

Advanced Algebra
Systems of Equations Review

Name

Key

1. Solve the system of equations by using your graphing calculator.

$$\begin{aligned} 2x + 2y &= 4 \longrightarrow y = -1x + 2 \\ x - 2y &= 0 \longrightarrow y = \frac{1}{2}x \end{aligned}$$

y =, enter equations, graph, 2nd,
trace (calc), Intersection, Enter
3 times

2. Write a system of equations that has no solutions.

Example: $y = 2x + 5$ Must have same slope
 $y = 2x + 6$ and different y intercepts

3. Write a system of equations that has an infinite number of solutions.

Example: $y = 2x + 3$ Must have same slope
 $y = 2x + 3$ and same y intercepts

4. Solve the system of equations by using the substitution method.

$$\begin{aligned} 2x + 3y &= -3 \\ x + 2y &= 2 \\ \downarrow \\ x &= -2y + 2 \end{aligned}$$

$$\begin{aligned} 2x + 3y &= -3 \\ 2(-2y + 2) + 3y &= -3 \\ -4y + 4 + 3y &= -3 \\ -y + 4 &= -3 \\ -y &= -7 \\ y &= 7 \end{aligned}$$

$$\begin{aligned} x &= -2y + 2 \\ x &= -2(7) + 2 \\ x &= -14 + 2 \\ x &= -12 \end{aligned}$$

$$\boxed{(-12, 7)}$$

5. Solve each system of equations by using the elimination method.

$$\begin{aligned} 3(5a + 4b &= 12) & 15a + 12b &= 36 \\ 2(7a - 6b &= 40) & 14a - 12b &= 80 \\ \hline 29a &= 116 \\ a &= 4 \end{aligned}$$

$$\begin{aligned} 7a - 6b &= 40 \\ 7(4) - 6b &= 40 \\ 28 - 6b &= 40 \\ -6b &= 12 \end{aligned}$$

$$\boxed{(4, -2)}$$

$$b = -2$$

$$\begin{aligned} 1(x + 3y &= 27) & -1x - 3y &= -27 \\ \frac{1}{2}x + 3y &= 19 & + & \frac{1}{2}x + 3y = 19 \\ \hline x + 3y &= 27 \\ 16 + 3y &= 27 \\ 3y &= 11 \\ y &= \frac{11}{3} \end{aligned}$$

$$\begin{aligned} -\frac{1}{2}x &= -8 \\ x &= 16 \end{aligned}$$

$$\boxed{(16, \frac{11}{3})}$$

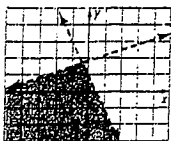
$$\begin{aligned} -30c(0.4m + 1.8n &= 8) & -12m - 54n &= -240 \\ 10(1.2m + 3.4n &= 16) & 12m + 34n &= 160 \\ \hline -20n &= -80 \\ n &= 4 \end{aligned}$$

$$\begin{aligned} 0.4m + 1.8n &= 8 \\ 0.4m + 6.8(4) &= 8 \\ 0.4m + 7.2 &= 8 \\ 0.4m &= .8 \\ m &= 2 \end{aligned}$$

$$\boxed{(2, 4)}$$

6. Write a system of inequalities that represents the graph.

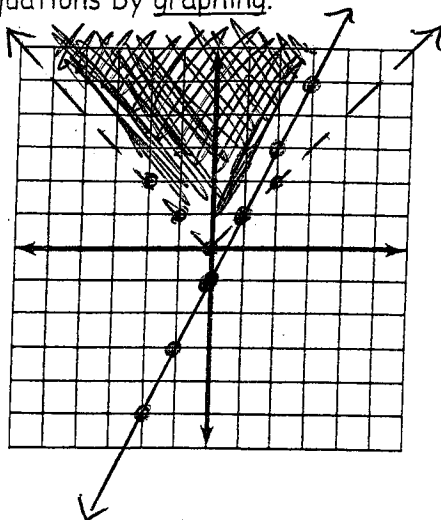
$$\begin{aligned} y &< -2x + 1 \\ y &< \frac{1}{3}x + 2 \end{aligned}$$



* graph will be bigger on test (easier to read)

7. Solve the system of equations by graphing.

$$\begin{aligned} y &> |x| \\ 2x - y &\leq 1 \\ \downarrow \\ 2x - y &\leq 1 \\ -y &\leq -2x + 1 \\ y &\geq 2x - 1 \end{aligned}$$



$$y > |x| \rightarrow \text{vertex } (0, 0)$$

$$\begin{array}{r|l} -2 & 2 \\ -1 & 1 \\ 0 & 0 \\ 1 & 1 \\ 2 & 2 \end{array}$$

8. Solve the system of equations by using the elimination method.

$$\begin{aligned} \textcircled{1} & (x + 2y + z = 10) - 2 \\ \textcircled{2} & 2x - y + 3z = -5 \\ \textcircled{3} & 2x - 3y - 5z = 27 \\ \hline \textcircled{1} & -2x - 4y - 2z = -20 \end{aligned}$$

$$\begin{aligned} \textcircled{1} & -2x - 4y - 2z = -20 \\ \textcircled{2} & 2x - y + 3z = -5 \\ \hline \textcircled{4} & -5y + z = -25 \end{aligned}$$

$$\begin{aligned} \textcircled{1} & -2x - 4y - 2z = -20 \\ \textcircled{3} & 2x - 3y - 5z = 27 \\ \hline \textcircled{5} & -7y - 7z = 7 \end{aligned}$$

$$\begin{aligned} \textcircled{4} & (-5y + z = -25) \cdot 7 \rightarrow -35y + 7z = -175 \\ \textcircled{5} & -7y - 7z = 7 \rightarrow -7y - 7z = 7 \\ \hline & -42y = -168 \\ & y = 4 \end{aligned}$$

$$\begin{aligned} \textcircled{4} & -5y + z = -25 \\ & -5(4) + z = -25 \\ & -20 + z = -25 \\ & z = -5 \end{aligned}$$

$$\begin{aligned} \textcircled{1} & x + 2y + z = 10 \\ & x + 2(4) + (-5) = 10 \\ & x + 8 - 5 = 10 \\ & x + 3 = 10 \\ & x = 7 \end{aligned}$$

$$\boxed{(7, 4, -5)}$$

9. a) For each problem, write what the variable represents.
b) Write the system of equations used to solve each problem.

- a. Campus Rentals rents 2 and 3-bedroom apartments for \$700 and \$900 per month, respectively. Last month they had six vacant apartments and reported \$4600 in lost rent. How many of each type of apartment were vacant?

a) Variables:

x = # of two-bed apts
 y = # of three bed apts

b) Equations:

$$x + y = 6$$

$$700x + 900y = 4600$$

x	y
4	2

- b. A gourmet coffee shop wants to mix coffee beans that cost \$6 per pound with coffee beans that cost \$10 per pound to create 25 pounds of a new blend that costs \$9.00 per pound. Find the number of pounds of each needed to produce the new blend.

a) Variables:

c = #'s of cheap coffee
 e = #'s of exp. coffee

b) Equations:

$$c + e = 25$$

$$6c + 10e = 225$$

c	e
6.25	18.75

25(\$9) \nearrow

- c. An electronic store offers 3 types of service: on-site, at-store, and by-mail. On-site service costs 3 times as much as at-store service. By-mail service costs \$10 less than at-store service. Last week, the shop completed 15 services on-site, 40 services at-store and 5 services by mail for total sales of \$2650. Find the cost of each type of service.

a) Variables:

S = cost of on site service
 a = cost of at store service
 m = cost of mail service

b) Equations:

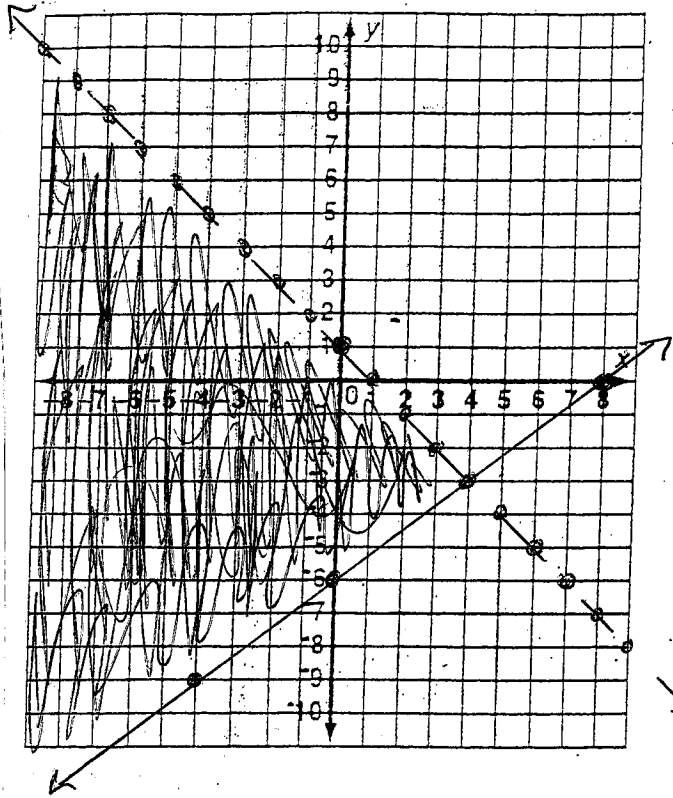
$$S = 3a$$

$$m = a - 10$$

$$15S + 40a + 5m = 2650$$

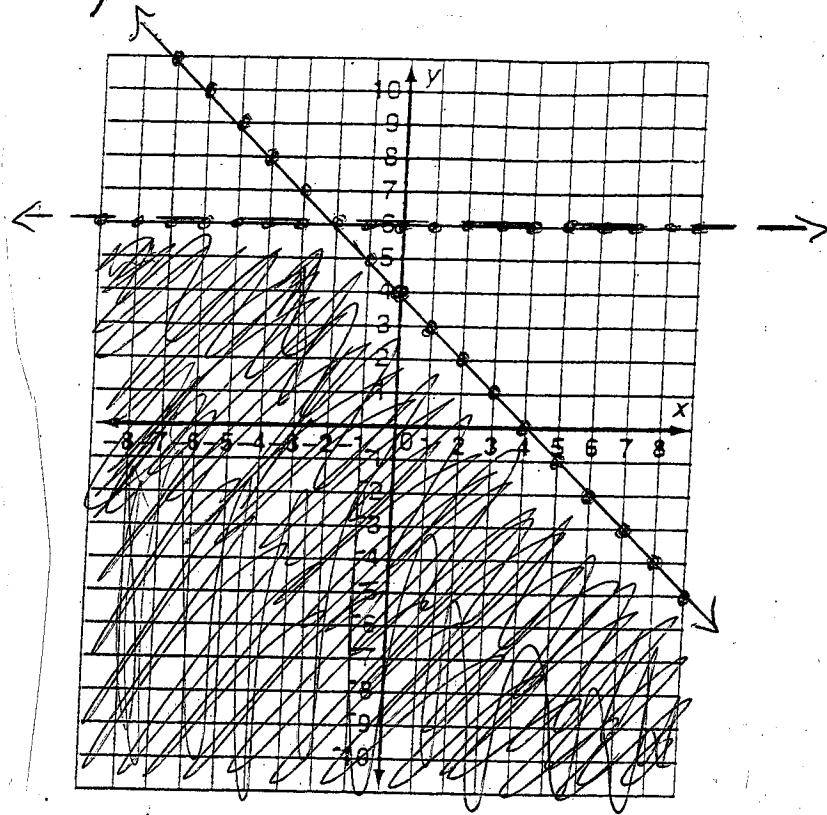
a	m	S
30	20	90

23)



$$y < -x + 1 \quad y \geq \frac{3}{4}x - 6$$

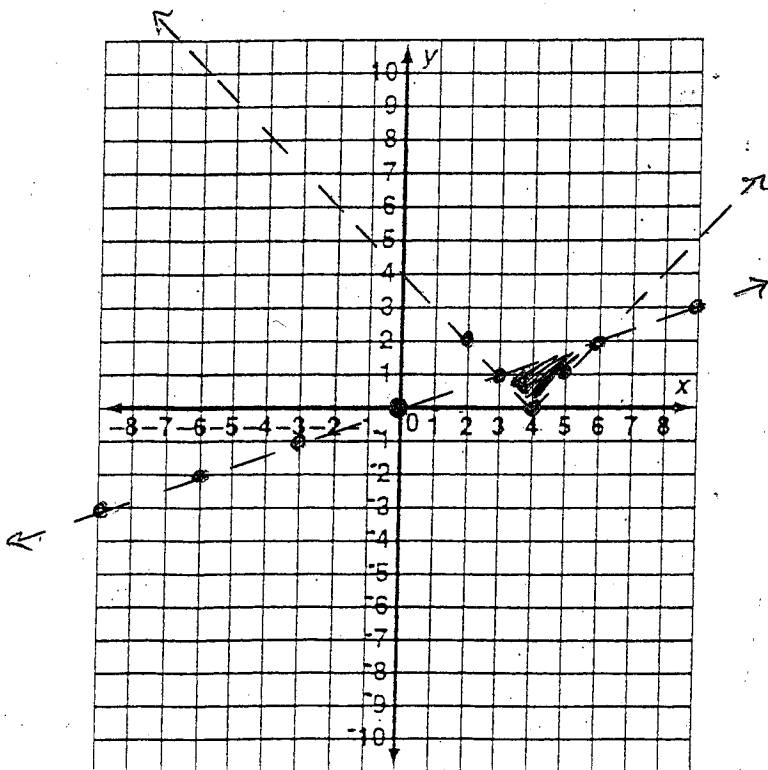
24)



$$x + y \leq 4 \rightarrow y \leq -x + 4$$

$$y < 6$$

25)



$$y > |x - 4| \quad y < \frac{1}{3}x$$

x	y
2	2
3	1
4	0
5	1
6	2