

**Instructions:** Show all work. If you are using your calculator to solve, you may sketch a graph or indicate keys pressed to show work. Exact values: do not use decimals in your answers unless the problem begins with decimals, or is a word problem. All answers should be fully reduced for full credit. Draw diagrams to help organize the data (this is worth partial credit). If you do your work on scrap paper, you should indicate that directly on the test paper along with your final answer. It is preferable, if you can, to do work directly on the test.

1. Determine if the ordered pairs are a solution to the system. (5 points)

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

- a. (10, -1)    b. (-1/2, 1/2)    c. (2, 1)

a.  $10 \neq -4(-1) + 2$   
 $10 \neq 4 + 2 = 6$

NO                  NO                  NO

b.  $-1/2 \neq -4(1/2) + 2$   
 $-1/2 \neq -2 + 2 = 0$

c.  $2 \neq -4(1) + 2$   
 $2 \neq -2$

2. Solve the system of equations by substitution. Show all work to receive full credit. Be sure to clearly state the solution if one exists. Label the system consistent or inconsistent; and dependent or independent if applicable. (10 points)

$$\begin{cases} x + 4y = 6 \\ y = 2x - 3 \end{cases}$$

$$\begin{aligned} X + 4(2x - 3) &= 6 \\ X + 8x - 12 &= 6 \\ &\quad + 12 \quad + 12 \end{aligned}$$

$$\begin{aligned} Y &= 2(2) - 3 \\ Y &= 4 - 3 = 1 \end{aligned}$$

$$\begin{array}{r} 9x = 18 \\ \hline 9 \quad 9 \\ \hline X = 2 \end{array}$$

(2, 1)

consistent and independent

3. Solve the system of equations by elimination by addition. Show all work to receive full credit. Be sure to clearly state the solution if one exists. Label the system consistent or inconsistent; and dependent or independent if applicable. (10 points)

$$\begin{cases} 2x - y = 6 & \times(-2) \\ 4x + 3y = 2 \end{cases}$$

$$\begin{array}{r} -4x + 2y = -12 \\ 4x + 3y = 2 \\ \hline 5y = -10 \\ \frac{5y}{5} = \frac{-10}{5} \\ y = -2 \end{array}$$

$$\begin{aligned} 2x - (-2) &= 6 \\ 2x + 2 &= 6 \\ 2x &= 4 \\ x &= 2 \end{aligned}$$

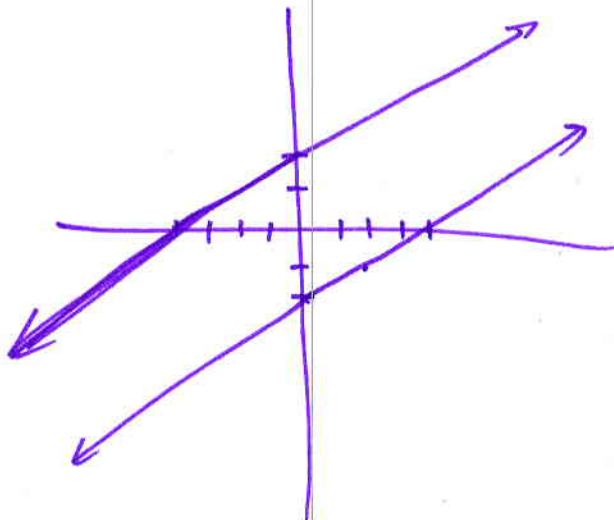
$(2, -2)$  consistent and independent

4. Solve the system of equations by any method. Show all work or sketch the graph to receive full credit. Be sure to clearly state the solution if one exists. Label the system consistent or inconsistent; and dependent or independent if applicable. (10 points)

$$\begin{cases} 4y = 2x - 8 \\ x - 2y = -4 \end{cases}$$

$$\begin{aligned} &\rightarrow y = \frac{1}{2}x - 2 \\ &\rightarrow -2y = -x - 4 \\ &\quad \underline{-2} \quad \underline{-2} \end{aligned}$$

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



inconsistent  
since lines are parallel  
no solutions

5. Solve the system of equations by any method. Show all work or sketch the graph to receive full credit. Be sure to clearly state the solution if one exists. Label the system consistent or inconsistent; and dependent or independent if applicable. (10 points)

$$\begin{cases} 6x + 3y = 12 \\ y = -2x + 4 \end{cases}$$

$$6x + 3(-2x + 4) = 12$$

$$6x - 6x + 12 = 12$$

$$12 = 12$$

infinite # of solutions  $y = -2x + 4$

Consistent & dependent

6. The sum of two numbers is 58. If twice the smaller number is subtracted from the larger number, the difference is -20. Find the two numbers. (10 points)

(x2)

$$x + y = 58$$

$$x - 2y = -20$$

$$2x + 2y = 116$$

$$x - 2y = -20$$

$$\frac{3x}{3} = \frac{96}{3}$$

$$x = 32$$

$$\begin{array}{r} 32 + y = 58 \\ -32 \quad -32 \\ \hline y = 26 \end{array}$$

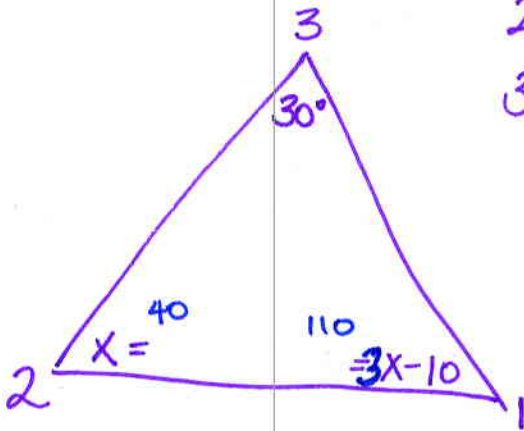
$$y = 26$$

let  $x =$  larger #  
 $y =$  smaller #

$$x = 32$$

$$y = 26$$

7. In a triangle, the measure of the first angle is  $10^\circ$  less than three times the measure of the second angle. If the measure of the third angle is  $30^\circ$ , find the measure of the two unknown angles. (10 points)



$$\begin{aligned} \text{1st angle} &= 3X - 10 = Y = 120 - 10 = 110 \\ \text{2nd angle} &= X = 40 \\ \text{3rd angle} &= 30^\circ \end{aligned}$$

$$\begin{aligned} X + Y + 30 &= 180 \\ -30 &= -30 \end{aligned}$$

$$\begin{aligned} X + Y &= 150 \\ 3X - 10 &= Y \end{aligned}$$

$$\begin{aligned} X + 3X - 10 &= 150 \\ 4X - 10 &= 150 \end{aligned}$$

$$\begin{aligned} \frac{4X}{4} &= \frac{160}{4} \\ X &= 40 \end{aligned}$$

8. A baker wants to mix a 60% sugar solution with a 30% sugar solution to obtain 10 quarts of a 51% sugar solution. How much of the 30% sugar solution will the baker use? (10 points)

$$\begin{aligned} X &= \text{qty of 60\% sugar} = 7 \\ Y &= \text{qty of 30\% sugar} = 3 \end{aligned}$$

$$X + Y = 10 \rightarrow Y = 10 - X$$

$$.6X + .3Y = .51(10) = 5.1$$

$$.6X + .3(10 - X) = 5.1$$

$$\begin{aligned} .6X + 3 - .3X &= 5.1 \\ -3 & \quad -3 \end{aligned}$$

$$\frac{.3X}{.3} = \frac{2.1}{.3}$$

$$X = 7$$

$$Y = 10 - 7 = 3$$

Need 3 qts  
of 30%  
solution

9. On the graph below, graph the system of linear inequalities and label each point of intersection. Be sure to shade the region satisfied by the system. (10 points)

$$\begin{cases} y \geq -2 \\ y \leq \frac{2}{5}x - 1 \\ y \leq -3x + 6 \\ x \geq 0 \end{cases}$$

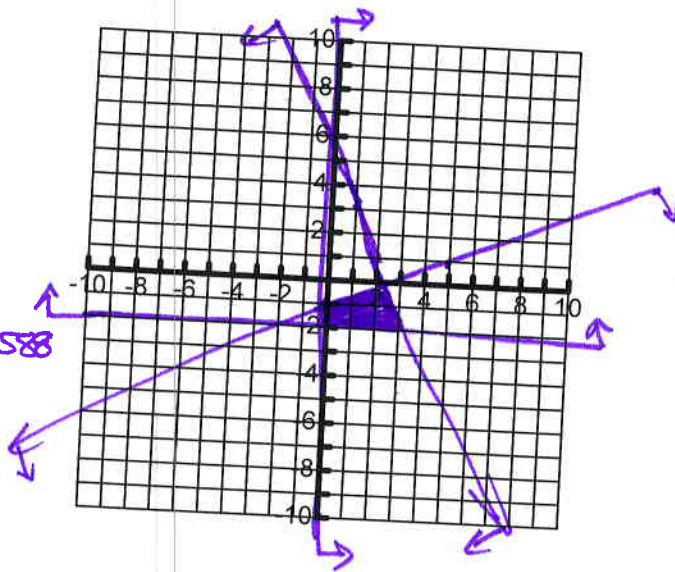
$$\begin{aligned} &(0, -2) \\ &(0, -1) \\ &(3, -2) \\ &\left(\frac{35}{17}, -\frac{3}{17}\right) \end{aligned}$$

$$\frac{2}{5}x - 1 = -3x + 6$$

$$\frac{17}{5}x = 7$$

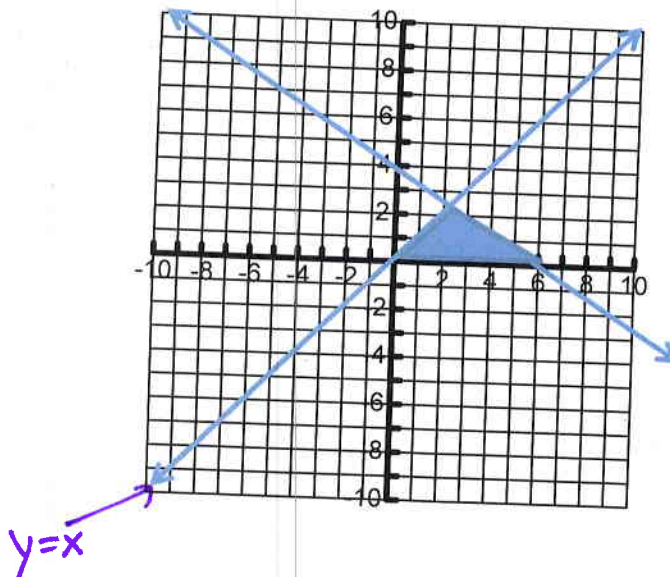
$$x = \frac{35}{17} \approx 2.0588$$

$$\begin{aligned} y &= -3\left(\frac{35}{17}\right) + 6 \\ &= -\frac{3}{17} \end{aligned}$$



10. For the system of inequalities graphed below, state the inequalities that produced the shaded region. [Hint: Pick two points on each line to obtain the equation of the line, then determine which inequality is needed to obtain the correct shaded region.] (10 points)

$$\begin{cases} y \leq x \\ y \leq -\frac{2}{3}x + 4 \\ x \geq 0 \\ y \geq 0 \end{cases}$$



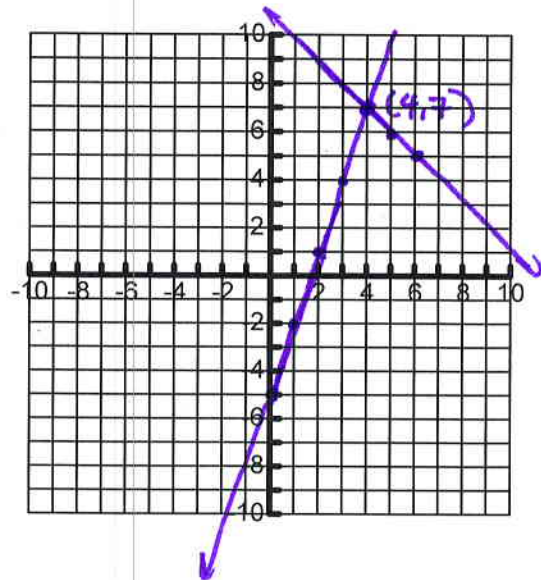
$$\begin{aligned} &(0, 4) \\ &(6, 0) \end{aligned} \quad m = \frac{4}{-6} = -\frac{2}{3}$$

$$y = -\frac{2}{3}x + 4$$

11. Solve the system of equations below by graphing. Graph both equations on the graph below and clearly label the solution on the graph. (10 points)

$$\begin{cases} y = 3x - 5 \\ x + y = 11 \end{cases}$$

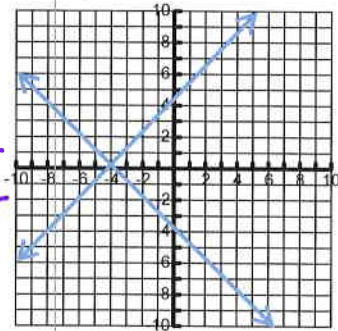
(4, 7)



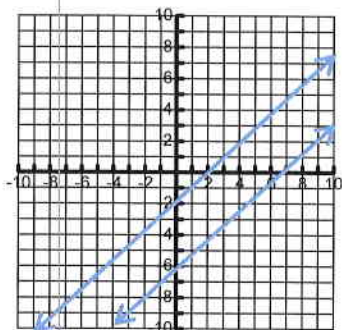
12. For each of the graphs below, determine whether the system graphed is consistent or inconsistent; and dependent or independent, if applicable. State the solution if possible. (2 points each)

a.

consistent  
independent

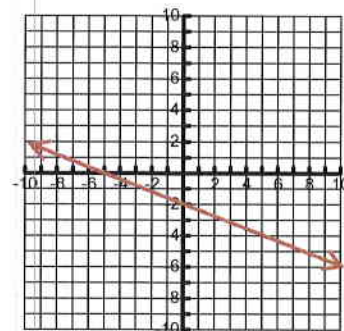


b.



inconsistent

c.



consistent  
dependent