

ANSWERS

Algebra 8R Final Exam Review Packet

The final will be 20 multiple choice questions. You will have one class period to complete it. You may use a calculator. What you need to know:

Say it With Symbols

- Write equivalent equations and expressions using distributive, commutative, and associative properties (Inv. 1)
- Combine equations together by adding or by substituting one equation in for another equation and simplifying (Inv. 2)
- Solve linear equations with parentheses using distributive property and properties of equality (Inv. 3)
- Solve quadratic equations by factoring and using the zero product property, also the same process as finding the x-intercepts (Inv. 3)
- Solve problems about objects in motion in a real life context by using the above strategy (Inv. 3)
- Solve for one variable in terms of another (Inv. 3)
- Decide whether an equation represents a linear, exponential, or quadratic relationship (Inv. 4)

The Shapes of Algebra

- Interpret a graph of linear systems in a real life context (Inv. 2)
- Write and solve linear inequalities with one variable and graph your solution on a number line (Inv. 2)
- Write a system of equations about a real life situation (Inv. 3)
- Write an equation in standard form ($ax + by = c$) (Inv. 3)
- Go from standard form to slope-intercept form ($y = mx + b$) (Inv. 3)
- Identify slope, x-intercept, and y-intercept given standard form or given slope-intercept form (Inv. 3)
- Graph equations in standard form or slope-intercept form (Inv. 3)
- Solve a system of equations by graphing and finding the point of intersection (Inv. 3)
- Solve a system of equations using the equivalent forms method (Inv. 4)
- Solve a system of equations using the substitution method (Inv. 4)
- Solve a system of equations using the combination/elimination method (Inv. 4)
- Graph a linear inequality in two variables (Inv. 5)
- Write a linear inequality in two variables given a graph (Inv. 5)
- Solve a system of linear inequalities (Inv. 5)

From our mini-geometry unit:

- Use the Pythagorean Theorem to find side lengths in right triangles
- Translate a figure in a coordinate plane given an algebraic rule (Ex: $(x - 1, y + 2)$)
- Reflect a figure across a line of reflection in a coordinate plane
- Rotate a figure 90° clockwise or counterclockwise about the origin
- Rotate a figure 180° about the origin

Write **two** expressions that are equivalent to the given expression.

1.) $5(x - 3) + 11$

$$5x - 15 + 11$$

$$5x - 4$$

2.) $3x + 15$

$$3(x + 5)$$

$$3(x + 4) + 3$$

3.) $4x - 2 - 3x + x$

$$2x - 2$$

$$2(x - 1)$$

4.) $x + x + x + 8 + 8 + 8$

$$3(x + 8)$$

$$3x + 24$$

Simplify the following expressions.

5.) $12(-2x + 1) - 20$

$$-24x + 12 - 20$$

$$-24x - 8$$

6.) $-5x - (x - 6)$

$$-5x - x + 6$$

$$-6x + 6$$

7.) $-2(5 - 4x) + 8(-3x + 3)$

$$-10 + 8x - 24x + 24$$

$$-16x + 14$$

8.) $10 + 7(-5x + 4x - 5) + 14$

$$10 - 35x + 28x - 35 + 14$$

$$10 - 7x - 21$$

$$-7x - 11$$

The Student Council is organizing a charity bake sale. They came up with the following expenses and incomes:

- They need to spend \$70 on baking materials – flour, sugar, butter, etc
- They will sell each baked good for \$2.50.

9.) Write an equation for the profit P based on selling n baked goods. Simplify your equation.

$$P = I - E$$

$$P = 2.50n - 70$$

10.) How many baked goods do they need to sell to break even?

To break even $P = 0$ or $I = E$ (same thing!)

$$\frac{2.50n}{2.50} = \frac{70}{2.50}$$

$$n = 28$$

They need to sell 28 baked goods to break even.

11.) Their goal is to raise \$325. How many baked goods do they need to sell to reach their goal?

$$\begin{array}{r} P = 2.50n - 70 \\ 325 = 2.50n - 70 \\ +70 \qquad \qquad +70 \\ \hline 395 = 2.50n \\ 2.50 \quad 2.50 \end{array}$$

$$158 = n$$

They need to sell 158 baked goods to reach their goal.

The profit P of a concession stand outside Fenway park is depended on the number of customers C that go to the stand before, during, and after the game. The number of customers depends on the probability of rain R . The owner of the stand came up with the following equations to help predict their daily profit.

$$P = 8C - 400$$

$$C = 250 - 150R$$

12.) What do the numbers in the profit equation mean **in the context of this situation**?

\$8: Each customer spends \$8 on average

400: They have \$400 worth of expenses to stock and run the concession stand.

13.) What is the profit of the concession stand if the probability of rain is 40%?

$$P = 8C - 400$$

$$P = 8(250 - 150R) - 400$$

$$P = 2000 - 1200R - 400$$

$$P = 1600 - 1200R$$

$$P = 1600 - 1200(.4)$$

$$P = 1600 - 480$$

$$P = 1120$$

Profit will be \$1120 with a 40% probability of rain.

14.) Write an equation for profit P in terms of probability of rain R .

$$P = 8C - 400 \quad C = 250 - 150R$$

$$P = 8(250 - 150R) - 400$$

$$P = 2000 - 1200R - 400$$

$$P = 1600 - 1200R$$

15.) Simplify your profit equation from #14. Use it to help you calculate the probability of rain if the profit of the concession stand is \$1540.

$$P = 400(4 - 3R) \quad \text{factored!}$$

$$\frac{1540}{400} = \frac{400(4 - 3R)}{400}$$

$$\frac{3.85}{-4} = \frac{4 - 3R}{-4}$$

$$\frac{-0.15}{-3} = \frac{-3R}{-3} \rightarrow 0.05 = R$$

They will make \$1540 when the probability of rain is 5%.

Solve for the given variable.

16.) x in terms of y

$$3x + 9y = 27$$

$$\frac{-9y \quad -9y}{3x = 27 - 9y}$$

$$\frac{3x}{3} = \frac{27 - 9y}{3}$$

$$x = 9 - 3y$$

17.) y in terms of x

$$5(2x + y) = 35 - 6x$$

$$\frac{10x + 5y = 35 - 6x}{-10x \quad -10x}$$

$$\frac{5y}{5} = \frac{35 - 16x}{5}$$

$$y = 7 - \frac{16}{5}x$$

18.) z in terms of x and y

$$2x - 8y + 4z = 20$$

$$\frac{-2x \quad -2x}{-8y + 4z = 20 - 2x}$$

$$\frac{-8y + 4z = 20 - 2x}{+8y \quad +8y}$$

$$\frac{4z}{4} = \frac{20 - 2x + 8y}{4}$$

$$z = 5 - \frac{1}{2}x + 2y$$

19.) w in terms of P and l

$$P = 2l + 2w$$

$$\frac{-2l \quad -2l}{P - 2l = 2w}$$

$$\frac{P - 2l}{2} = \frac{2w}{2}$$

$$\frac{P}{2} - l = w$$

$$w = \frac{P}{2} - l$$

Using the two given equations, write a new equation relating the given variables. Think about what variable you *don't* want and how you can rid of that variable. Simplify your final equation.

20.) x in terms of z

$$x = 3y + 4z$$

$$y = 5z + 9$$

$$x = 3(5z + 9) + 4z$$

$$x = 15z + 27 + 4z$$

$$x = 19z + 27$$

21.) A in terms of B

$$A = BC$$

$$B = 5 + C \Rightarrow B = 5 + C$$

$$\begin{array}{r} -5 \quad -5 \\ B = 5 + C \\ \hline B - 5 = C \end{array}$$

$$A = BC$$

$$A = B(B - 5)$$

$$A = B^2 - 5B$$

22.) A in terms of l and P

$$A = lw$$

$$P = 2l + 2w \Rightarrow P = 2l + 2w$$

$$\begin{array}{r} -2l \quad -2l \\ P = 2l + 2w \\ \hline P - 2l = 2w \end{array}$$

$$\frac{P - 2l}{2} = \frac{2w}{2}$$

$$\frac{P}{2} - l = w$$

$$A = lw$$

$$A = l\left(\frac{P}{2} - l\right)$$

23.) I in terms of n

$$I = np$$

$$10n = 75 - 5p \Rightarrow 10n = 75 - 5p$$

$$\begin{array}{r} -75 \quad -75 \\ 10n = 75 - 5p \\ \hline 10n - 75 = -5p \end{array}$$

$$\begin{array}{r} -5 \quad -5 \\ 10n - 75 = -5p \\ \hline -2n + 15 = p \end{array}$$

$$-2n + 15 = p$$

$$I = np$$

$$I = n(-2n + 15)$$

$$I = -2n^2 + 15n$$

For 24-27, use the following information.

The Metropolis Middle School volleyball team is operating the concession stand at school basketball games to help raise money for new uniforms. The profit in dollars P from operating the stand is given by the equation $P = 15n - 5(2n + 20)$, where n is the total number of items sold.

24.) How much money will the volleyball team raise if they sell 65 items?

$$\begin{aligned}P &= 15n - 5(2n + 20) \\P &= 15(65) - 5(2(65) + 20) \\P &= 975 - 5(130 + 20) \\P &= 975 - 5(150) \\P &= 975 - 750 \\P &= 225\end{aligned}$$

The volleyball team
will raise \$225

25.) How many items does the team need to sell in order to **break even**?

$$\begin{aligned}\text{To break even, } P &= 0 \\0 &= 15n - 5(2n + 20) \\0 &= 15n - 10n - 100 \\0 &= 5n - 100 \\+100 \quad \quad +100 \\ \hline 100 &= 5n \\ \frac{100}{5} &= \frac{5n}{5} \\20 &= n\end{aligned}$$

They need to sell
20 items to
break even.

26.) If the team needs to raise \$1,000 for new uniforms, how many items will they have to sell?

$$\begin{aligned}1000 &= 15n - 5(2n + 20) \\1000 &= 5n - 100 \\+100 \quad \quad +100 \\ \hline 1100 &= 5n \\ \frac{1100}{5} &= \frac{5n}{5} \\220 &= n\end{aligned}$$

They need to sell
220 items to raise
\$1,000 for the new
uniforms.

27.) Write an equivalent equation for the profit P .

$$\begin{aligned}P &= 15n - 5(2n + 20) \\P &= 15n - 10n - 100 \\P &= 5n - 100\end{aligned}$$

Solve for the given variable.

28.) $5x + 2(x + 4) = 64$

$$5x + 2x + 8 = 64$$

$$\begin{array}{r} 7x + 8 = 64 \\ -8 \quad -8 \\ \hline \end{array}$$

$$\begin{array}{r} 7x = 56 \\ \underline{7 \quad 7} \end{array}$$

$$\boxed{x = 8}$$

29.) $x^2 - 3x - 10 = 0$

$$(x - 5)(x + 2) = 0$$

$$\begin{array}{l} \swarrow \quad \searrow \\ 0 = x - 5 \quad 0 = x + 2 \\ +5 \quad +5 \quad -2 \quad -2 \\ \hline 5 = x \quad -2 = x \end{array}$$

$$\boxed{x = -2 \text{ and } 5}$$

30.) $x^2 - 12x = 0$

$$x(x - 12) = 0$$

$$\begin{array}{l} \swarrow \quad \searrow \\ x = 0 \quad 0 = x - 12 \\ +12 \quad +12 \\ \hline 12 = x \end{array}$$

$$\boxed{x = 0 \text{ and } 12}$$

31.) $7(6x - 1) + x = 36$

$$42x - 7 + x = 36$$

$$\begin{array}{r} 43x - 7 = 36 \\ +7 \quad +7 \\ \hline \end{array}$$

$$\begin{array}{r} 43x = 43 \\ \underline{43 \quad 43} \end{array}$$

$$\boxed{x = 1}$$

32.) $2x^2 + 45 = -12x$

$$+12x \quad +12x$$

$$2x^2 + 12x + 45 = 0$$

$\boxed{\text{No Solution}}$

$$\begin{aligned} b^2 - 4ac &= 12^2 - 4(2)(45) \\ &= 144 - 360 \\ &= -216 \end{aligned}$$

33.) $33 + 15w = 3w - w + 4w$

$$33 + 15w = 2w + 4w$$

$$\begin{array}{r} -15w \quad -15w \\ \hline 33 = -9w \\ -9 \quad -9 \end{array}$$

$$\boxed{-\frac{11}{3} = w}$$

34.) $7(7c + 1) - 4c = 13(3c - 2)$

$$49c + 7 - 4c = 39c - 26$$

$$\begin{array}{r} 45c + 7 = 39c - 26 \\ -39c \quad -39c \\ \hline \end{array}$$

$$\begin{array}{r} 6c + 7 = -26 \\ -7 \quad -7 \\ \hline \end{array}$$

$$\begin{array}{r} 6c = -33 \\ \underline{6 \quad 6} \end{array}$$

$$\boxed{c = -\frac{11}{2}}$$

35.) $8x^2 + 2x - 15 = 0$

$$8x^2 + 12x - 10x - 15 = 0$$

$$4x(2x + 3) - 5(2x + 3) = 0$$

$$(4x - 5)(2x + 3) = 0$$

$$\begin{array}{l} \swarrow \quad \searrow \\ 0 = 4x - 5 \quad 0 = 2x + 3 \\ +5 \quad +5 \quad -3 \quad -3 \\ \hline 5 = 4x \quad -3 = 2x \\ \underline{5 \quad 4} \quad \underline{-3 \quad 2} \end{array}$$

$$\boxed{x = \frac{5}{4} \text{ and } -\frac{3}{2}}$$

$8x^2$	$12x$
$-10x$	-15

$$36.) x^2 + 8x + 16 = 0$$

$$(x+4)(x+4) = 0$$

$$\begin{array}{r} \swarrow \\ 0 = x+4 \\ -4 \quad -4 \\ \hline -4 = x \end{array}$$

$$\boxed{x = -4}$$

$$37.) 6(n-5) - 11n = -5n + 4$$

$$\begin{array}{r} 6n - 30 - 11n = -5n + 4 \\ -5n - 30 = -5n + 4 \\ +5n \quad +5n \\ \hline -30 = 4 \end{array}$$

$$\boxed{\text{No solution}}$$

$$38.) 9y - 4(y+5) = 40$$

$$9y - 4y - 20 = 40$$

$$\begin{array}{r} 5y - 20 = 40 \\ +20 \quad +20 \\ \hline 5y = 60 \end{array}$$

$$\begin{array}{r} 5y = 60 \\ 5 \quad 5 \\ \hline y = 12 \end{array}$$

$$y = 12$$

$$39.) x^2 - 49 = 0$$

$$(x-7)(x+7) = 0$$

$$\begin{array}{r} \swarrow \quad \searrow \\ 0 = x-7 \quad 0 = x+7 \\ +7 \quad +7 \quad -7 \quad -7 \\ \hline 7 = x \quad -7 = x \end{array}$$

$$\boxed{x = -7 \text{ and } 7}$$

$$40.) \frac{2}{7}(4m-18) = 12$$

$$7 \left[\frac{2}{7}(4m-18) \right] = (12)7$$

$$2(4m-18) = 84$$

$$8m - 36 = 84$$

$$+36 \quad +36$$

$$\begin{array}{r} 8m = 120 \\ 8 \quad 8 \\ \hline m = 15 \end{array}$$

$$\boxed{m = 15}$$

$$41.) 3x^2 + 11x - 10 = 0$$

$$x = \frac{-11 \pm \sqrt{(11)^2 - 4(3)(-10)}}{2(3)}$$

$$= \frac{-11 \pm \sqrt{121 + 120}}{6}$$

$$= \frac{-11 \pm \sqrt{241}}{6}$$

$$\boxed{x = 0.75 \text{ and } -4.42}$$

$$42.) 4x^2 + 7x + 3 = 0$$

$$4x^2 + 4x + 3x + 3 = 0$$

$$4x(x+1) + 3(x+1) = 0$$

$$(4x+3)(x+1) = 0$$

$$\begin{array}{r} \swarrow \quad \searrow \\ 0 = 4x+3 \quad 0 = x+1 \\ -3 \quad -3 \quad -1 \quad -1 \\ \hline -3 = 4x \quad -1 = x \\ -3 = 4x \quad -1 = x \\ 4 \quad 4 \end{array}$$

$$\boxed{x = -\frac{3}{4} \text{ and } -1}$$

$$43.) 3q - 16q = 7 + \frac{1}{2}(-32q - 12)$$

$$-13q = 7 - 16q - 6$$

$$+16q \quad +16q$$

$$\begin{array}{r} 3q = 1 \\ 3 \quad 3 \end{array}$$

$$\boxed{q = \frac{1}{3}}$$

For questions 44-47, use the following information.

A rocket is launched into the air from ground level with an initial velocity of 120 feet per second.

44.) Write an equation that models how the height h of the rocket changes over time t .

$$h = -16t^2 + 120t$$

$$h = -8t(2t - 15)$$

45.) How long will it take for the rocket to hit the ground?

$$0 = -8t(2t - 15)$$

$$\begin{aligned} 0 &= -8t \\ 0 &= t \end{aligned}$$

$$\begin{aligned} 0 &= 2t - 15 \\ 15 &= 2t \\ \frac{15}{2} &= \frac{2t}{2} \\ 7.5 &= t \end{aligned}$$

The rocket will hit the ground after 7.5 seconds

46.) The advertising on the package says "Can fly over 250 feet high!" Does this rocket exceed the height listed on the package?

$$\begin{aligned} 250 &= -16t^2 + 120t \\ -250 & \quad -250 \\ \hline 0 &= -16t^2 + 120t - 250 \end{aligned}$$

$$\begin{aligned} b^2 - 4ac &= (120)^2 - 4(-16)(-250) \\ &= 14400 - 16000 \\ &= -1600 \end{aligned}$$

No, it can't fly over 250 feet high

$$\text{OR } -\frac{b}{2a} = \frac{-120}{2(-16)} = 3.75$$

$$LOS = 3.75$$

find maximum:

$$h = -16(3.75)^2 + 120(3.75)$$

$$h = -225 + 450$$

$$h = 225 \leftarrow \text{maximum height}$$

47.) When is the rocket 160 feet off the ground?

$$\begin{aligned} 160 &= -16t^2 + 120t \\ -160 & \quad -160 \\ \hline 0 &= -16t^2 + 120t - 160 \end{aligned}$$

$$0 = -2t^2 + 15t - 20$$

$$x = \frac{-15 \pm \sqrt{(15)^2 - 4(-2)(-20)}}{2(-2)}$$

$$x = \frac{-15 \pm \sqrt{225 - 160}}{-2}$$

$$x = 1.73 \text{ and } 5.76$$

The rocket will be 160 feet off the ground after 1.73 sec and 5.76 seconds.

State whether each equation below represents a linear, exponential, or quadratic relationship and **explain how you know**.

48.) $y = 3x^2 - 12$

QUADRATIC

The highest order exponent is 2.

OR
Follows form $ax^2 + bx + c$

49.) $y = 2(3.5)^x$

EXPONENTIAL

Follows format of $y = ag^x$

50.) $y = (x - 4)(2x + 8)$

QUADRATIC

Product of 2 linear expressions.

51.) $y = -x + 14$

LINEAR

Follows format of $y = mx + b$

52.) $y = 6(x - 2) + 7(x + 1)$
 $= 6x - 12 + 7x + 7$
 $= 13x - 5$

LINEAR

Follows format $y = mx + b$

53.) $y = .25^x$

EXPONENTIAL

Follows format $y = ag^x$

54.) $y = \frac{1}{2}x^2 - 15x + 11$

QUADRATIC

Highest order exponent is 2.

OR

Follows form $ax^2 + bx + c$

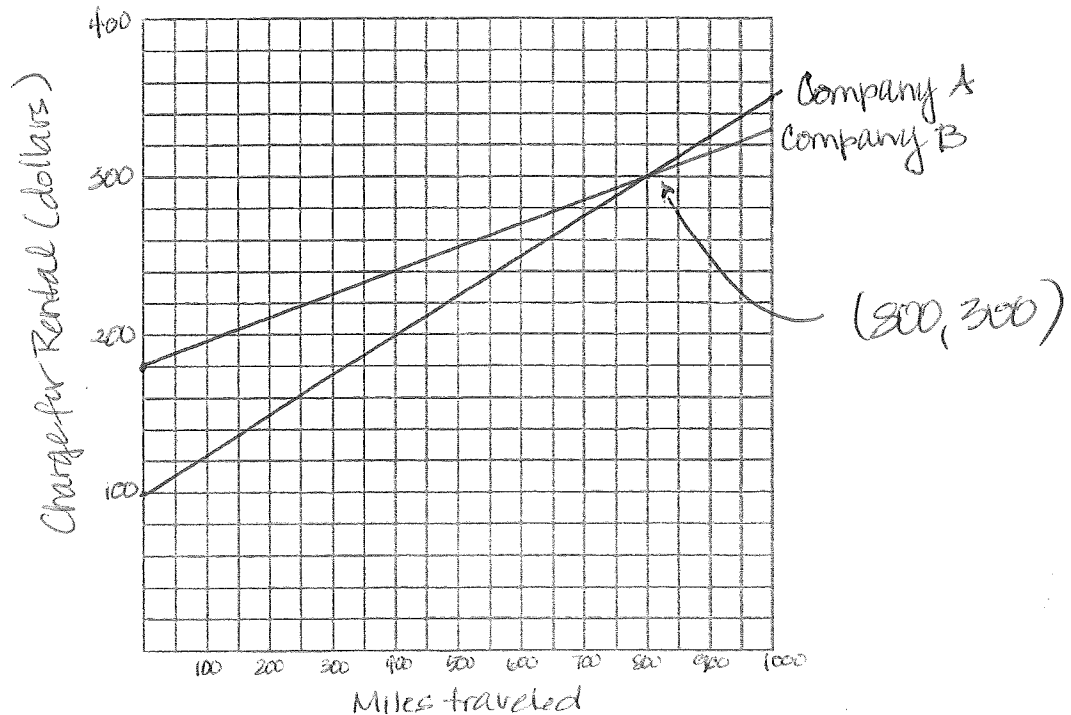
55.) $y = 3(2x + 12)(-3x + 2)$

QUADRATIC

Product of 2 linear expressions

You are planning a road trip this summer and are considering two car rental companies. Company A charges \$100 up front and an additional \$0.25 per mile. Company B charges \$180 up front and an additional \$0.15 per mile.

56.) Graph both situations. Remember that you may need to go out pretty far on your x and y axes.



57.) Use your graph to estimate at how many miles the costs of the two companies will be the same. What is that cost?

$\sim \$300$

58.) For how many miles is Company A *less than* Company B?

~ 800 miles

59.) Redo problems 57 and 58 algebraically using your equations.

$$\begin{array}{r} 100 + .25X = 180 + .15X \\ - .15X \quad - .15X \\ \hline 100 + .1X = 180 \\ -100 \quad -100 \\ \hline .1X = 80 \\ \cdot 10 \quad \cdot 10 \\ \hline X = 800 \text{ miles} \end{array}$$

$$\begin{aligned} C &= 100 + .25X \\ &= 100 + .25(800) \\ &= 100 + 200 \\ &= 300 \end{aligned} \quad \$300$$

60.) Say you choose Company B and drive 1000 miles. How much will it cost?

$$\begin{aligned} C_B &= 180 + .15X \\ C_B &= 180 + .15(1000) \\ C_B &= 330 \end{aligned}$$

Company B will charge
\$330 for driving 1000 miles

Solve the inequality and graph your solution on a number line.

61.) $5(-x+2) > 8x-3$

$$\begin{array}{r} -5x+10 > 8x-3 \\ -8x \quad -8x \\ \hline -13x+10 > -3 \\ -10 \quad -10 \\ \hline -13x > -13 \\ -13 \quad -13 \\ \hline x < 1 \end{array}$$



63.) $3x-8-4x < 14$

$$\begin{array}{r} -x-8 < 14 \\ +8 \quad +8 \\ \hline -x < 22 \\ -1 \quad -1 \\ \hline x > -22 \end{array}$$



62.) $\frac{3}{4}x - \frac{7}{2} \geq \frac{1}{4}x + 6$

$$\begin{array}{r} 3x-14 \geq x+24 \\ -x \quad -x \\ \hline 2x-14 \geq 24 \\ +14 \quad +14 \\ \hline 2x \geq 38 \\ \frac{2}{2} \quad \frac{2}{2} \\ \hline x \geq 19 \end{array}$$



64.) $\frac{2}{3}(5-3x) \leq 12x$

$$\begin{array}{r} \frac{10}{3} - 2x \leq 12x \\ +2x \quad +2x \\ \hline \left(\frac{1}{14}\right) \frac{10}{3} \leq \frac{14x}{14} \\ \frac{10}{42} \leq x \\ \frac{5}{21} \leq x \end{array}$$



Write the equation in slope-intercept form. Identify the slope, x-intercept, and y-intercept.

65.) $5x+10y=25$

$$\begin{array}{r} -5x \quad -5x \\ \hline \frac{10y}{10} = \frac{-5x+25}{10} \end{array}$$

$$\begin{array}{l} y = -\frac{1}{2}x + \frac{5}{2} \\ \text{y-int: } (0, \frac{5}{2}) \\ \text{x-int: } (5, 0) \end{array}$$

66.) $-3x=12+2y$

$$\begin{array}{r} -12 \quad -12 \\ \hline \frac{-3x-12}{2} = \frac{2y}{2} \end{array}$$

$$\begin{array}{l} -\frac{3}{2}x - 6 = y \\ \text{y-int: } (0, -6) \\ \text{x-int: } (-4, 0) \end{array}$$

Write the equation in standard form. Identify the slope, x-intercept, and y-intercept.

67.) $y = -\frac{2}{5}x + 8$

$$\begin{array}{r} +\frac{2}{5}x \quad +\frac{2}{5}x \\ \hline \frac{2}{5}x + y = 8 \end{array}$$

$$\begin{array}{l} \frac{2}{5}x + y = 8 \\ \text{y-int: } (0, 8) \\ \text{x-int: } (20, 0) \end{array}$$

68.) $x = 2y + 10$

$$\begin{array}{r} -2y \quad -2y \\ \hline x - 2y = 10 \end{array}$$

$$\begin{array}{l} x - 2y = 10 \\ \text{y-int: } (0, -5) \\ \text{x-int: } (10, 0) \end{array}$$

69.) Marcello is an artist who makes oil paintings and charcoal sketches. He sells each oil painting for \$500 and each charcoal sketch for \$300. Suppose Marcello makes 86 works in total and earns \$30,000. Write a system of equations that could represent this situation. **DO NOT SOLVE THE SYSTEM.**

$$\begin{cases} x + y = 86 \\ 500x + 300y = 30,000 \end{cases}$$

x : oil paintings
 y : charcoal sketches

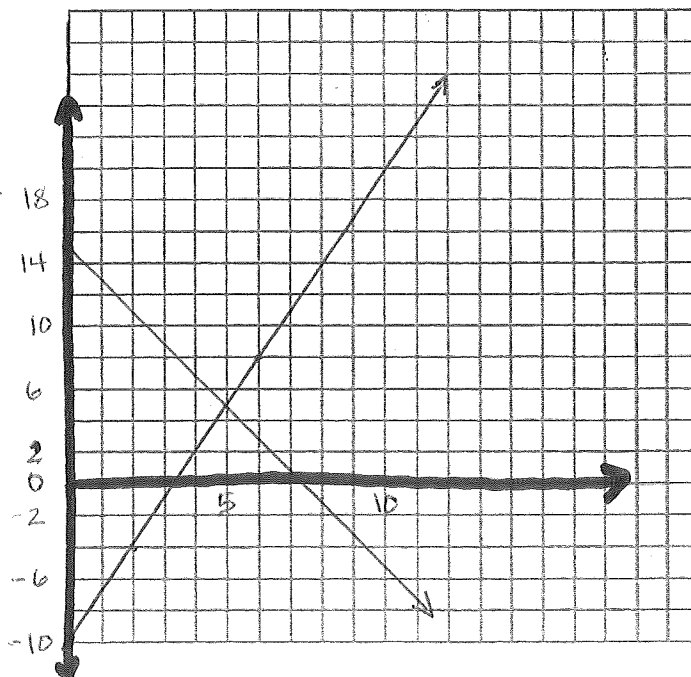
70.) The Plano Texans are a youth drum and bugle corps that competes with music and precision marching against other groups all over the country. The corps rents instruments to members. Each bugle rents for \$10 per month and each drum rents for \$5 per month. Suppose that there are 12 members of the drum and bugle corps who rent an instrument. Write a system of equations that finds the number of bugle rentals b and drum rentals d that supply 12 members and rental budget of \$100. **DO NOT SOLVE THE SYSTEM.**

$$\begin{cases} b + d = 12 \\ 10b + 5d = 100 \end{cases}$$

Solve the system by graphing.

71.)
$$\begin{cases} y = 3x - 10 \\ 2x + y = 15 \\ y = -2x + 15 \end{cases}$$

$(5, 5)$ common solution



Solve the system using the equivalent forms method.

$$72.) \begin{cases} y = \frac{1}{2}x + 4 \\ y = 4x - 3 \end{cases}$$

$$y = \frac{1}{2}(2) + 4 \\ = 1 + 4 \\ = 5$$

$$\begin{array}{r} \frac{1}{2}x + 4 = 4x - 3 \\ -\frac{1}{2}x \quad -\frac{1}{2}x \\ \hline 4 = \frac{7}{2}x - 3 \\ +3 \quad +3 \\ \hline \left(\frac{2}{7}\right) 7 = \frac{7}{2}x \left(\frac{2}{7}\right) \\ 2 = x \end{array}$$

check:

$$y = 4x - 3 \\ 5 = 4(2) - 3 \\ 5 = 8 - 3 \\ 5 = 5 \checkmark$$

$$(2, 5)$$

Solve the system using the substitution method.

$$73.) \begin{cases} x - 3y = 8 \Rightarrow x = 8 + 3y \\ 4x - 2y = 2 \end{cases}$$

$$\begin{array}{r} 4(8 + 3y) - 2y = 2 \\ 32 + 12y - 2y = 2 \\ -32 \quad -32 \\ \hline 10y = -30 \\ 10y = -30 \\ \hline y = -3 \end{array}$$

$$\begin{array}{r} x - 3(-3) = 8 \\ x + 9 = 8 \\ -9 \quad -9 \\ \hline x = -1 \end{array}$$

$$(-1, -3)$$

check:

$$\begin{array}{r} 4x - 2y = 2 \\ 4(-1) - 2(-3) = 2 \\ -4 + 6 = 2 \\ 2 = 2 \checkmark \end{array}$$

Solve the system using the combination/elimination method.

$$74.) \begin{cases} -x + 3y = 9 \\ x + 3y = -1 \end{cases}$$

$$\begin{array}{r} 6y = 8 \\ 6 \quad 6 \\ \hline y = \frac{4}{3} \end{array}$$

$$\begin{array}{r} -x + 3\left(\frac{4}{3}\right) = 9 \\ -x + 4 = 9 \\ -4 \quad -4 \\ \hline -x = 5 \\ x = -5 \end{array}$$

$$\begin{array}{r} (-5) + 3y = -1 \\ +5 \quad +5 \\ \hline 3y = 4 \\ 3 \quad 3 \\ \hline y = \frac{4}{3} \end{array}$$

check:

$$\begin{array}{r} x + 3y = -1 \\ -5 + 3\left(\frac{4}{3}\right) = -1 \\ -5 + 4 = -1 \\ -1 = -1 \checkmark \end{array}$$

$$\left(-5, \frac{4}{3}\right)$$

Solve the systems using any method you like.

$$75.) \begin{cases} 6x - 3y = 15 \\ 4x - 3y = 7 \end{cases}$$

$$\begin{array}{r} 6x - 3y = 15 \\ -4x + 3y = -7 \\ \hline \end{array}$$

$$\frac{2x}{2} = \frac{8}{2}$$

$$x = 4$$

$$\begin{array}{r} 6(4) - 3y = 15 \\ 24 - 3y = 15 \\ -24 \quad -24 \\ \hline -3y = -9 \\ -3 \quad -3 \\ \hline y = 3 \end{array}$$

Check:

$$\begin{array}{l} 4x - 3y = 7 \\ 4(4) - 3(3) = 7 \\ 16 - 9 = 7 \\ 7 = 7 \checkmark \end{array}$$

$$\boxed{(4, 3)}$$

$$76.) \begin{cases} 7x - 3y = -5 & \times 2 \\ -2x + 8y = -20 & \times 7 \end{cases}$$

$$\begin{array}{r} 14x - 6y = -10 \\ -14x + 56y = -140 \\ \hline \end{array}$$

$$\frac{50y}{50} = \frac{-150}{50}$$

$$y = -3$$

$$\begin{array}{r} 7x - 3(-3) = -5 \\ 7x + 9 = -5 \\ -9 \quad -9 \\ \hline 7x = -14 \\ \frac{7x}{7} = \frac{-14}{7} \\ x = -2 \end{array}$$

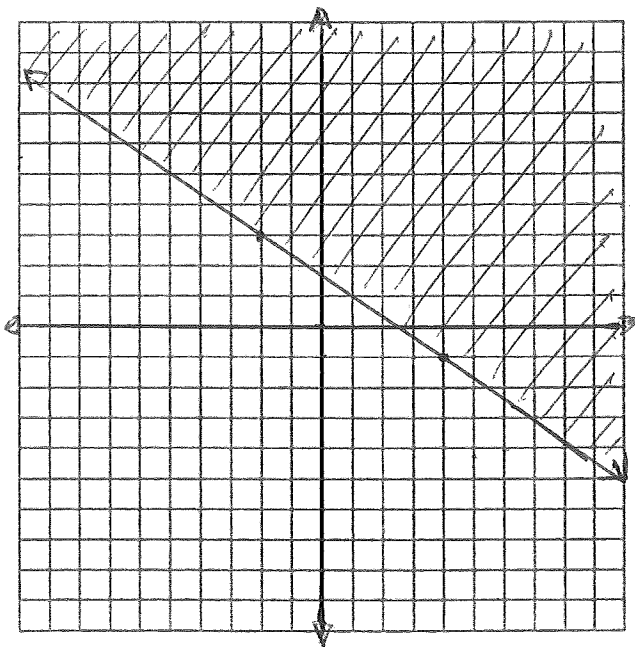
Check:

$$\begin{array}{l} -2x + 8y = -20 \\ -2(-2) + 8(-3) = -20 \\ 4 - 24 = -20 \\ -20 = -20 \checkmark \end{array}$$

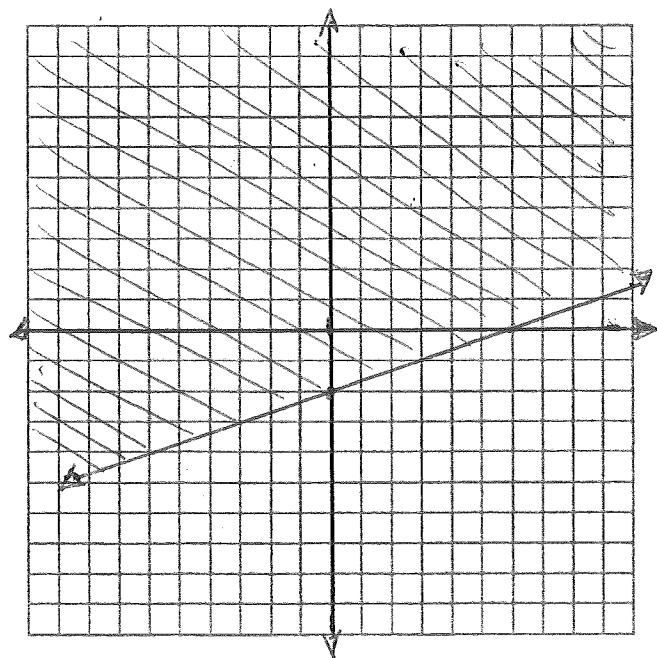
$$\boxed{(-2, -3)}$$

For 77 and 78, draw a graph illustrating all possible solutions of the inequality.

$$77.) 4x + 6y \geq 10$$

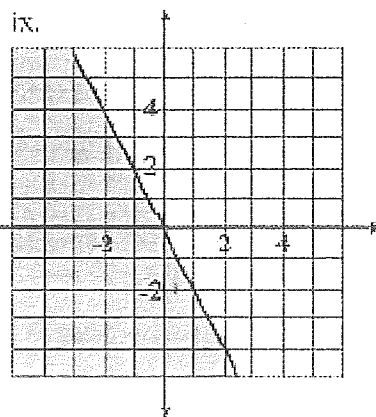
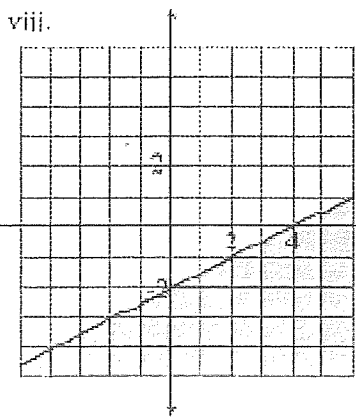
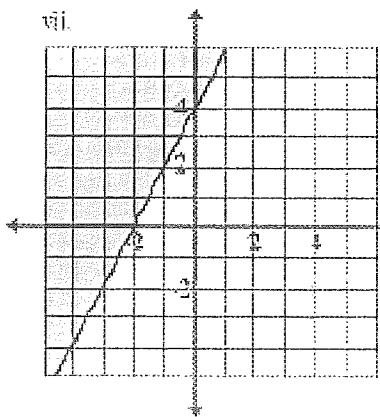
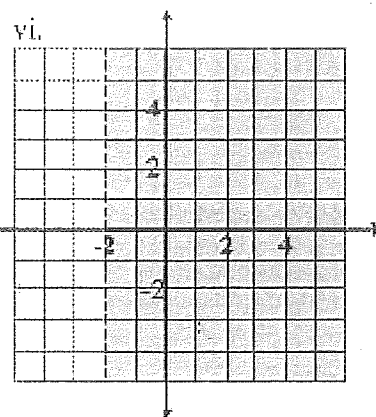
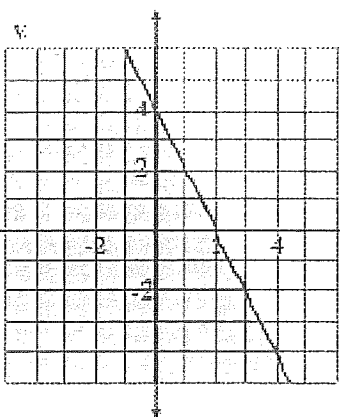
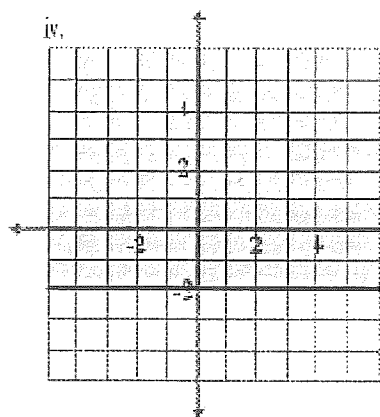
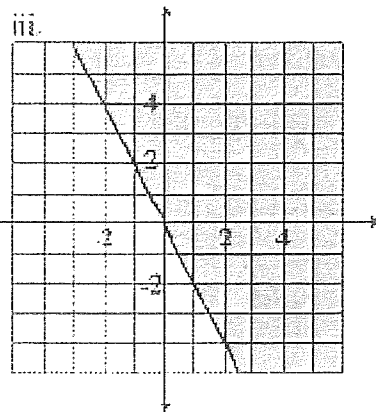
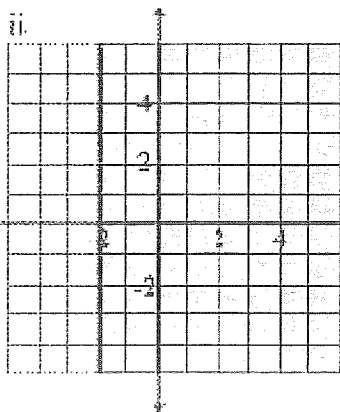
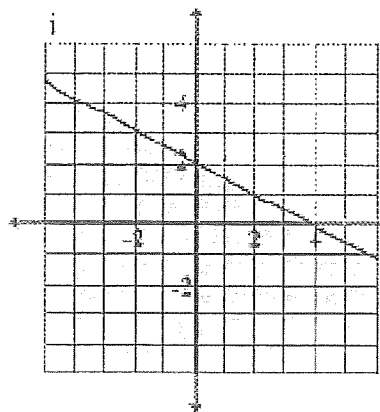


$$78.) x - 3y \leq 6$$



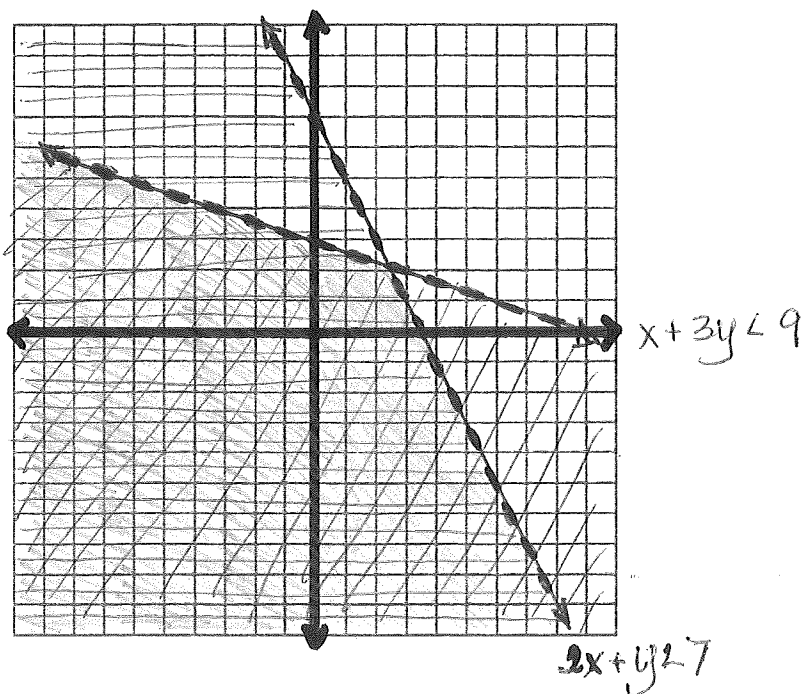
Match the inequality with its graph.

- (viii) 79.) $x - 2y \geq 4$
 $y \leq \frac{x}{2} - 2$
 (i) 82.) $x + 2y \leq 4$
 $y \leq -\frac{x}{2} + 2$
 (ii) 85.) $x \geq -2$
 (vii) 80.) $y - 2x \geq 4$
 $y \geq 2x + 4$
 (iii) 83.) $y \geq -2x$
 (iv) 86.) $y \geq -2$
 (v) 81.) $2x + y \leq 4$
 $y \leq 4 - 2x$
 (ix) 84.) $y \leq -2x$
 (vi) 87.) $-2 < x$



88.) Draw a graph illustrating the solutions to the system of linear inequalities.

$$\begin{cases} 2x + y < 7 \\ x + 3y < 9 \end{cases}$$



Simplify the radical expressions.

$$\begin{aligned} 89.) \sqrt{300} \\ &= \sqrt{100 \cdot 3} \\ &= 10\sqrt{3} \end{aligned}$$

$$\begin{aligned} 90.) \sqrt{63} \\ &= \sqrt{9 \cdot 7} \\ &= 3\sqrt{7} \end{aligned}$$

$$\begin{aligned} 91.) \sqrt{384} \\ &= \sqrt{16 \cdot 4 \cdot 6} \\ &= 8\sqrt{6} \end{aligned}$$

$$\begin{aligned} 92.) \sqrt{8400} \\ &= \sqrt{400 \cdot 21} \\ &= 20\sqrt{21} \end{aligned}$$

$$\begin{aligned} 93.) \sqrt{45} \cdot 3\sqrt{10} \\ &= 3\sqrt{9 \cdot 5 \cdot 5 \cdot 2} \\ &= 45\sqrt{2} \end{aligned}$$

$$\begin{aligned} 94.) 2\sqrt{150} \cdot 4\sqrt{8} \\ &= 8\sqrt{3 \cdot 25 \cdot 2 \cdot 2 \cdot 4} \\ &= 160\sqrt{3} \end{aligned}$$

$$\begin{aligned} 95.) \frac{\sqrt{75}}{\sqrt{3}} \\ &= \sqrt{\frac{75}{3}} \\ &= 5 \end{aligned}$$

$$\begin{aligned} 96.) \frac{\sqrt{10}}{\sqrt{35}} \\ &= \sqrt{\frac{2}{7}} \cdot \frac{\sqrt{7}}{\sqrt{7}} \\ &= \frac{\sqrt{14}}{7} \end{aligned}$$

$$\begin{aligned} 97.) \frac{\sqrt{15}}{\sqrt{45}} &= \frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} \\ &= \frac{\sqrt{3}}{3} \end{aligned}$$

Use the following diagram to perform the given transformations. Identify the coordinates of the new point, segment, or shape.

102.) A after a translation of $(x - 7, y + 2)$

$$A'(-7, 8)$$

103.) B after a reflection across the y -axis

$$B'(-2, 4)$$

104.) Segment CD after a reflection across the line $y = -3$

$$C'(-2, -6) \quad D'(-4, -9)$$

105.) D after a rotation 90 degrees about the origin

$$D'(3, 4)$$

106.) Segment AB after a rotation of 180 degrees about the origin

$$A'(0, -6) \quad B'(-2, -4)$$

107.) Quadrilateral $ABCD$ after a reflection across the y -axis

$$A'(0, 6) \quad B'(-2, 4) \quad C'(2, 0) \quad D'(4, 3)$$

108.) Quadrilateral $ABCD$ after a 180 degree rotation about the point $(0, 2)$

$$A'(9, -2) \quad B'(2, 4) \quad C'(-2, 0) \quad D'(4, 1)$$

109.) Quadrilateral $ABCD$ after a rotation of 90 degrees counterclockwise about the origin

$$A'(-6, 0) \quad B'(-4, 2) \quad C'(0, -2) \quad D'(-3, -4)$$

110.) Quadrilateral $ABCD$ after a rotation of 180 degrees about the origin followed by a reflection in the line $x = 3$

$$A''(6, -6) \quad B''(8, -4) \quad C''(4, 0) \quad D''(2, -3)$$

