Rosa International Middle School
Introduction to Functions
Summer Packet

KEY

MATHEMATICAL NUMBER SENSE

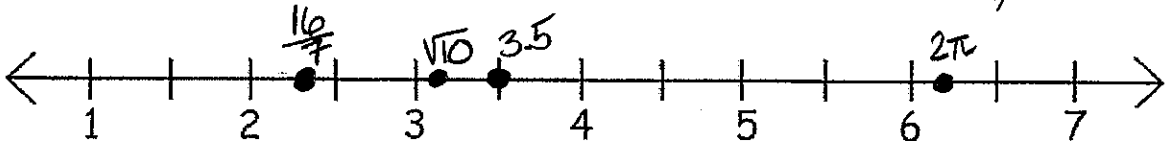
1. Describe each of the numbers as rational or irrational.

$\frac{\pi}{2}$	$\sqrt{5}$	$-(3)^2$	$\frac{1}{3}$	$\frac{a}{b}$ if $b \neq 0$
I	I	R	R	R

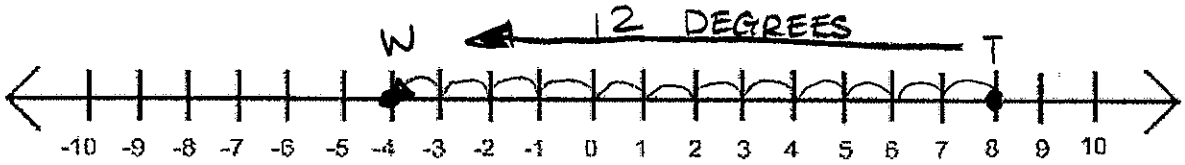
2. Circle **ALL** of the answers that are equivalent to: $m \times \frac{p}{r}$

(a.) $\frac{m}{1} \times \frac{p}{r}$ b. $\frac{m}{r} \times \frac{p}{r}$ (c) $\frac{m}{r} \times p$ (d.) $(m \times p) \times \frac{1}{r}$

3. Plot the following numbers on a number line. 2π, $\sqrt{10}$, 3.5, $\frac{16}{7}$



4. The temperature on Tuesday was 8 degrees. On Wednesday the temperature fell 12 degrees. Use the number line to show how to calculate Wednesday's temperature.



5. Rewrite a problem that is the same as $-\frac{4}{11} - (-\frac{2}{5})$ then solve your new problem.

$-\frac{4}{11} + \frac{2}{5} = -\frac{20}{55} + \frac{22}{55} = \frac{2}{55}$

6. How many numbers have an absolute value of 4? 4, -1 of 0? 0 of -3? NONE

7. Find $0 \div 8$. 0 Find $8 \div 0$. NOT POSSIBLE

8. Define integer and give 3 examples.

Integers are the set of positive whole numbers, their opposites, and zero. ex: 0, -3, 3, 5, -5

9. Find the mean and median of the following set of numbers.

10.4, 4.0, 3.6, 2.2, 5.8, 0.4

Mean: 4.4

Median: 3.8

10. Rewrite each fraction as a decimal. $-\frac{114}{8}$ $\frac{53}{12}$

-14.25 $4.41\overline{6}$

11. Rewrite as a fraction in lowest terms. -1.372 2.48

$-1\frac{93}{250}$ $2\frac{12}{25}$

12. Calculate.

a. $2\frac{1}{4}\left(-3\frac{1}{2}\right)$

$-7\frac{7}{8}$

b. $4\frac{1}{3}\div\frac{2}{5}$

$10\frac{5}{6}$

c. $0.2\cdot\left(-\frac{1}{4}\right)$

-0.05

$-\frac{1}{20}$ OR

d. $-\frac{3}{5}\left(\frac{2}{3}-\frac{1}{4}\right)$

$-\frac{1}{4}$

13. Jimmy was notified that his balance in his bank account was –7 dollars and he was being charged a $30 fee since he had a negative balance. Today he added $50 to his account. What is Jimmy's new balance after today's deposit?

$-7-30+50=\$13$

PROPORTIONS

1. The scale on a map is 1 cm = 3.5 mi. Alfredo measures the distance on the map between two towns and calculates it to be 6.5 cm. How far apart are the towns?

$\frac{1cm}{3.5mi} = \frac{6cm}{x}$ $x = 21$ miles

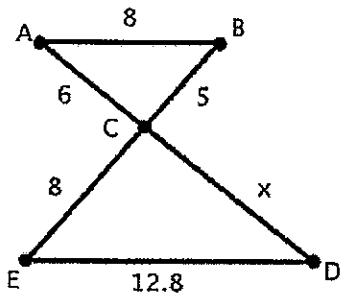
2. A science book shows a picture using a scale of 1 cm = 0.02 mm. The actual is 0.054 mm. How thick is the picture in the book?

$\frac{1cm}{0.02mm} = \frac{x}{0.054mm}$ $x = 2.7cm$

3. Jimmy casts a shadow that is 3.2 feet long and is five feet tall. At the same time a flagpole casts a shadow that is 12 feet long. How tall is the flagpole?

$\frac{S}{A} = \frac{3.2}{5} = \frac{12}{x}$ $x = 18.75$ ft

4. Write a proportion to find the missing side.



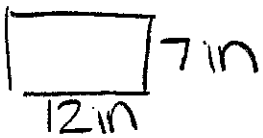
$\frac{12.8}{8} = \frac{x}{6}$ $x = 9.6$ units

5. A sketch of a rectangular poster for a bus is 9 inches high by 11 inches wide. The poster company is using a scale of 1 *inch* $= 1\frac{3}{4}$ *feet*. What are the dimensions of the actual poster?

$\frac{1in}{1.75ft} = \frac{9in}{H}$ $\frac{1in}{1.75ft} = \frac{11in}{L}$

Height= 15.75 ft Length= 19.25 ft

6. The dimensions of a rectangle photograph are 12 inches long by 7 inches wide. Find the measurements of the picture after it is dilated using a scale factor of 4.



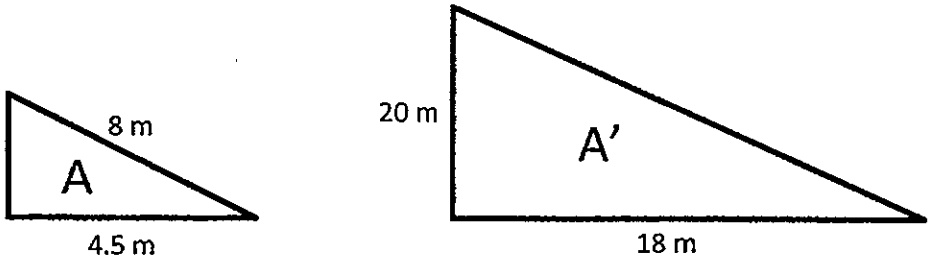
Length= 48 in Width= 28 in

7. A triangle has side measuring 24 inches, 10 inches and 8 inches. What are the lengths of the sides after a dilation using a scale factor of $\frac{14}{4}$?

84, 35, 28

8. Figure A was dilated to form figure A'. Find the scale factor.

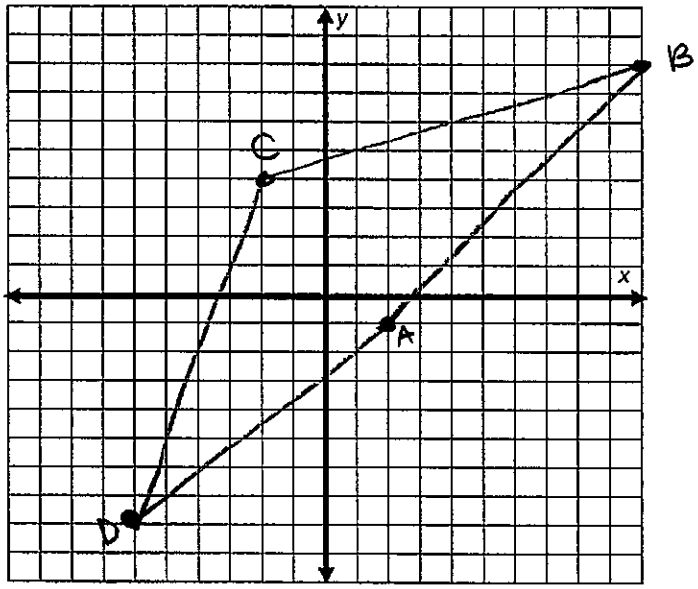
Scale Factor = 4



9. Graph and label the points to form quadrilateral ABCD.

A (2, -1) B (10, 8)

C (-2, 4) D (-6, -8)



Dilate ABCD using a scale Factor of $\frac{1}{2}$. Graph and label the points. List the points below.

A' (1 , -0.5)

B' (5 , 4)

C' (-1 , 2)

D' (-3 , -4)

GEOMETRY

Find the compliment and supplement of each angle.

1. $m\angle ABC = 38°$

   complement = 52°

   supplement = 142°

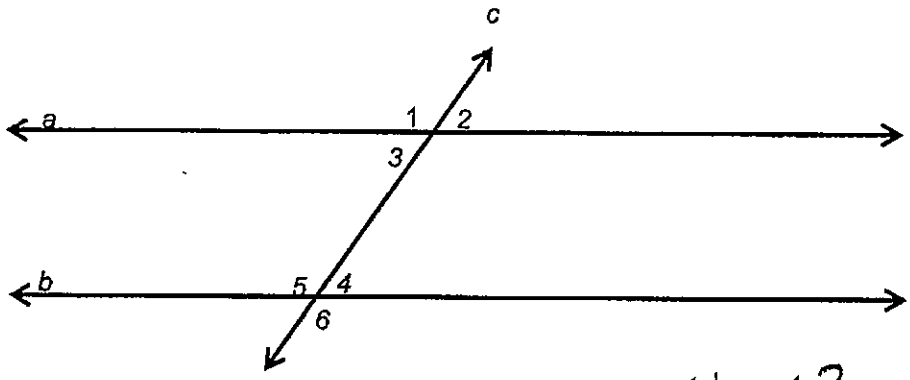
2. $m\angle EFG = 18°$

   complement = 72°

   supplement = 162°

Use the drawing below to answer questions 3-7.

$a \| b$



3. Name a pair of adjacent angles at the intersection of line *a* and line *c* ∠1, ∠2

4. Name a pair of vertical angles at the intersection of line *b* and line *c* ∠5, ∠6

5. Name a pair of alternate interior angles ∠3, ∠4

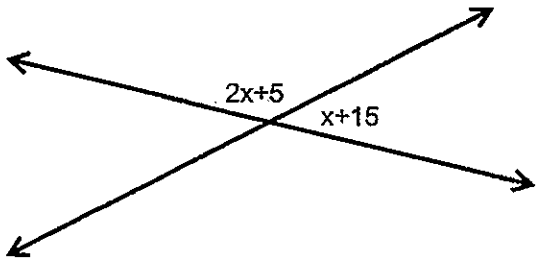
6. Name a pair of alternate exterior angles ∠1, ∠6

7. Name a pair of supplementary angles at the intersection of line *b* and *c* ∠5, ∠4

Use the diagrams to answer the questions 8 - 10. Show work.

8. Find *x*. $53\frac{1}{3}$

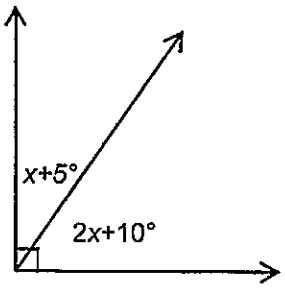
$3x+20=180$



9. Find the measure of each angle.

30°

60°



10. Find the measures angles 1-5 if the $m\angle 6$ *is* 112°

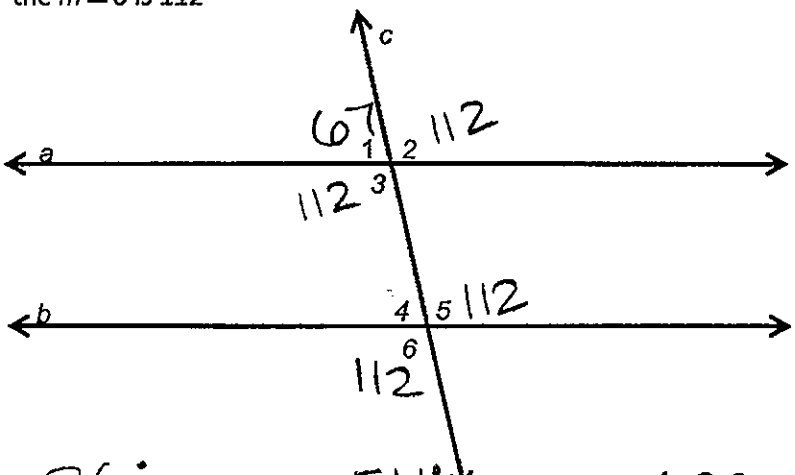
$m\angle 1 = 68^\circ$

$m\angle 2 = 112^\circ$

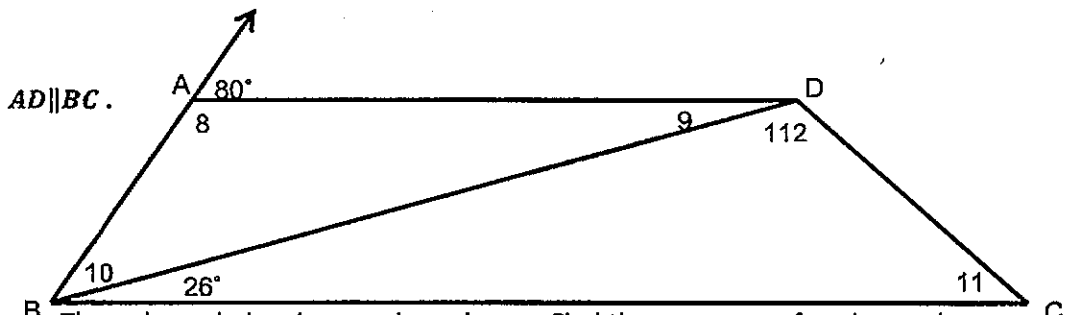
$m\angle 3 = 112^\circ$

$m\angle 4 = 68^\circ$

$m\angle 5 = 112^\circ$



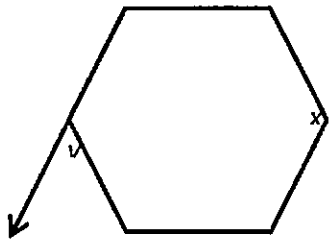
11. $m\angle 8 = 100^\circ$ $m\angle 9 = 26^\circ$ $m\angle 10 = 54^\circ$ $m\angle 11 = 42^\circ$



12. The polygon below is a regular polygon. Find the measures of angle *x* and *y*.

$m\angle x = 120^\circ$

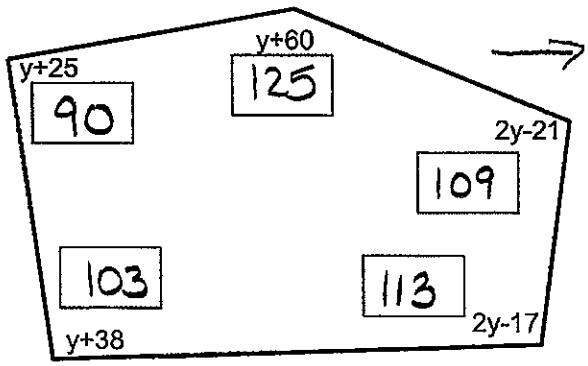
$m\angle y = 60^\circ$



13. Find the value of *y*. **Write the measure of each angle inside the figure in the boxes.**

$y = 65$

$7y + 85 = 540$

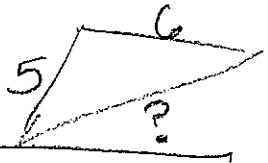


→ SUM: 540

14. A triangle has sides measuring 6 meters and 5 meters. The length of the third side is a whole number. Give **ALL** of the possible lengths of the third side.

$5 + x > 6$ | $5 + 6 > x$ | $x + 6 > 5$

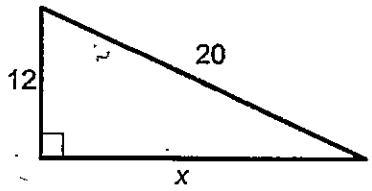
$x > 1$ | $11 > x$ | $x > -1$



2, 3, 4, 5, 6, 7, 8, 9, 10

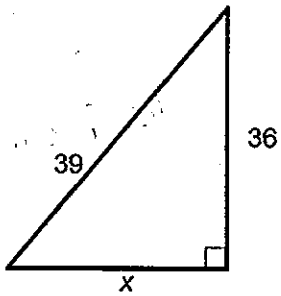
For problems 15-16 find the length of the missing side. Round all of your answers to the nearest tenth, where necessary.

15.



$X = 16$

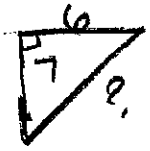
16.



$X = 15$

For problems 17-18 place the answer to each question on the blank. Show work. Round all of your answers to the nearest tenth, where necessary.

17. A man walks his dog 7 blocks north then turns and walks 6 blocks to the east. How far are the man and his dog from the starting point?



≈ 9.2

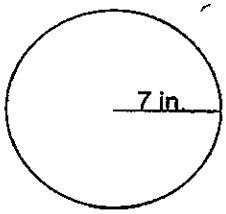
18. A square has a perimeter of 32 inches. Find the length of the diagonal of the square.

11.3 in

19. Circumference 14π

Area 49π

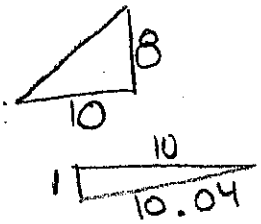
Leave your answers in terms of pi.

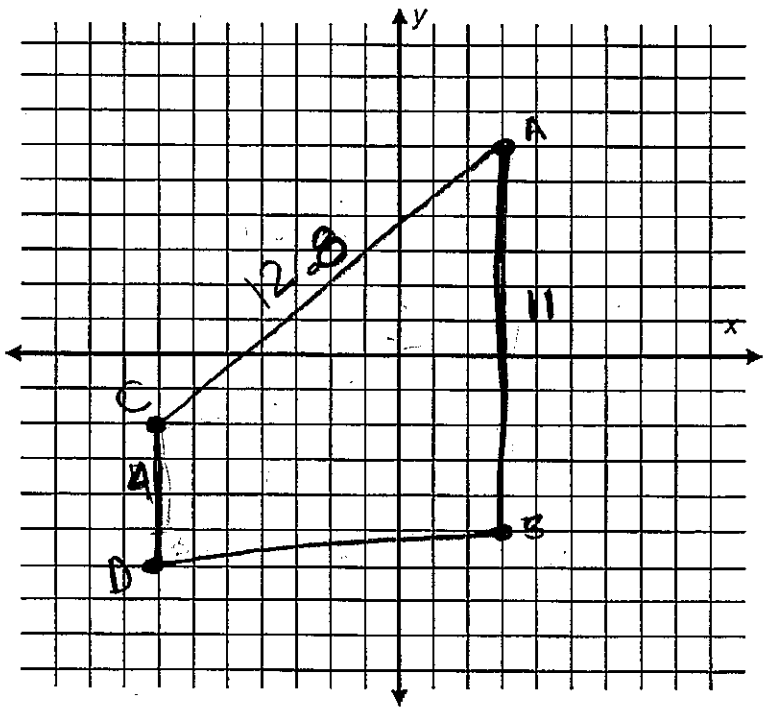


20. Graph: A (3, 6), B (3, -5), C (-7, -2), D (-7, 6) **Show all work. Label your answers.**

Perimeter = 37.84 units

Area = 75 units^2

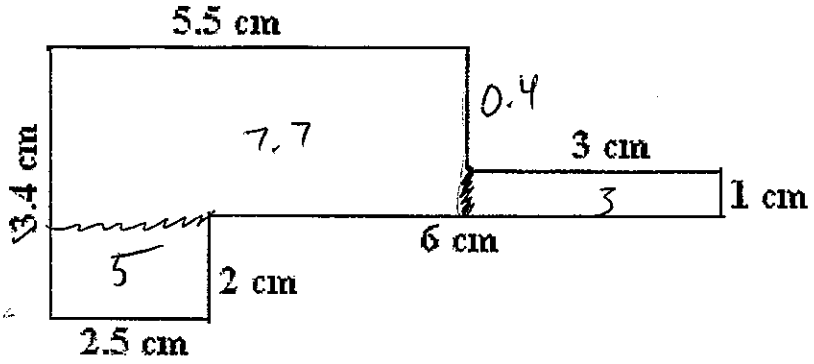




Find the perimeter and area of the figure. **Show all work.**

21. Perimeter= 23.8 cm

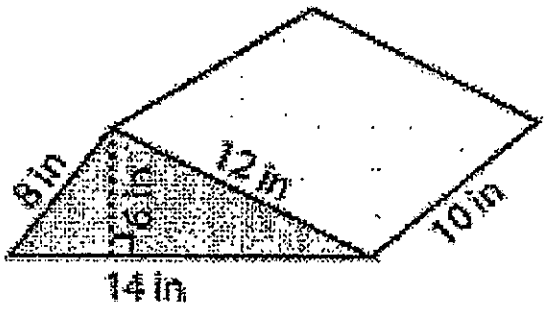
22. Area = 15.7 cm^2

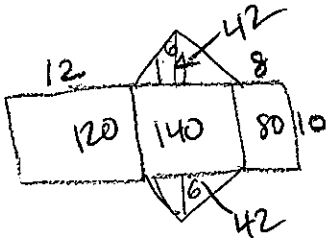


Find the surface area and volume of the following:

23. Surface Area = 424 in^2

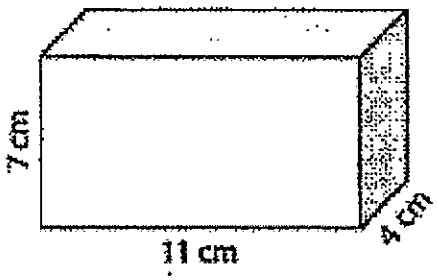
24. Volume = 420 in^3





25. Surface Area = 298 cm^2

26. Volume = 308 cm^3



$7(11)2 - 154$

$4(11)2 - 88$

$4(7)2 - 56$

EXPRESSIONS AND EQUATIONS

Simplify the expressions using distributive property and combining like terms.

1. $3x - 8 + 2x - 5$

$5x - 13$

2. $2x + 6y - 2 - 3y - 7x + 2$

$-5x + 3y$

3. $\frac{1}{2}(12y - 2)$

$6y - 1$

4. $4(5 - 3x) - 6(x + 5)$

$20 - 12x - 6x - 30$

$= -18x - 10$

Solve the following equations.

5. $2x - 12 = -12$

$+12 \quad +12$

$\frac{2x}{2} = \frac{0}{2}$

$x = 0$

6. $15 + \frac{x}{2} = 12$

$-15 \quad -15$

$2\left(\frac{x}{2}\right) = (-3)2$

$x = -6$

7. $26 = \frac{x}{3} + 16$

$-16 \quad -16$

$3(10) = \left(\frac{x}{3}\right)3$

$x = 30$

8. $5x + 6 - 3x + 2 = 28 - 4$

$2x + 8 = 24$

$-8 \quad -8$

$\frac{2x}{2} = \frac{16}{2} \quad x = 8$

9. $5x - 20 = -40 + 15$

$5x - 20 = -25$

$+20 \quad +20$

$\frac{5x}{5} = \frac{-5}{5} \quad x = -1$

10. $3(x + 9) = 2x + 4$

$3x + 27 = 2x + 4$

$-2x \quad -2x$

$x + 27 = 4$

$-27 \quad -27$

$x = -23$

11. $4[5(x + 3) - (2x + 1)] = 3x + 11$

$4[5x + 15 - 2x - 1] = 3x + 11$

$4[3x + 14] = 3x + 11$

$12x + 56 = 3x + 11$

$-3x \quad -56 \quad -3x \quad -56$

$9x = -45 \quad x = -5$

12. $\frac{1}{2}x - 6 = \frac{3}{4}x + 12$

$-\frac{1}{2}x \quad -\frac{1}{2}x$

$-6 = \frac{1}{4}x + 12$

$-12 \quad -12$

$-18 = \frac{1}{4}x$

13. $3(2x - 10) = 7x$

$6x - 30 = 7x$

$-6x \quad -6x$

$-30 = x$

14. $8 + 4(x + 2) = 2x + 3(x + 7)$

$8 + 4x + 8 = 2x + 3x + 21$

$4x + 16 = 5x + 21$

$-4x \quad -4x$

$16 = x + 21$

$-21 \quad -21$

$-5 = x$

For each word problem write the equation that could be used to solve the problem.

15. The sum of three consecutive integers where (n) is the smallest integer is 312. Find the number.

$n+n+1+n+2=312$

16. The length of a rectangle is 2 more than twice the width (w). The perimeter is 72 inches. Find the dimensions.

$2(2+2w)+2w=72$

17. Karen had 60 pieces of candy. After giving 4 pieces to each of her friends (f) she had 12 remaining. How many friends does Karen have?

$60-4f=12$

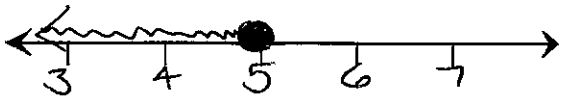
18. The longest side of a triangle is 6 more than the shortest side (x). The third side is one more than the shortest side. The perimeter is 28 cm. Find the length of each side.

$6+x+1+x+x=28$

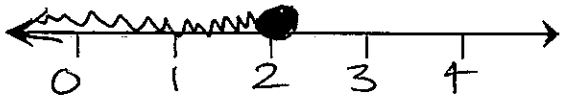
INEQUALITIES AND ABSOLUTE VALUE

Graph each inequality.

1. $x \leq 5$

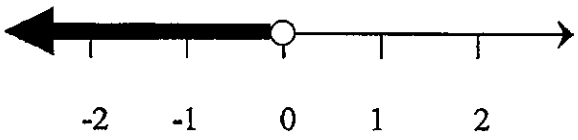


2. $2 \geq x$



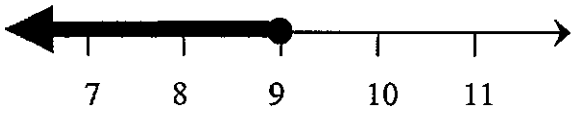
Write the inequality for each graph.

3.



$x < 0$

4.



$x \leq 9$

Solve. Show all work.

5. $3x + 2 > 6x - 13$

$-3x \quad -3x$

$2 > 3x - 13$

$+13 \quad +13$

$\frac{15}{3} > \frac{3x}{3}$

$5 > x$

6. $-2(4x - 5) \leq 50$

$-8x + 10 \leq 50$

$-10 \quad -10$

$\frac{-8x}{-8} \leq \frac{40}{-8}$

$x \geq -5$

7. $\frac{x}{-2} - 9 > -6$

$+9 \quad +9$

$-2\left(\frac{x}{-2}\right) > (3)\,-2$

$x < -6$

8. $7(x + 5) \geq 4(2x - 1)$

$7x + 35 \geq 8x - 4$

$-7x \quad -7x$

$35 \geq x - 4$

$+4 \quad +4$

$39 \geq x$

9. $\frac{1}{4}(8x - 16) \leq x + 22$

$2x - 4 \leq x + 22$

$-x \quad -x$

$x - 4 \leq 22$

$+4 \quad +4$

$x \leq 26$

10. $5 - (2x - 5) \geq -3x + 14$

$5 - 2x + 5 \geq -3x + 14$

$-2x + 10 \geq -3x + 14$

$+2x \quad +2x$

$10 \geq -x + 14$

$-14 \quad -14$

$-4 \geq -x$

$x \geq 4$

Write an inequality for each problem below.

11. The balance in Beth's checking account is \$200. She must make a deposit (d) so that she has at least enough money to pay her \$450 rent bill.

$200 + d \geq 450$

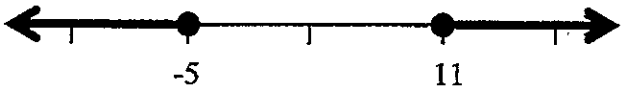
12. Mike wants to rent a car for his vacation. The rental costs \$85 a week plus \$0.18 a mile. How many miles (m) can Mike travel if he wants to spend at most \$150 for the car?

$85 + 0.18m \leq 150$

Represent the shaded portion of the number line using interval notation.

13.

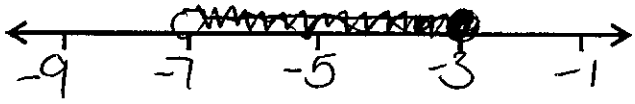
$(-8, 1)$

14. 

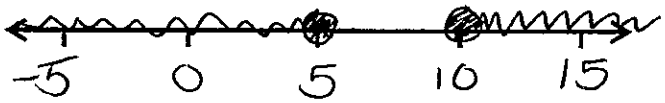
$(-\infty, 5], [11, \infty)$

Graph each compound inequality.

15. $-7 < x \leq -3$



16. $x \leq 5$ *or* $x \geq 10$



Solve. Show all work.

17. $-9 < 3m + 9 \leq 21$

$-9 \quad -9 \quad -9$

$\frac{-18}{3} < \frac{3m}{3} \leq \frac{12}{3}$

$-6 < m \leq 4$

18. $5x - 1 > 9$ *or* $4x - 8 < -12$

$+1 \quad +1 \qquad +8 \quad +8$

$\frac{5x}{5} > \frac{10}{5} \qquad \frac{4x}{4} < \frac{-4}{4}$

$x > 2$ or $x < -1$

19. $3x + 4 < -5$ *or* $-4x + 2 < 2$

$-4 \quad -4 \qquad -2 \quad -2$

$\frac{3x}{3} < \frac{-9}{3}$ or $\frac{-4x}{-4} < \frac{0}{-4}$

$x < -3$ or $x > 0$

20. $5 < 4x - 3 \leq 7$

$+3 \quad +3 \quad +3$

$\frac{8}{4} < \frac{4x}{4} \leq \frac{10}{4}$

$2 < x \leq \frac{5}{2}$

21. $-2 \leq x - 5 < -1$

$+5 \quad +5 \quad +5$

$3 \leq x < 4$

22. $6x - 4 < -10$ *or* $2x - 1 > 5$

$+4 \quad +4 \qquad +1 \quad +1$

$\frac{6x}{6} < \frac{-6}{6} \qquad \frac{2x}{2} > \frac{6}{2}$

$x < -1$ or $x > 3$

Solve. Show all work. Circle your solution(s).

23. $|x| - 2 = 15$

$+2 \quad +2$

$|x| = 17$

$x = 17, -17$

24. $|2x - 4| = 24$

$2x - 4 = 24 \qquad 2x - 4 = -24$

$+4 \quad +4 \qquad +4 \quad +4$

$\frac{2x}{2} = \frac{28}{2} \qquad \frac{2x}{2} = \frac{-20}{2}$

$x = 14 \qquad x = -10$

25. $\frac{3}{3}|x - 1| = \frac{21}{3}$

$|x - 1| = 7 \qquad x - 1 = 7 \qquad x - 1 = -7$

$+1 \quad +1 \qquad +1 \quad +1$

$x = 8 \qquad x = -6$

26. $8 \cdot \frac{|x+3|}{2} = (5)2$

$x + 3 = 10 \qquad x + 3 = -10$

$-3 \quad -3 \qquad -3 \quad -3$

$x = 7 \qquad x = -13$

27. $2|x + 8| + 22 = 30$

$-22 \quad -22$

$\frac{2|x+8|}{2} = \frac{8}{2} \qquad x + 8 = 4 \qquad x + 8 = -4$

$-8 \quad -8 \qquad -8 \quad -8$

$x = -4 \qquad x = -12$

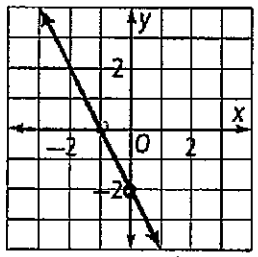
28. $\left|\frac{x}{3}\right| = 10$

$3 \cdot \frac{x}{3} = (10)3 \qquad 3\frac{x}{3} = +10 \cdot 3$

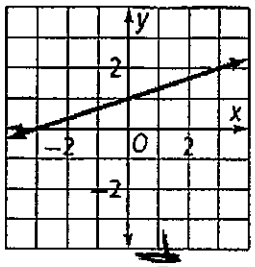
$x = 30 \qquad x = -30$

LINEAR EQUATIONS

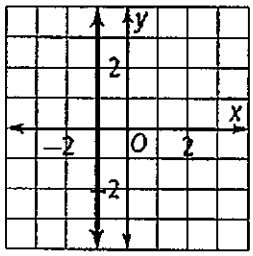
Find the slope of each line.

1. 

$m = -2$

2. 

$m = 3$

3. 

$m =$ undefined

Find the slope and *y*-intercept.

20. $y = 6x + 8$

$m = 6$ y int $(0, 8)$

21. $3x + 4y = -24$

$\frac{4y}{4} = \frac{-3x}{4} - \frac{24}{4}$

$m = -\frac{3}{4}$, y int $(0, -6)$ $y = -\frac{3}{4}x - 6$

22. $2y = 8$ $y = 4$

$m = 0$, y int $(0, 4)$

23. $y = \frac{-3}{4}x - 8$

$m = -\frac{3}{4}$ y int $(0, -8)$

24. $\frac{2y}{2} = \frac{3x}{2} - \frac{1}{2}$

$m = \frac{3}{2}$, y int $(0, -\frac{1}{2})$

25. $4x - 5y = 2$

$\frac{4x}{5} - \frac{2}{5} = \frac{5y}{5}$

$m = \frac{4}{5}$ y int $(0, -\frac{2}{5})$

A line passes through the given points. Write an equation for the line in slope-intercept form.

26. (–2, 4) and (3, 9)

$y = x + 6$

27. (1, 6) and (9, –4)

$y = -\frac{5}{4}x + \frac{29}{4}$

28. (0, –7) and (–1, 0)

$y = 7x - 7$

29. (7, 0) and (3, –4)

$y = x - 7$

30. (0, 0) and (–7, 1)

$y = -\frac{1}{7}x$

31. (10, 0) and (0, 7)

$y = -\frac{7}{10}x + 7$

Write an equation in slope-intercept form for each situation.

34. A skateboard ramp is 5 ft high and 12 ft long from end to end.

35. An airplane with no fuel weighs 2575 lbs. Each gallon of gasoline added to the fuel tanks weighs 6 lbs.

$y = 6x + 2575$

Find the *x*- and *y*-intercepts for each equation.

39. $y = -7x$

y int $(0, 0)$
x int $(0, 0)$

40. $y = \frac{1}{2}x + 3$

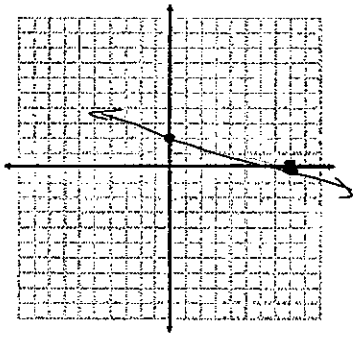
y int $(0, 3)$
x int $(-6, 0)$

41. $-2y = 5x - 12$

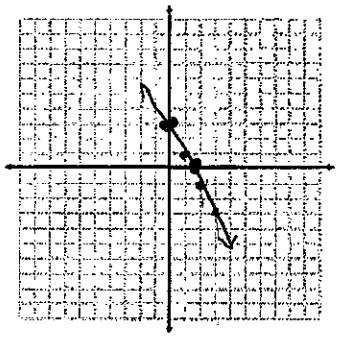
y int $(0, 6)$
x int $(\frac{12}{5}, 0)$

Graph each equation.

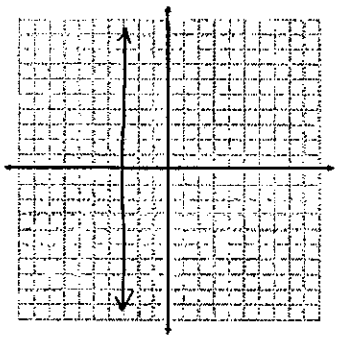
42. $x + 4y = 8$



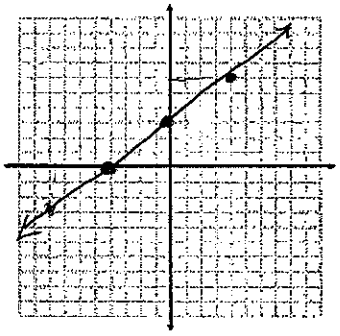
43. $y - 5 = -2(x + 1)$



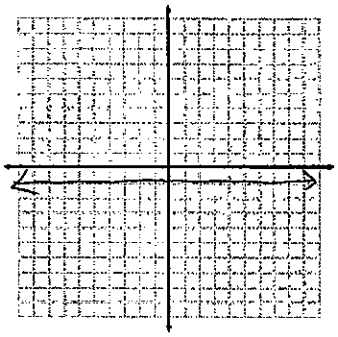
44. $x + 3 = 0$



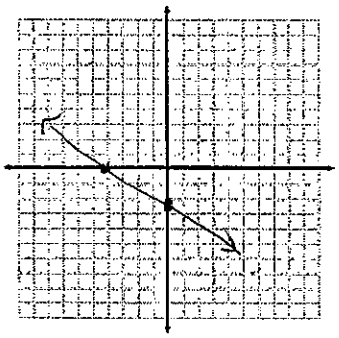
45. $4x - 3y = 12$



46. $y = -1$



47. $y + 1 = -\frac{1}{2}(x + 2)$



Write an equation in slope-intercept form for each situation.

48. A train travels at a rate of 70 mi/h. Two hours after leaving the station it is 210 miles from its destination.

49. An escalator has a slope of $\frac{3}{4}$. After traveling forward 32 feet, the escalator is 24 feet above the floor.

Write an equation in slope-intercept form that satisfies the given conditions.

52. parallel to $y = 4x + 1$, through $(-3, 5)$

$y = 4x + 17$

53. perpendicular to $y = -x - 3$, through $(0, 0)$

$y = -x$

54. perpendicular to $3x + 4y = 12$, through $(7, 1)$

$y = \frac{-3}{4}x + \frac{25}{4}$

55. parallel to $2x - y = 6$, through $(-6, -9)$

$y = 2x + 3$

56. parallel to the x-axis and through $(4, -1)$

$y = -1$

57. through $(4, 44)$ and parallel to the y-axis

$x = 4$

Additional Linear Equation Problems

1. Find x-intercepts and y-intercepts in a. $y = -3x - 6$ b. $2x - 6y = -18$

x int (-2, 0) x int (-9, 0)

y int (0, -6) y int (0, 3)

2. Find a solution the makes the equation true and prove it: $2y + 12 = 4x$

$y = 2x - 6$

(0, -6)

3. Find the slope passing through (-7, 3) (-3, 7)

$\frac{7-3}{-3-(-7)} = \frac{4}{4} = 1$

4. Find the slope and y-intercept of the following: a. $y = \frac{1}{3}x - 6$ b. $2x - 4y = 10$

$m = \frac{1}{3}$ $m = \frac{1}{2}$

y int (0, -6) y int: $(0, \frac{5}{2})$

5. Write a line parallel to $2x - 2y = -18$

$y = x + 9$

$y = x + 15$

6. Kevin's savings account balance changed from $840 in January to $1440 in April. Find the average rate of change per month. Round your answer to the nearest dollar.

$200/month

7. Write an equation of a line with slope $-\frac{1}{2}$ and goes through (2, -6)

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

8. Write an equation that passes through (-2, 1) and (2, 5)

$y = x + 3$

9. A climber is on a hike. After 2 hours he is at an altitude of 1400 feet. After 5 hours, he is at an altitude of 3100 feet. What is his average rate of change?

$566.\overline{6}$ ft/hr

10. Larry currently weighs 250 lbs and plans to go on a diet and lose 3 pounds per week. Write an equation that models his weight(y) in relation to weeks(x). How many weeks will it take him to weigh 224 lbs.? What does slope and y-intercept represent in this particular problem?

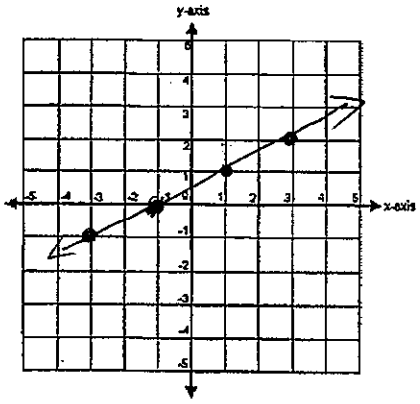
$y = -3x + 250$

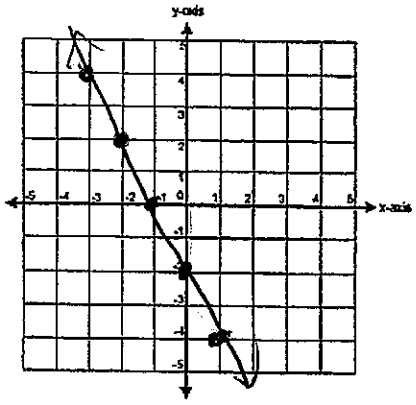
-3 lbs/week

250 lb starting point

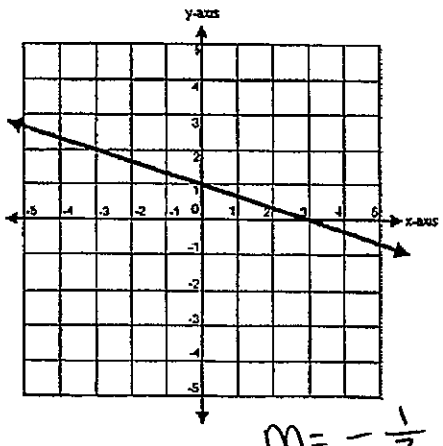
11. Graph using slope intercept form: a. $2y - 1 = x$ and b. $2x + y = -2$

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



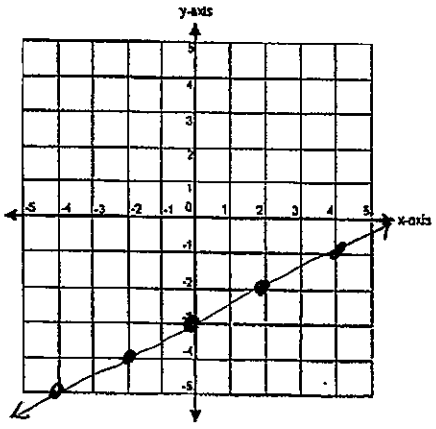


12. Find the slope



$m = -\frac{1}{3}$

13. Complete a table of values for $y = \frac{1}{2}x - 3$ and graph



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

SYSTEMS OF EQUATIONS

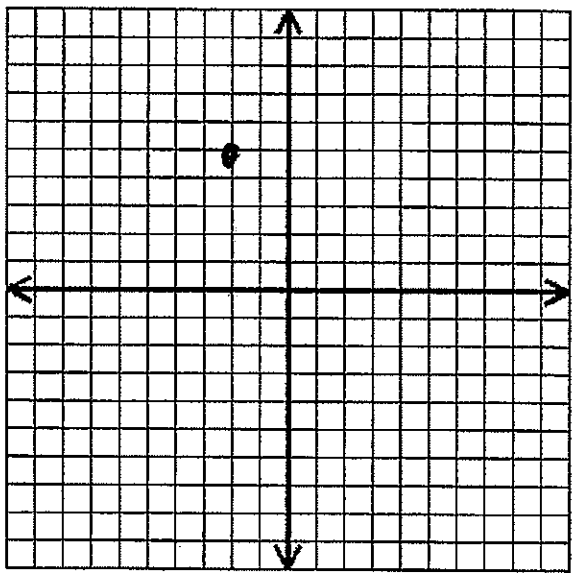
1. Determine if each ordered pair is a solution to the system. SHOW ALL WORK!

$\begin{cases} 4x-3y=30 \\ 3x+2y=22 \end{cases}$ $(6,-2)$

UD

2. Solve the system of linear equations by graphing. State the solution!

$\begin{cases} 3y-3=-6x \\ 2x-2y=-14 \end{cases}$ $(-2,5)$



Solve by substitution or elimination.

3. $\begin{cases} 2x+y=5 \\ -4x+6y=12 \end{cases}$

$\left(\frac{21}{4}, -\frac{11}{2}\right)$

4. $\begin{cases} 2x-3y=-1 \\ 10x+y=11 \end{cases}$

$(1,1)$

5. $\begin{cases} 4x+2y=3 \\ 6x+3y=8 \end{cases}$

(NO SOL.)

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

$\left(2, \frac{1}{2}\right)$

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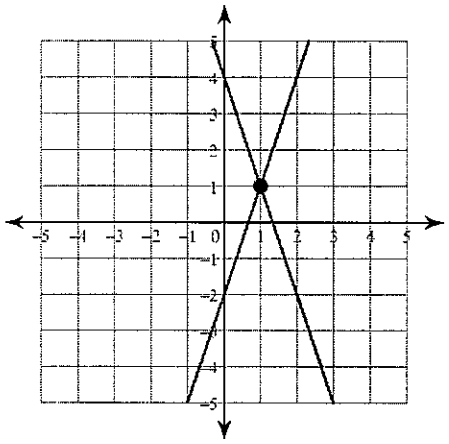
Name_____

Systems of Two Equations

Date_____ Period____

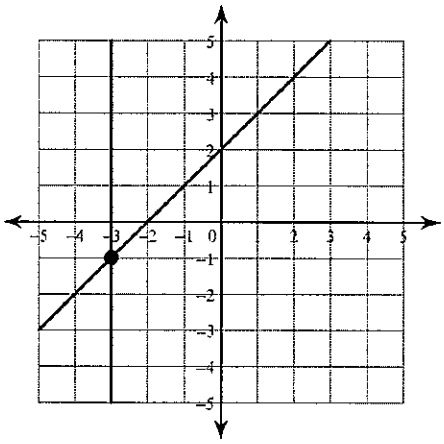
Solve each system by graphing.

1) $y = -3x + 4$
$y = 3x - 2$



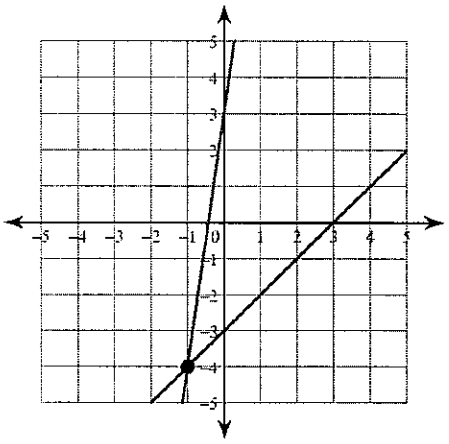
(1, 1)

2) $y = x + 2$
$x = -3$



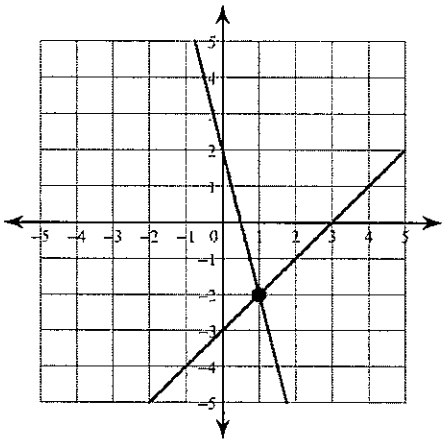
(–3, –1)

3) $x - y = 3$
$7x - y = -3$



(–1, –4)

4) $4x + y = 2$
$x - y = 3$



(1, –2)

Solve each system by substitution.

5) $y = 4x - 9$
$y = x - 3$

(2, –1)

6) $4x + 2y = 10$
$x - y = 13$

(6, –7)

7) $y = -5$
$5x + 4y = -20$

(0, –5)

8) $x + 7y = 0$
$2x - 8y = 22$

(7, –1)

9) $6x + 8y = -22$
$y = -5$
$(3, -5)$

10) $-7x + 2y = 18$
$6x + 6y = 0$
$(-2, 2)$

11) $7x + 2y = -19$
$-x + 2y = 21$
$(-5, 8)$

12) $3x - 5y = 17$
$y = -7$
$(-6, -7)$

13) $-7x + 4y = 24$
$4x - 4y = 0$
$(-8, -8)$

14) $4x - y = 20$
$-2x - 2y = 10$
$(3, -8)$

Solve each system by elimination.

15) $8x - 6y = -20$
$-16x + 7y = 30$

$(-1, 2)$

16) $6x - 12y = 24$
$-x - 6y = 4$

$(2, -1)$

17) $-8x - 10y = 24$
$6x + 5y = 2$

$(7, -8)$

18) $-24 - 8x = 12y$
$1 + \frac{5}{9}y = -\frac{7}{18}x$

$(6, -6)$

19) $-4y - 11x = 36$
$20 = -10x - 10y$

$(-4, 2)$

20) $-9 + 5y = -4x$
$-11x = -20 + 9y$

$(1, 1)$

21) $0 = -2y + 10 - 6x$
$14 - 22y = 18x$

$(2, -1)$

22) $-16y = 22 + 6x$
$-11y - 4x = 15$

$(-1, -1)$

23) $-16 + 20x - 8y = 0$
$36 = -18y - 22x$

$(0, -2)$

24) $-\frac{5}{7} - \frac{11}{7}x = -y$
$2y = 7 + 5x$

$(-3, -4)$

Critical thinking questions:

25) Write a system of equations with the solution $(4, -3)$.

Many answers. Ex: $x + y = 1$, $2x + y = 5$

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