 \le -4(-1) - 3$ $\quad$ $4 \le 1$ NO

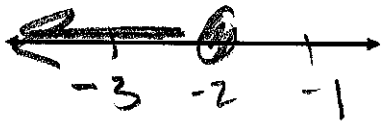
**IV. Inequalities & Systems of Inequalities**

Graph, then write the inequality in interval notation.

1. $x > 4$ $\quad$ $(4, \infty)$

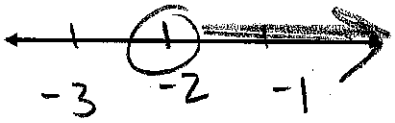



2. $x \le -2$ $\quad$ $(-\infty, -2]$

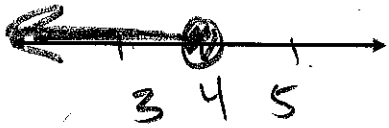



Graph, then write the interval in inequality notation.

3. $(-2, \infty)$ $\quad$ $x > -2$




4. $(-\infty, 4]$ $\quad$ $x \le 4$

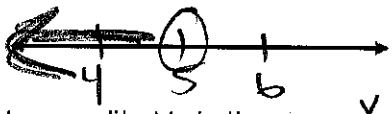



**Solve the inequality. Write the answer in inequality and interval notations and graph the solution.**

5. $2 > x + 7$

$-5 > x$

$x < -5$




Inequality Notation: $x < -5$

Interval Notation: $(-\infty, -5)$

6. $2(3 - x) + 8 \ge 10$

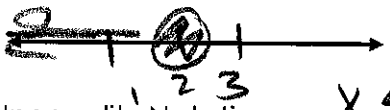
$6 - 2x + 8 \ge 10$

$-2x + 14 \ge 10$

$-2x \ge -4$

$\frac{-2x}{-2} \ge \frac{-4}{-2}$

$x \le 2$




Inequality Notation: $x \le 2$

Interval Notation: $(-\infty, 2]$

7. Which of the following is a solution to $7 < -2(x + 4) - 3x$?

A. -10 $\quad$ B. -3 $\quad$ C. 3 $\quad$ D. 10

Has to be less than -3

$7 < -2x - 8 - 3x$

$7 < -8 - 5x$

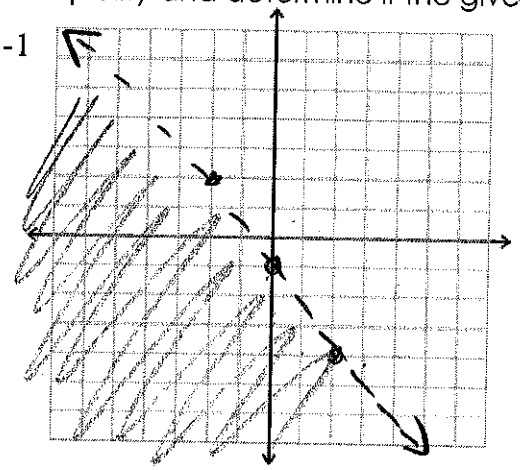
$\frac{15}{-5} < \frac{-5x}{-5}$

$-3 > x$

$x < -3$

Graph each inequality and determine if the given points are solutions.

a. $y < -\frac{3}{2}x - 1$



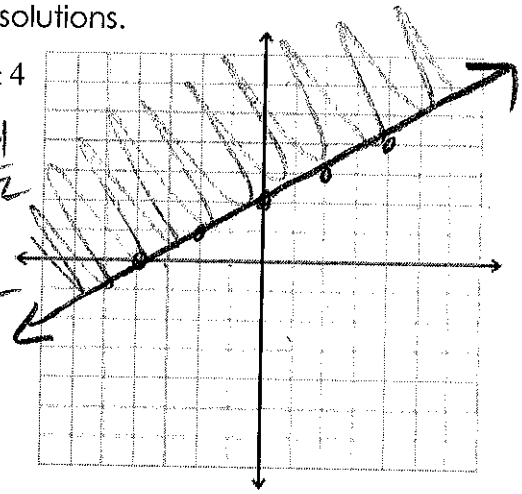
Is (0, -1) a solution? NO

Is (-6, -2) a solution? yes

b. $2y - x \geq 4$

$\frac{2y}{2} \geq \frac{x}{2} + \frac{4}{2}$

$y \geq \frac{1}{2}x + 2$

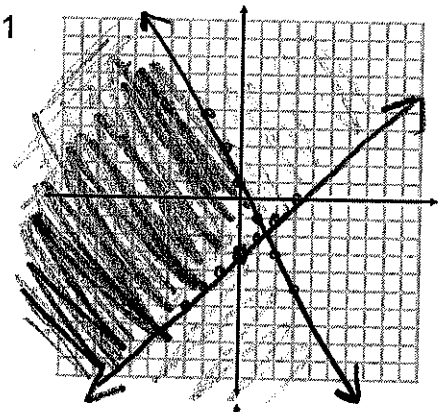


Is (2, 1) a solution? NO

Is (-4, 0) a solution? yes

**Graph the solution to the system of inequalities and name a possible solution.**

9. $\begin{cases} y \leq -2x + 1 \\ y \geq x - 3 \end{cases}$



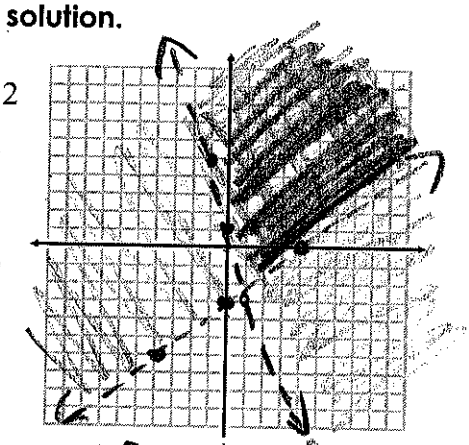
(-3, -1)

10. $\begin{cases} 3x - 4y < 12 \\ 4x + y > 1 \end{cases}$

$y > -4x + 1$

$\frac{-4y}{-4} < \frac{-3x}{-4} + \frac{12}{-4}$

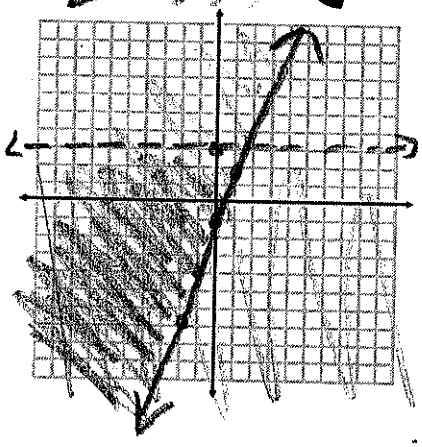
$y > \frac{3}{4}x - 3$



(2, 2)

11. $\begin{cases} y < 3 \\ y + 1 \geq 3x \end{cases}$

$y \geq 3x - 1$



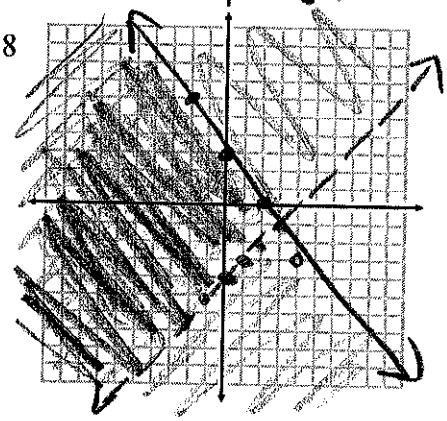
(-3, -3)

12. $\begin{cases} 9x + 6y \leq 18 \\ x - y < 4 \end{cases}$

$\frac{6y}{6} \leq \frac{-9x}{6} + \frac{18}{6}$

$y \leq \frac{-3}{2}x + 3$

$y > x - 4$



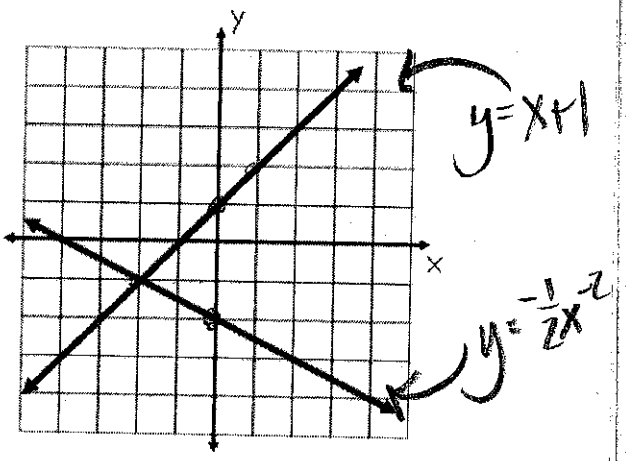
B 13. Which system of equations is graphed on the right?

A. $\begin{cases} y = x + 1 \\ y = \frac{1}{2}x - 2 \end{cases}$

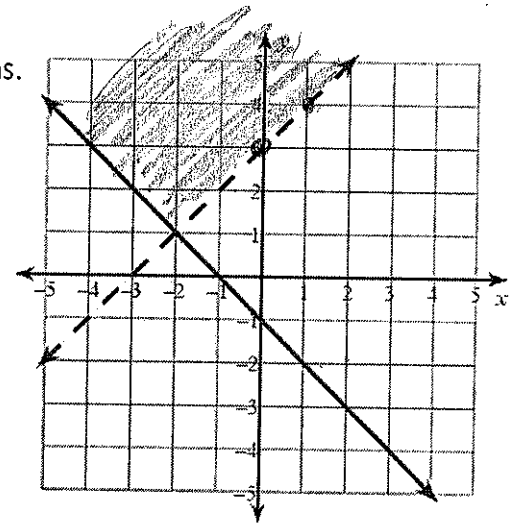
B. $\begin{cases} y = x + 1 \\ y = -\frac{1}{2}x - 2 \end{cases}$

C. $\begin{cases} y = x - 1 \\ y = \frac{1}{2}x + 2 \end{cases}$

D. $\begin{cases} y = x - 1 \\ y = -\frac{1}{2}x + 2 \end{cases}$



14. Use the graph to the right to answer the following questions.



A. Name 3 possible solutions to the system of inequalities.

(-2,2) (-3,3) (-2,-4)

B. Name 3 points that are NOT solutions to the system.

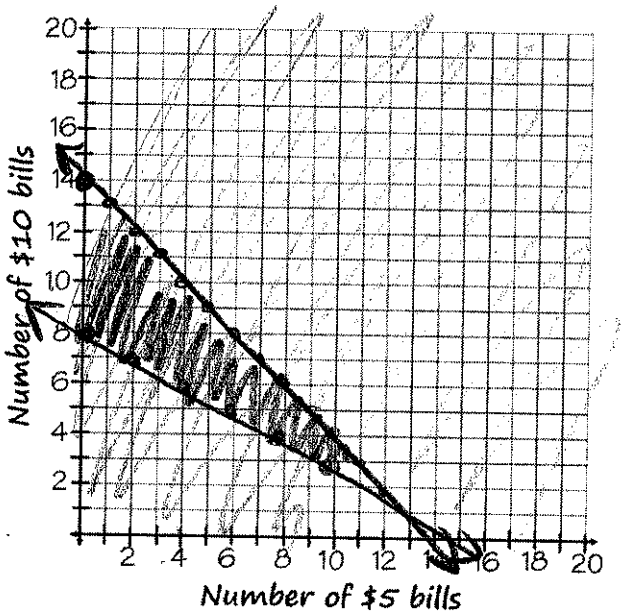
(-2,0) (0,0) (0,-2)

C. Write the two inequalities that are graphed in slope-intercept form.

y 2x+3

y 3 -x -1

15. Jordyn has at least $80 in her wallet that consists of $5 and $10 bills. She has at most 14 bills in her wallet. Write a system of inequalities that could be used to describe the scenario. Then graph on the coordinate plane.




x represents # of $5 bills

y represents # of $10 bills

Equation 1: 5x + 10y ≥ 80 Amount of $

Equation 2: x + y ≤ 14 # of bills

$\frac{10y}{10} \geq \frac{-5x+80}{10}$

Equations in slope-int form (y=mx+b):

y ≥ -½x + 8

y ≤ -x + 14

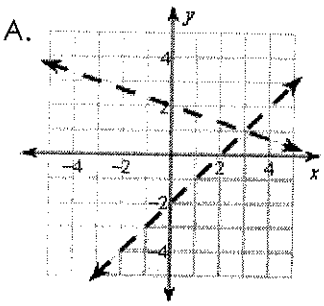
Name one possible solution: (4, 8)

Write what this solution means in context:

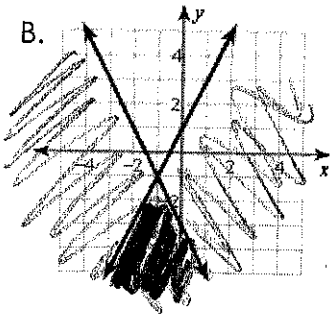
Jordyn could have 4 $5 bills and 8 $10 bills in her wallet.

_____ 16. Which of these shows the correct graph of this system of inequalities? $\begin{cases} y \leq 2x+1 \\ y \leq -2x-3 \end{cases}$

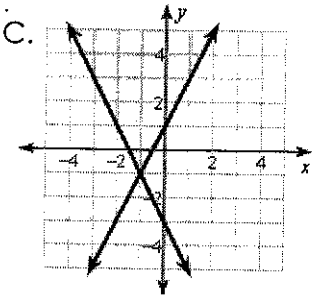
A.



B.



C.



D.