

Algebra 2 – Chapter 3 & 4 Test Review

It's possible there are a few errors on this, if found I will update it later.

Name: Key Hour: _____

Solve the following systems of equations using any method.

$$\begin{array}{r} 1. \begin{cases} x + 3y = -1 \\ 2x + 9y = 7 \end{cases} \quad (-10, 3) \\ \begin{array}{r} -2x - 6y = 2 \\ \hline 3y = 9 \\ y = 3 \end{array} \end{array}$$

$$\begin{array}{r} x + 3(3) = -1 \\ x + 9 = -1 \\ x = -10 \end{array}$$

$$\begin{array}{r} 3. \begin{cases} 17x - 3y = 5 \\ y = 3x + 1 \end{cases} \\ y = 3(1) + 1 \\ y = 4 \end{array}$$

Substitution

$$\begin{array}{r} 17x - 3(3x + 1) = 5 \\ 17x - 9x - 3 = 5 \\ 8x - 3 = 5 \\ 8x = 8 \\ x = 1 \end{array} \quad (1, 4)$$

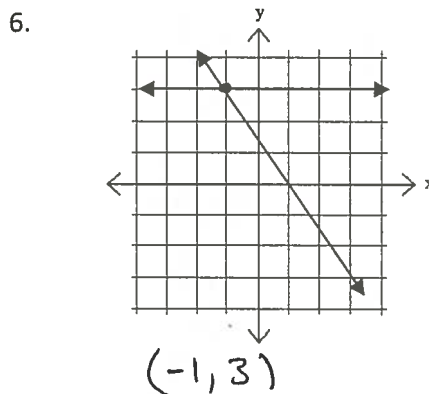
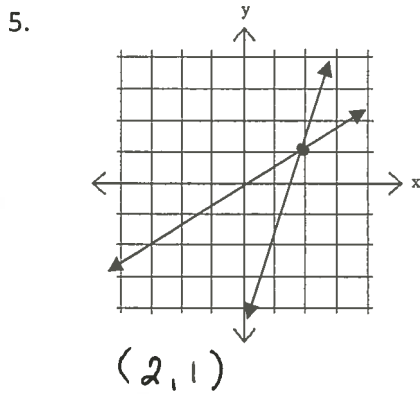
$$\begin{array}{r} 2. \begin{cases} 7x + y = 6 \\ x - 2y = -12 \end{cases} \\ 14x + 2y = 12 \\ \hline 15x = 0 \\ x = 0 \end{array}$$

$$\begin{array}{r} 7(0) + y = 6 \\ y = 6 \\ (0, 6) \end{array}$$

$$\begin{array}{r} 4. \begin{cases} -24x + 9y = 12 \\ 8x - 3y = -4 \end{cases} \\ 24x - 9y = -12 \\ \hline -24x + 9y = 12 \\ 0 + 0 = 0 \end{array}$$

$0 = 0$ ✓
Inf. many Sol.ⁿ

State the solution to the following system of equations by looking at their graphs. (Approximate to the nearest whole number values for x and y)



Model and solve the following word problems using systems of equations.

7. The sum of two numbers is 35. The larger number is one less than three times the smaller number. What are the two numbers?

$$\begin{array}{r} x + y = 35 \\ x = 3y - 1 \end{array}$$

Substitution:

$$\begin{array}{r} (3y - 1) + y = 35 \\ 4y - 1 = 35 \\ 4y = 36 \\ y = 9 \end{array}$$

$$\begin{array}{r} x + y = 35 \\ x + 9 = 35 \\ x = 26 \end{array}$$

9, 26

8. Rachel offers to go to the coffee shop to buy cappuccinos and lattes for her coworkers. She buys a total of nine drinks for \$35.75. If cappuccinos cost \$3.75 each and the lattes cost \$4.25 each, how many of each drink did she buy?

$$\begin{array}{r} (C + L = 9) \cdot 3.75 \\ 3.75C + 4.25L = 35.75 \\ \hline -3.75C - 3.75L = -33.75 \\ \hline 0.50L = 2 \\ L = 4 \end{array}$$

$$\begin{array}{r} C + L = 9 \\ C = 5 \\ \hline 5 \text{ cappuccinos} \\ 4 \text{ lattes} \end{array}$$

9. You are on the prom decorating committee and are in charge of buying balloons. You want to use both latex and mylar balloons. The latex balloons cost \$0.10 each and the mylar balloons cost \$0.50 each. You need 125 balloons and you have \$32.50 to spend. How many of each can you buy?

$$\begin{array}{r} (L + M = 125) \cdot 0.1 \\ 0.10L + 0.5M = 32.50 \\ -0.10L - 0.1M = -12.50 \\ \hline 0.4M = 20 \end{array}$$

$$M = 50$$

$$L + 50 = 125$$

$$L = 75$$

50 mylar balloons.
75 latex balloons.

Solve the following system of inequalities by graphing and shading.

0 > -2
0 ≤ 4

$$10. y > \frac{1}{2}x - 2$$

$$4x + 6y \leq 24$$

$$6y \leq -4x + 24$$

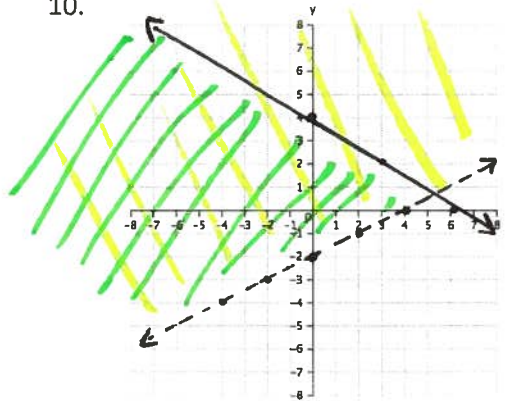
$$y \leq -\frac{4}{6}x + 4$$

$$11. y \geq -x - 3$$

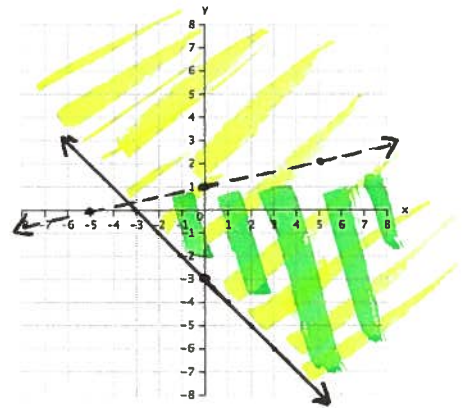
$$y < \frac{1}{5}x + 1$$

0 ≥ -3 ✓
0 < 1 ✓

10.



11.



0 ≤ 4

$$12. y \leq \frac{1}{2}x + 4$$

$$x - 2y \leq 2$$

$$-2y \leq -x + 2$$

0 ≥ -1

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

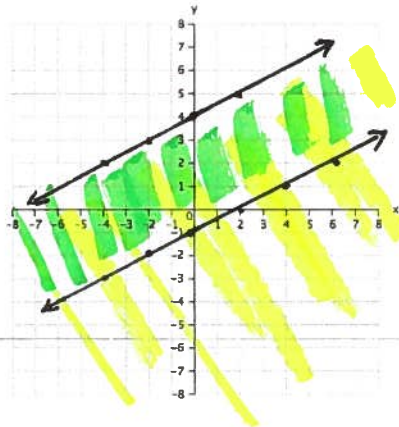
$$13. x + y \leq 3 \quad 0 \leq 3 \quad \checkmark$$

$$x \leq 3 \quad 0 \leq 3 \quad \checkmark$$

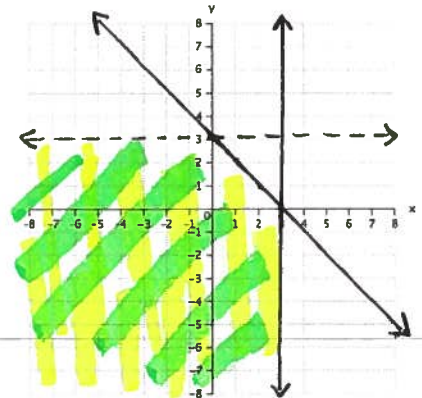
$$y < 3 \quad 0 < 3 \quad \checkmark$$

$$y \leq -x + 3$$

12.



13.



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Use the following Matrices to answer the questions below.

$$A = \begin{bmatrix} 2 & 1 \\ -3 & 5 \end{bmatrix}$$

2×2

$$B = \begin{bmatrix} 2 & 3 & 1 \\ -5 & -8 & 4 \end{bmatrix}$$

2×3

$$C = \begin{bmatrix} -5 & 2 \\ -8 & 3 \\ 4 & 1 \end{bmatrix}$$

3×2

$$D = \begin{bmatrix} -5 & 1 & 3 \\ 8 & -2 & 6 \\ 4 & 9 & 7 \end{bmatrix}$$

3×3

$$E = \begin{bmatrix} 5 & -1 & 8 \\ -2 & 6 & -3 \end{bmatrix}$$

2×3

$$F = \begin{bmatrix} 2 & -3 \\ -6 & 0 \end{bmatrix}$$

2×2

14. $F + A$

$$\begin{bmatrix} 2 & -3 \\ -6 & 0 \end{bmatrix} + \begin{bmatrix} 2 & 1 \\ -3 & 5 \end{bmatrix} = \begin{bmatrix} 4 & -2 \\ -9 & 5 \end{bmatrix}$$

20. $2A - F$

15. $E - B$

$$\begin{bmatrix} 5 & -1 & 8 \\ -2 & 6 & -3 \end{bmatrix} - \begin{bmatrix} 2 & 3 & 1 \\ -5 & -8 & 4 \end{bmatrix} = \begin{bmatrix} 3 & -4 & 7 \\ 3 & 14 & -7 \end{bmatrix}$$

21. $B + 3E$

16. $C + D$

22. $D - B$

Not possible

$$17. AB = \begin{bmatrix} x_{11} & x_{12} & x_{13} \\ x_{21} & x_{22} & x_{23} \end{bmatrix} = \begin{bmatrix} -1 & -2 & 6 \\ -31 & -49 & 17 \end{bmatrix}$$

$$\left. \begin{aligned} x_{11} &= 2(2) + 1(-5) = 4 - 5 = -1 \\ x_{12} &= 2(3) + 1(-8) = 6 - 8 = -2 \\ x_{13} &= 2(1) + 1(4) = 2 + 4 = 6 \end{aligned} \right\} \begin{aligned} x_{21} &= -3(2) + 5(-5) \\ x_{22} &= -3(3) + 5(-8) \\ x_{23} &= -3(1) + 5(4) \end{aligned}$$

used calculator 23. FA

$$\begin{bmatrix} 13 & -13 \\ -12 & -6 \end{bmatrix}$$

18. BC

$$\begin{matrix} 2 \times 3 & 3 \times 2 \\ \underline{=} & \end{matrix} \begin{bmatrix} y_{11} & y_{12} \\ y_{21} & y_{22} \end{bmatrix} = \begin{bmatrix} -30 & 14 \\ 105 & -30 \end{bmatrix}$$

24. DC

$$y_{11} = 2(-5) + 3(-8) + 1(4) \quad y_{21} = -5(-5) + -8(-8) + 4(4)$$

$$y_{12} = 2(2) + 3(3) + 1(1) \quad y_{22} = -5(2) + (-8)(3) + 4(1)$$

$3 \times 3 \cdot 3 \times 2$
=

calculator

$$\begin{bmatrix} 29 & -4 \\ 0 & 16 \\ -64 & 42 \end{bmatrix}$$

19. FE

$$2 \times 2 \cdot 2 \cdot 3$$

=

calculator

$$\begin{bmatrix} 16 & -20 & 25 \\ -30 & 6 & -48 \end{bmatrix}$$

$$A = \begin{bmatrix} 2 & 1 \\ -3 & 5 \end{bmatrix}$$

$$\begin{aligned} 25. \det A &= 2(5) - 1(-3) \\ &= 10 + 3 \\ &= 13 \end{aligned}$$

$$F = \begin{bmatrix} 2 & -3 \\ -6 & 0 \end{bmatrix} \quad \det F = 0 - 18 = -18$$

$$27. F^{-1} =$$

$$\frac{1}{\det F} \begin{bmatrix} 0 & 3 \\ 6 & 2 \end{bmatrix} = \frac{1}{-18} \begin{bmatrix} 0 & 3 \\ 6 & 2 \end{bmatrix} = \begin{bmatrix} 0 & -\frac{1}{6} \\ -\frac{1}{3} & \frac{1}{9} \end{bmatrix}$$

$$26. \det D = (-5 \cdot -2 \cdot 7) + (1 \cdot 6 \cdot 4) + (3 \cdot 4 \cdot 9)$$

$$\begin{bmatrix} -5 & 1 & 3 & -8 \\ 8 & -2 & 6 & 8 \\ 4 & 9 & 7 & 4 \end{bmatrix}$$

$$= 310 - (-238) + (1 \cdot 8 \cdot 7) + (-5 \cdot 6 \cdot 9) + (3 \cdot -2 \cdot 4)$$

$$548$$

$$28. A^{-1} =$$

$$\frac{1}{\det A} \begin{bmatrix} 5 & -1 \\ 3 & 2 \end{bmatrix} = \frac{1}{13} \begin{bmatrix} 5 & -1 \\ 3 & 2 \end{bmatrix} = \begin{bmatrix} 5/13 & -1/13 \\ 3/13 & 2/13 \end{bmatrix}$$

Solve the following systems of equations by converting to a matrix equation, then using $X = A^{-1} \cdot B$

$$29. 3x - 2y = 1$$

$$7x - 5y = -2$$

$$(9, 13)$$

$$\begin{bmatrix} 3 & -2 \\ 7 & -5 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 1 \\ -2 \end{bmatrix}$$

$$X = A^{-1} B \quad X = \begin{bmatrix} 9 \\ 13 \end{bmatrix}$$

$$30. x + y = 45$$

$$-3 + 2y = -10$$

$$(20, 25)$$

$$\begin{bmatrix} 1 & 1 \\ -3 & 2 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 45 \\ -10 \end{bmatrix}$$

$$X = A^{-1} B \quad X = \begin{bmatrix} 20 \\ 25 \end{bmatrix}$$

$$31. 4x + 6y = 8$$

$$-9y = 2x - 2$$

$$-2x - 2x$$

$$-2x - 9y = -2$$

$$(2.5, -\frac{1}{3})$$

$$\begin{bmatrix} 4 & 6 \\ -2 & -9 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 8 \\ -2 \end{bmatrix}$$

$$X = A^{-1} B \quad X = \begin{bmatrix} 2.5 \\ -\frac{1}{3} \end{bmatrix}$$

$$32. 8x + y - 4z = 4$$

$$-2z - 3y + 4z = -17$$

$$4x + 5y - 8z = 11$$

$$0x - 2y + 4z = -17$$

$$\begin{bmatrix} 8 & 1 & -4 \\ 4 & 5 & -8 \\ 0 & -3 & 4 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 4 \\ 11 \\ -17 \end{bmatrix}$$

$$X = A^{-1} B$$

A is a singular matrix!!

$$33. x - y + z = 13$$

$$2x + 5y - 3z = -13$$

$$4x - y - 6z = -4$$

$$\begin{bmatrix} 1 & -1 & 1 \\ 2 & 5 & -3 \\ 4 & -1 & -6 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 13 \\ -13 \\ -4 \end{bmatrix}$$

$$X = A^{-1} B$$

$$X = \begin{bmatrix} 6 \\ -2 \\ 5 \end{bmatrix}$$

$$(6, -2, 5)$$