# THE SOLUTIONS TO THE PRACTICE PROBLEMS FROM CHAPTERS 3 + 4!

#1) $\frac{400\,cars}{1,000\,people} = \frac{2\,cars}{5\,people} = \frac{2}{5} = 2:5$ ■

#2) $\frac{3}{x} = \frac{6}{30}$

$6x = 90$

$\frac{6x}{6} = \frac{90}{6}$

$x = 15$ ■

#3) $\frac{x}{9} = \frac{x-2}{6}$

$9(x-2) = 6x$

$9x - 18 = 6x$

$-6x \qquad -6x$

$3x - 18 = 0$

$+18 \quad +18$

$3x \qquad = 18$

$x = 6$ ■

#4) 1) *Let* $x =$ *the cost of a* 12 *ounce can of pineapple juice*

3) $\frac{ounces}{\$} = \frac{ounces}{\$}$

$\frac{15}{1.80} = \frac{12}{x}$

4) $15x = 21.60$

$\frac{15x}{15} = \frac{21.60}{15}$

$x = 1.44$

6) A 12 ounce can of pineapple juice would sell for \$1.44. ■

#5) 1) *Let* $x =$ *the sales tax on a car that sold for* \$11,000

2) *Then* $x + 330 =$ *the sales tax on a car that sold for* \$15,000

3) $\frac{sales\ tax}{price\ of\ car} = \frac{sales\ tax}{price\ of\ car}$

$\frac{x}{11,000} = \frac{x+330}{15,000}$

4) $15,000x = 11,000(x+330)$

$15,000x = 11,000x + 3,630,000$

$4,000x = 3,630,000$

$\frac{4,000x}{4,000} = \frac{3,630,000}{4,000}$

$x = 907.50$

6) *The sales tax on the* \$11,000 *was* \$907.50. ■

#6)

1) *Let* $x =$ *# of ounces of* 50 % *alcohol solution*

3) *The amount of alcohol in the* 50 % *solution* + *the amount of alcohol in the* 20 % *solution* = *the amount of alcohol in the* 40% *solution*

$0.50x + 0.20 \cdot 80 = 0.40(80 + x)$

4) $50x + 20 \cdot 80 = 40(80 + x)$

$50x + 1,600 = 3,200 + 40x$

$-40x \qquad\qquad -40x$

$10x + 1,600 = 3,200$

$-1,600 \quad -1,600$

$10x \qquad = 1,600$

$\frac{10x}{10} = \frac{1,600}{10}$

$x = 160$

5) *Check* : $0.50(160) + 0.20(80) = 0.40(160)$

$80 + 16 = 96$✓

6) 160 *ounces of a* 50% *alcohol solution must be added to* 80 *ounces of a* 20% *solution to make* $(160 + 80 = 240)$ *ounces of a* 40% *alcohol solution.* ■

#7) 1) *Let* $x =$ *# of acid of* 50 % *acid solution*

2) *Then* 100-$x$ = *# of acid of* 80% *acid solution*

3) *The amount of acid in the* 50% *solution* + *the amount of acid in the* 80 % *solution* = *the amount of acid in the* 68% *solution*

$0.50x + 0.80(100 - x) = 0.68 \cdot 100$

4) $50x + 80(100 - x) = 68 \cdot 100$

$50x + 8,000 - 80x = 6,800$

$-30x + 8,000 = 6,800$

$-8,000 \quad -8,000$

$-30x \qquad = -1,200$

$\frac{-30x}{-30} = \frac{-1,200}{-30}$

$x = 40$

5) *Check* : $0.50(40) + 0.80(60) = 0.68(100)$

$20 + 48 = 68$✓

6) 40 *ml of a* 50% *acid solution must be added to* 60 *ml of a* 80% *solution to make* 100 *ml of a* 68% *acid solution.* ■

#8) 1) *let* $x = \#$ *of dollars invested at* 3%
2) *let* $14,000 - x = \#$ *of* \$ *invested at* 6%
3) *the amount of interest earned at* 3%
+ *the amount of interest earned at* 6%
= *the total interest earned,* \$735

$$0.03x + 0.06(14,000 - x) = 735.00$$

4)
$$3x + 6(14,000 - x) = 73,500$$
$$3x + 84,000 - 6x = 73,500$$
$$-3x + 84,000 = 73,500$$
$$-84,000 \quad -84,000$$
$$-3x = -10,500$$
$$\frac{-3x}{-3} = \frac{-10,500}{-3}$$
$$x = 3,500$$

5) 3% *of* $3,500 = \$105$
*and* 6% *of* $\$10,500 = 630$
*which adds up to a total of* \$735 *in interest.*

6) \$3,500 *should be invested at* 3% *and* $(14,000 - 3,500) = \$10,500$ *should be invested at* 6%. ■

#9) 1) *let* $x = \#$ *of dollars invested at* 10%
2) *let* $3,000 - x = \#$ *of* \$ *invested at* 5%
3) *the amount of interest earned at* 10%
= *the amount of interest earned at* 5%

$$0.10x = 0.05(3,000 - x)$$

4)
$$10x = 5(3,000 - x)$$
$$10x = 15,000 - 5x$$
$$15x = 15,000$$
$$x = 1,000$$

6) \$1,000 *was invested at* 10% *and* $(3,000 - 1,000) = \$2,000$ *was invested at* 5%. ■

#10) 1) *let* $x =$ *# of hours*
3) *the distance of the first bus*
+ *the distance of the second bus*
= *the total distance*

$$60x + 50x = 385$$

4)
$$110x = 385$$
$$\frac{110x}{110} = \frac{385}{110}$$
$$x = 3.5$$

5) *It will take them* 3.5 *hours for the two buses to meet.* ■

#11) 1) *Let* $x = \#$ *of hours traveling by plane*
2) *Then* $x - 2 = \#$ *of hours traveling by car*
3) *the distance traveling by plane*
+ *the distance traveling by car*
= *the total distance*

$$450x + 50(x - 2) = 1,900$$

4)
$$450x + 50x - 100 = 1,900$$
$$500x = 2,000$$
$$x = 4$$

6) *Your travel* 4 *hours by plane and* 2 *hours by car.* ■

#12) $C = \pi \cdot r^2$
$C = \pi \cdot 36$
$C = 36\pi$ *square inches*
$C = 36 \cdot 3.14$
$C = 113$ *square inches* ■

#13) $A = \frac{1}{2}bh$
$A = \frac{1}{2} \cdot 15 \cdot 16$
$A = \frac{1}{2} \cdot 240$
$A = 120$ *square inches* ■

#14) $V = \pi r^2 h$
$V = \pi \cdot (1.5)^2 \cdot 4.5$
$V = \pi \cdot 2.25 \cdot 4.5$
$V = 10.125\pi$ *cubic inches*
$V = 32$ *cubic inches* ■

#15) $V = \pi r^2 h$
$V = \pi \cdot 2^2 \cdot 4$
$V = 16\pi$
$V = 16 \cdot 3.14$
$V \approx 50$ *cubic feet*

20 *fish* ■
$2.5\overline{)50.0}$

#16) 1) *Let* $x =$ *measure of 1st angle*
2) *Then* $2x + 10 =$ *measure of 2nd angle*
*Then* $2x + 20 =$ *measure of 3rd angle*
3) $m\angle 1 + m\angle 2 + m\angle 3 = 180°$

$$x + (2x + 10) + (2x + 20) = 180$$

4)
$$\begin{array}{r} 5x + 30 = 180 \\ -30 \quad -30 \\ \hline 5x \quad = 150 \\ x \quad = 30 \end{array}$$

6) *The measure of the first angle is* $30°$ *and the measure of the second angle is* $(2 \cdot 30 + 10) = 70°$ *and the measure of the third angle is* $(2 \cdot 30 + 20) = 80°$. ■

#17) *let* $x =$ *measure of the angle*
2) *then* $180 - x =$ *measure of the supplement*
3) *the measure of the angle* $=$ $12°$ *less than the supplement*
$x = (180 - x) - 12$
4) $x = 168 - x$
$+x \qquad +x$
$2x = 168$
$x = 84$
6) *The measure of the angle is* $84°$ *and the measure of the supplement is* $96°$. ■

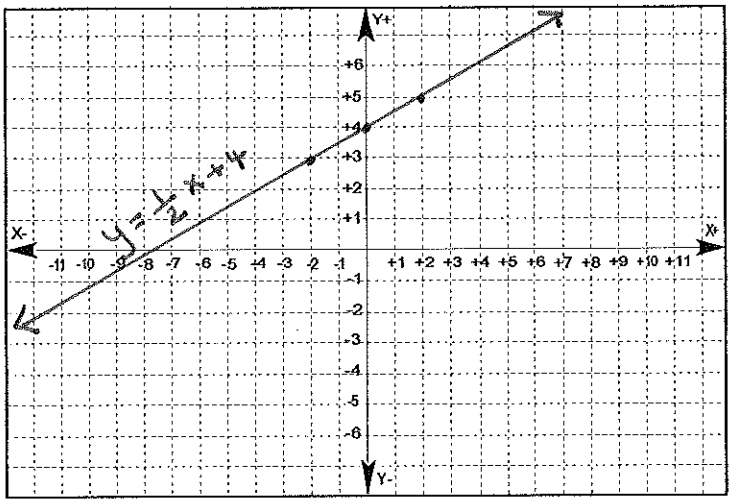
#18) 1) *Let* $x =$ *the measure of the angle*
2) *Then* $180 - x =$ *the supplement*
*Then* $90 - x =$ *the complement*
3) *The supplement* $= 2 \cdot$ *complement* $+ 52$
$180 - x = 2(90 - x) + 52$
4) $180 - x = 180 - 2x + 52$
$-x = -2x + 52$
$x = 52$
5) *Check* : $180 - 52 \stackrel{?}{=} 180 - 2 \cdot 52 + 52$
$128 \stackrel{?}{=} 180 - 104 + 52$
$128 \stackrel{?}{=} 76 + 52$
$128 = 128$ ✓
6) *The measure of the angle is* $52°$.

#19)
*Perimeter* $= 8 + 3 + 1 + 10 + 9 + 13 = 44\,cm$
*Area* $= 1 \cdot 10 + 8 \cdot 13 = 10 + 84 = 94\,cm^2$ ■

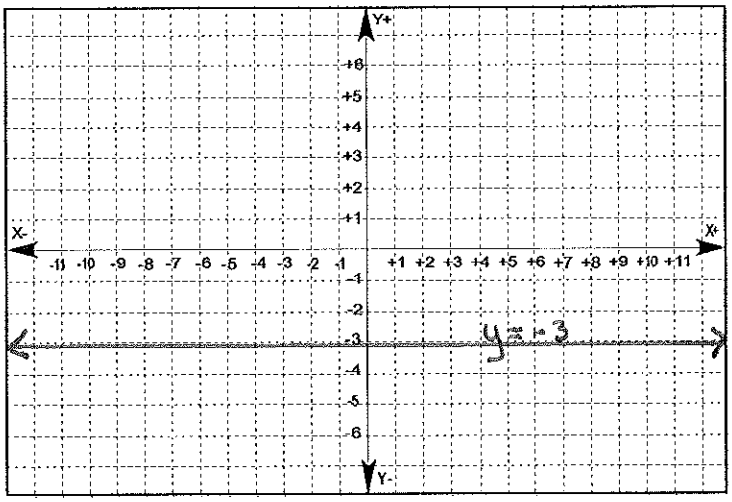
#20) $2x - y = -3$.
$2(-2) - (-1) \stackrel{?}{=} -3$
$-4 + 1 \stackrel{?}{=} -3$
$-3 = -3$ *True*
$(-2, -1)$ *is a solution of* $2x - y = -3$. ■

#21) $y = \frac{1}{2}x + 4$ using $-2$, $0$, and $-2$ for $x$.

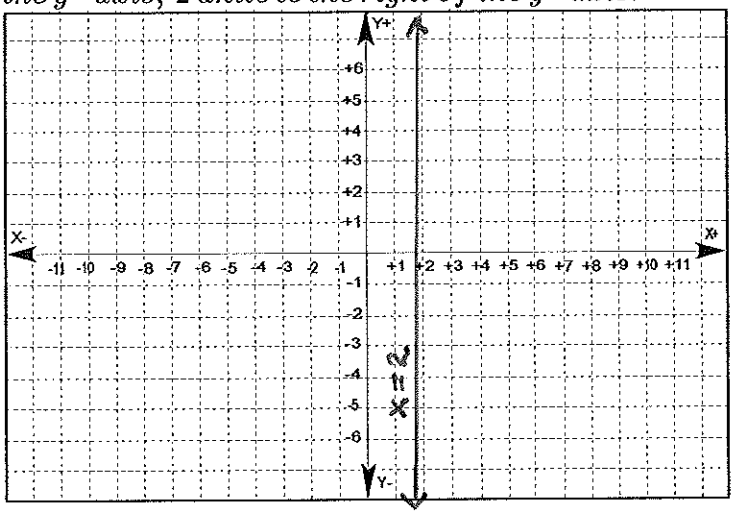
| $x$ | $y = \frac{1}{2}x + 4$ | $(x, y)$ |
|---|---|---|
| $-2$ | $y = \frac{1}{2}(-2) + 4 = -1 + 4 = 3$ | $(-2, 3)$ |
| $0$ | $y = \frac{1}{2} \cdot 0 + 4 = 4$ | $(0, 4)$ |
| $2$ | $y = \frac{1}{2} \cdot 2 + 4 = 1 + 4 = 5$ | $(2, 5)$ |




#22) *To graph* $y = -3$ *recall that the graph of any equation in the form* $y = b$ *is a horizontal line. In this case, the horizontal line will be a parallel line to the* $x-$*axis,* $3$ *units below the* $x-$*axis.*



#23) *To graph* $x = 2$ *recall that the graph of any equation in the form* $x = a$ *is a vertical line. In this case, the vertical line will be a parallel line to the* $y-$*axis,* $2$ *units to the right of the* $y-$*axis.*




#24) *To find the y-intercept, let* $x = 0$

$$-27x + 9y = 54$$
$$-27 \cdot 0 + 9y = 54$$
$$9y = 54$$
$$y = 6$$

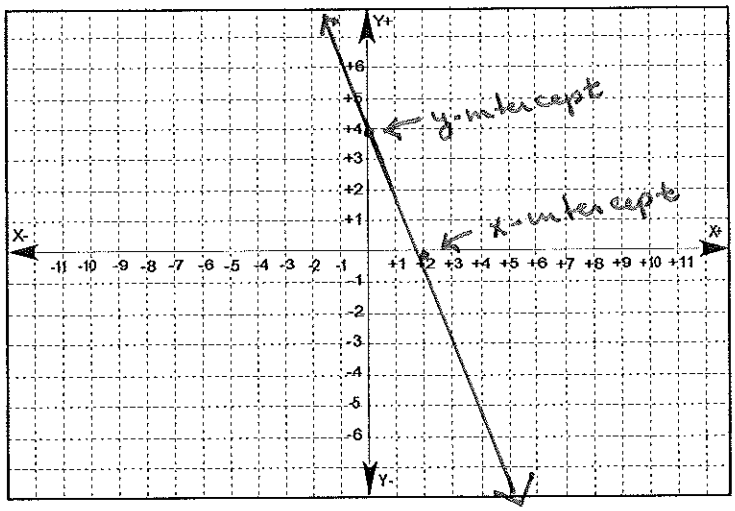
*To find the x-intercept, let* $y = 0$

$$-27x + 9y = 54$$
$$-27x + 9 \cdot 0 = 54$$
$$-27x = 54$$
$$x = -2$$

*The y-intercept is* $(0, 6)$ *and the x-intercept is* $(-2, 0)$. ■

#25) $4x + 2y = 8$

| $x$ | $y$ |
|---|---|
| 0 | 4 |
| 2 | 0 |




#26) $(x_1, y_1) = (-4, -1)$ *and* $(x_2, y_2) = (2, 3)$

$m = \frac{3-(-1)}{2-(-4)} = \frac{3+1}{2+4} = \frac{4}{6} = \frac{2}{3}$ ■

#27) $(x_1, y_1) = (0, 4)$ *and* $(x_2, y_2) = (6, 0)$

$m = \frac{0-4}{6-0} = \frac{-4}{6} = \frac{-2}{3}$ ■

#28) $m = \frac{-2-(-1)}{3-7} = \frac{-2+1}{3+(-7)} = \frac{-1}{-4} = \frac{1}{4}$ ■

#29) $m = \frac{-4-(-4)}{2-3} = \frac{-4+(+4)}{2+(-3)} = \frac{0}{-1} = 0$ ■

#30) $2x - 3y = 15$

$$-3y = -2x + 15$$
$$\frac{-3y}{-3} = \frac{-2x}{-3} + \frac{15}{-3}$$
$$y = \frac{2}{3}x - 5$$

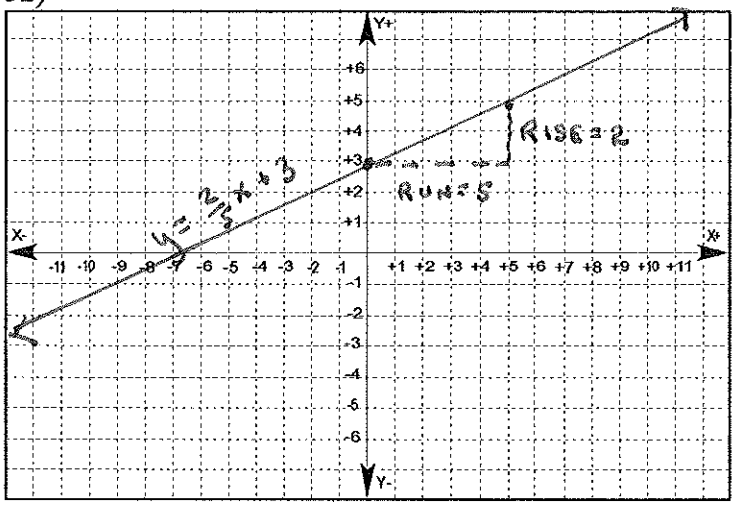
*The slope of the given line is* $\frac{2}{3}$ *so the slope of the new line is* $\frac{-3}{2}$. ■ *(The two slopes are negative reciprocals and have a product of* $-1$.*)*

31) $-15x - 45y = -135$

$$\underline{+15x \qquad\qquad +15x}$$
$$-45y = 15x - 135$$
$$\frac{-45y}{-45} = \frac{15x}{-45} + \frac{-135}{-45}$$
$$y = -\frac{1}{3}x + 3$$

*The slope is* $\frac{-1}{3}$ *and the coordinates of the* $y-$*intercept are* $(0, 3)$. ■

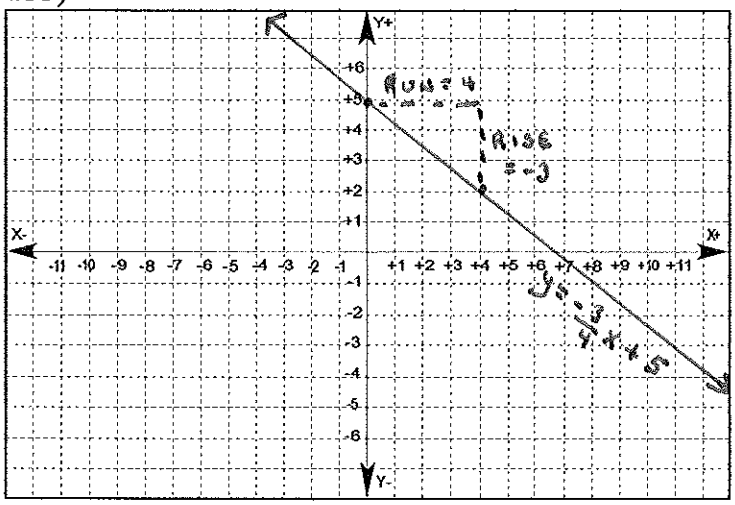
32)




$y - y_1 = m(x - x_1)$
$y - (-3) = \frac{-2}{3}(x - (-2))$
$y + 3 = \frac{-2}{3}(x + 2)$ *Point−Slope Form*
$y + 3 = \frac{-2}{3}x - \frac{4}{3}$
$-\frac{9}{3} \qquad -\frac{9}{3}$
$y \quad = \frac{-2}{3}x - \frac{13}{3}$ *Slope−Intercept Form*

$3 \cdot y = 3 \cdot \frac{-2}{3}x - 3 \cdot \frac{13}{3}$
$3y = -2x - 13$
$2x + 3y = -13$ *Standard Form* ■

#33)




36) *Step#1) Find the slope!*
$m = \frac{-11-(-5)}{-5-(-2)} = \frac{-11+5}{-5+2} = \frac{-6}{-3} = 2$

$y - y_1 = m(x - x_1)$
$y - (-5) = 2(x - (-2))$
$y + 5 = 2(x + 2)$ *Point−Slope Form*
$y + 5 = 2x + 4$
$-5 \qquad -5$
$y \quad = 2x - 1$ *Slope−Intercept Form*

$-2x + y = -1$
$-1(-2x) + -1(y) = -1 \cdot (-1)$
$2x - y = 1$ *Standard Form* ■

34) $m = -2$, $point_1 = (x_1, y_1) = (3, 4)$

$y - y_1 = m(x - x_1)$
$y - 4 = -2(x - 3)$ *Point−Slope Form*
$y - 4 = -2x + 6$
$+4 \qquad +4$
$y \quad = -2x + 10$ *Slope−Intercept Form*

$2x + y = 10$ *Standard Form* ■

35) $2x + 3y = 10$
$3y = -2x + 10$
$\frac{3y}{3} = \frac{-2}{3}x + \frac{10}{3}$
$y = \frac{-2}{3}x + \frac{10}{3}$

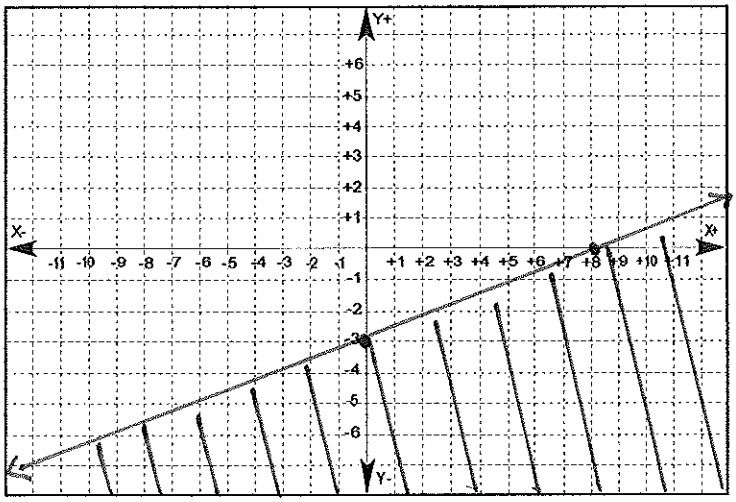
*slope of the new line* $= \frac{-2}{3}$
*point on the new line* $= (-2, -3)$

37) $-6x + 16y \leq -48$
*Set* $x = 0$ *to find the y−intercept.*
$-6 \cdot 0 + 16y = -48$
$16y = -48$
$y = -3$
*Set* $y = 0$ *to find the x−intercept.*
$-6x + 16 \cdot 0 = -48$
$-6x = -48$
$x = 8$

*Graph a solid line throught the intercepts* $(0, -3)$ *and* $(8, 0)$ *because the equation contains a* $\leq$ *symbol. Then use the* $(0, 0)$ *test to determine which half−plane to shade.*

$-6x + 16y \leq -48$
$-6 \cdot 0 + 16 \cdot 0 \leq -48$
$0 \leq -48$ *FALSE!*

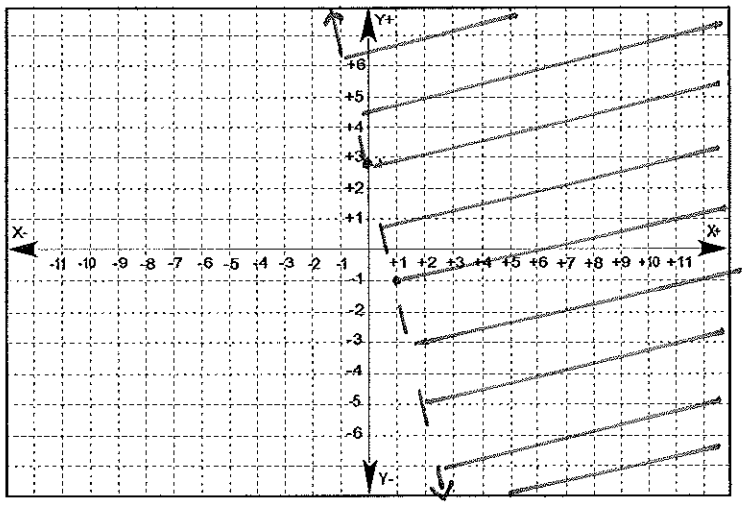
*Shade the half−plane that does not contain* $(0, 0)$!




#38) *Graph* $y > -4x + 3$ *by first graphing the line* $y = -4x + 3$. *Plot the* $y-$*intercept,* 3, *and then run* 1 *and rise* $-4$ *to find a second point,* $(1, -1)$. *Connect the points but make the line a dashed line because the equation contain a* $<$ *symbol. The dashed line indicates that the points on the line are not part of the solution, just a boundary. Then test* $(0, 0)$.

$y > -4x + 3$
$0 > -4 \cdot 0 + 3$
$0 > 3$ *FALSE*!

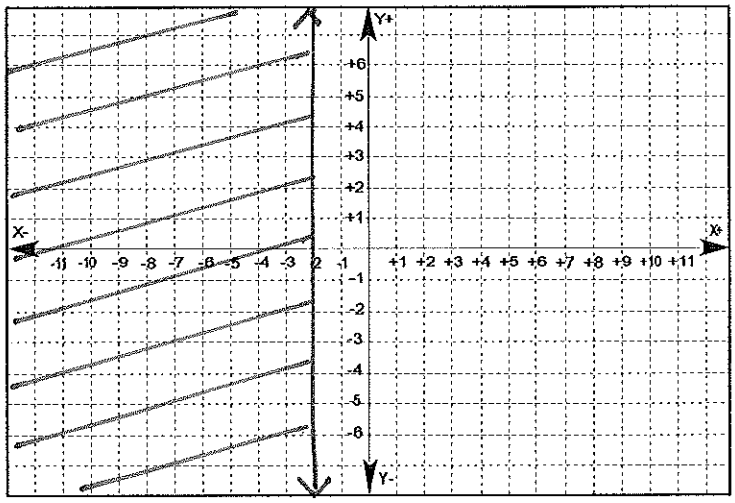
*Therefore, shade the half-plane that does not include* $(0, 0)$!




#39) *Graph* $x \leq -2$ *by first graphing the vertical line* $x = -2$ *as a solid line because the boundary is a part of the solution. Then use the* $(0, 0)$ *test.*

$x \leq -2$
$0 \leq -2$ *FALSE*!

*Therefore, shade the half-plane that does not include* $(0, 0)$!




#40) *Graph* $y > -2$ *by first graphing the horizontal line* $y = -2$ *as a broken line because the boundary is not a part of the solution. Then use the* $(0, 0)$ *test.*

$y > -2$
$0 > -2$ *TRUE*!

*Therefore, shade the half-plane that includes* $(0, 0)$!