Algebra I Semester Exam Review

Solve the equation. Justify each step.

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

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

$x = \frac{3}{4} - \frac{1}{2}$

$x = \frac{3}{4} - \frac{2}{4}$

$\boxed{x = \frac{1}{4}}$

Solve the equation. Determine whether the equation has *one solution*, *no solution*, or *infinitely many solutions*.

2. $13 + 3p + 10 = 23 + 3p$

$23 + 3p = 23 + 3p$
$-3p \quad -3p$
$23 = 23$

IM

3. $7 + 4y = 39$

$-7 \quad -7$

$\frac{4y}{4} = \frac{32}{4}$

$y = 8$

8

4. $\frac{3}{2}b + 6 + \frac{1}{2}b = 15 + 2b$

$\frac{4}{2}b + 6 = 15 + 2b$

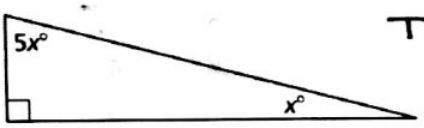
$2b + 6 = 15 + 2b$

$6 = 15$

NS

Find the value of the variable. Then find the angle measures of the polygon.

5.



TRIANGLE ANGLE SUM = 180°

(5) $5x + x + 90 = 180$

$6x + 90 = 180$

$-90 \quad -90$

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

$x = 15$

$5(15) = 75$

$x = 15$

$\boxed{x = 15 \quad 75°, 15°, 90°}$

Solve the equation.

6. $\frac{3}{2}(d + 12) = \frac{1}{2}(2d - 6)$

(6) $\frac{3}{2}d + 18 = d - 3$

$-d - 18 \quad -d - 18$

$\frac{2}{1} \cdot \frac{1}{2}d = -21 \cdot \frac{2}{1}$

$d = -42$

$\boxed{-42}$

7. $|b - 12| = 15$

(7) CASE 1

$b - 12 = 15$

$+12 \quad +12$

$b = 27$

CASE 2

$b - 12 = -15$

$+12 \quad +12$

$b = -3$

$\boxed{27, -3}$

8. Your business needs to print brochures. You call two different print shops about prices. Each print shop charges a set-up fee for preparing the brochure and a price per brochure.

	Brochure set-up fee	Price per brochure
Company A	$50	$1.50
Company B	$75	$1.00

a. The total cost is the same for each company. How many brochures is your business printing? $\boxed{\text{50 brochures}}$

b. You decide to increase the number of brochures. From which company should you order? $\boxed{\text{COMPANY B}}$

COMP A

$50 + 1.5b$

COMP B

$75 + 1b$

(8a) $50 + 1.5b = 75 + b$

$-50 \quad -1b \quad -50 - b$

$\frac{0.5b}{0.5} = \frac{25}{0.5}$

$b = 50$

(8b) increase – use more than 50 for b. I'll use 55. Then plug in to each equation

COMP A

$50 + 1.50(55)$

$50 + 82.50$

132.50

COMP B

$50 + 1(55)$

$50 + 55$

105

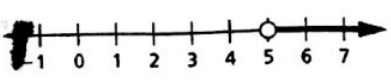
Write the sentence as an inequality.

9. The product of a number n and 2 is no less than 14.

$\boxed{n \cdot 2 \geq 14 \text{ or } 2n \geq 14}$

Write an inequality that represents the graph.

10.



$\boxed{x > 5}$

Solve the inequality.

11. $2k > 2k + 4$

$2k > 2k + 4$
$-2k \quad -2k$
$0 > 4$ FALSE

$\boxed{\text{N.S.}}$

12. $5n + 3 \geq 4 - (6 - 5n)$

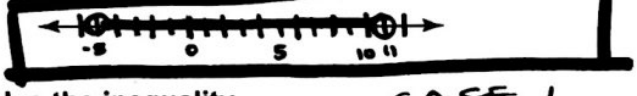
$5n + 3 \geq 4 - 6 + 5n$
$5n + 3 \geq -2 + 5n$
$-5n \quad\quad -5n$
$3 \geq -2$ TRUE

$\boxed{\text{IM}}$

Solve the inequality. Graph the solution.

13. $7 < 12 + c < 13$
$-12 \quad -12 \quad -12$

$\boxed{-5 < c < 11}$



Solve the inequality.

14. $|3x + 15| < 6$

CASE 1
$3x + 15 < 6$
$-15 \quad -15$
$\frac{3x}{3} < \frac{-9}{3}$ $\quad x < -3$

CASE 2
$3x + 15 > -6$
$-15 \quad -15$
$\frac{3x}{3} > \frac{-21}{3}$ $\quad x > -7$

$\boxed{x < -3 \quad x > -7}$

15. You need to earn at least \$75. You earn \$6.00 for each hour you work. Write and solve an inequality that represents the number of hours h that you need to work.

$\boxed{6h \geq 75}$ $\quad \boxed{h \geq 12.5}$

16. The cost to rent a construction crane is \$1500 per day plus \$250 per hour of use. Write and solve an inequality that can be used to determine the maximum number of hours h the crane can be used if the rental cost for one day will not exceed \$5000.

$\boxed{1500 + 250h \leq 5000}$
$-1500 \quad\quad -1500$

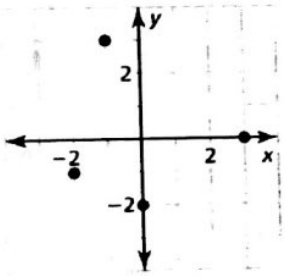
$250h \leq 3500$

$\boxed{h \leq 14}$

Find the domain and range of the function represented by the graph. Determine whether the domain is *discrete* or *continuous*.

17.

$-1, -1)$
$1, 3)$
$, -2)$
$3, 0)$



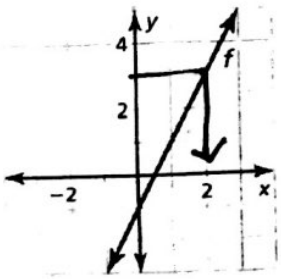
DOMAIN $\{-2, -1, 0, 3\}$
RANGE $\{-1, 3, -2, 0\}$
DISCRETE

Find the value of x so that $f(x) = 3$.

$y = 3$

$\boxed{x = 2}$

18.



Find the x- and y-intercepts of the graph of the linear equation.

x-int → plug 0 for y
y-int → plug 0 for x

19. $\frac{1}{2}x + y = -8$

x	y
0	-8
-16	0

$\frac{1}{2}(0) + y = -8$
$y = -8$

$\frac{1}{2}x + (0) = -8$
$2 \cdot \frac{1}{2}x$

$\boxed{(0, -8) \quad (-16, 0)}$

The points represented by the table lie on a line. Find the slope of the line.

$\frac{y_2 - y_1}{x_2 - x_1}$

you may use any points or graph the points and count rise over run.

20.

x	2	2	2	2
y	−6	3	−7	1

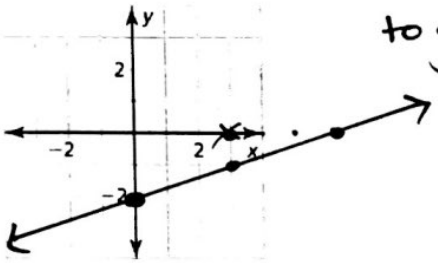
(2, −6)
(2, 3)

$\frac{3 - -6}{2-2} = \frac{9}{0}$

$\boxed{\text{undefined}}$

Graph the linear equation.

21. $x - 3y = 6$



to graph using intercepts

$x - 3y = 6$

0	−2
6	0

to graph using slope intercept

$x - 3y = 6$
$-x \qquad -x$
$\frac{-3y}{-3} = \frac{-x}{-3} + \frac{6}{-3}$
$y = \frac{1}{3}x - 2$

Identify the slope, *y*-intercept, and *x*-intercept of the graph of the linear equation.

22. $y = x - 3$ $\boxed{m = 1 \quad y\text{-int} = -3 \quad x\text{-int} = 3}$

23. $x = -4$ $\boxed{m = \text{undefined} \quad y\text{-int} = \text{none} \quad x\text{-int} = -4}$

(23) vertical line @ −4

Write the slope-intercept form of the equation with the given characteristics.

24. passes through (−2, 1) and (2, −5) $\boxed{y = -\frac{3}{2}x - 2}$

must find slope
then put in point slope form
then change to slope intercept

(24) $m = \frac{-5-1}{2--2} = \frac{-6}{4}$
$m = -\frac{3}{2}$
$y - 1 = -\frac{3}{2}(x+2)$
$y - 1 = -\frac{3}{2}x - 3$
$+1 \qquad +1$
$y = -\frac{3}{2}x - 2$

25. parallel to the line $y = -3x + 5$; passes through (−4, 5) $\boxed{y = -3x - 7}$

parallel = same slope

(25) $y - y_1 = m(x - x_1)$
$y - 5 = -3(x - -4)$
$y - 5 = -3x - 12$
$+5 \qquad +5$
$y = -3x - 7$

26. perpendicular to the line $y = \frac{1}{2}x - 8$; passes through (7, −6)

perpen = opp recip slope $\frac{1}{2} \rightarrow -\frac{2}{1}$

(26) $m = -2$
(7, −6)
$y - y_1 = m(x - x_1)$
$y - -6 = -2(x - 7)$
$y + 6 = -2x + 14$
$-6 \qquad -6$
$\boxed{y = -2x + 8}$

Determine if the given lines are parallel, perpendicular, or neither. look @ slope

same = parallel
opposite reciprocal = perp.

27. $3x - 5y = 10$ ✓ $m = \frac{3}{5}$
$10x + 6y = -36$ $m = -\frac{5}{3}$
$\frac{6y}{6} = \frac{-10x}{6} - \frac{36}{6}$

$\frac{-5y}{-5} = \frac{-3x}{-5} + \frac{10}{-5}$

28. $-2x - 3y = 9$ $+2x$ $m = -\frac{2}{3}$
$4x + 6y = 24$ $-4x$ $m = -\frac{2}{3}$
$\frac{6y}{6} = \frac{24}{6} - \frac{4x}{6}$

$\frac{-3y}{-3} = \frac{2x}{-3} + \frac{9}{-3}$

$\boxed{\text{PERPENDICULAR}}$ $\boxed{\text{PARALLEL}}$

Solve the system of linear equations using any method.

29. $-6x + 5y = 1$
$6x + 4y = -10$
$-6x + 5(-1) = 1$
$-6x - 5 = 1$
$+5 \quad +5$
$\frac{-6x}{-6} = \frac{6}{-6}$
$x = -1$
$\frac{9y}{9} = \frac{-9}{9}$
$y = -1$
$\boxed{(-1, -1)}$

30. $-5x + y = -3$ $+5x$
$3x - 8y = 24$
$\boxed{(0, -3)}$

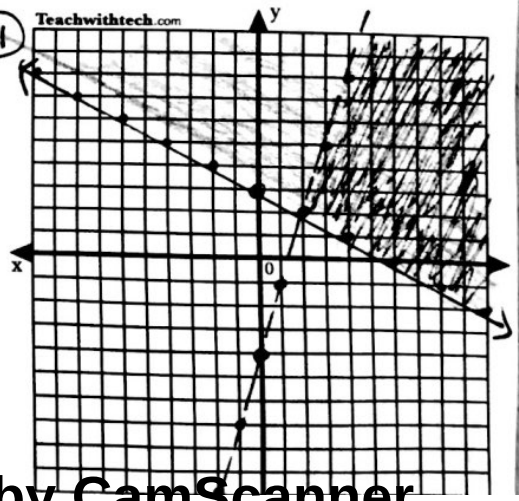
(30) $3x - 8(-3 + 5x) = 24$
$3x + 24 - 40x = 24$
$-37x + 24 = 24$
$-37x = 0$
$x = 0$
$-5(0) + y = -3$
$y = -3$

Graph the system of linear inequalities.

31. $y < 3x - 4$

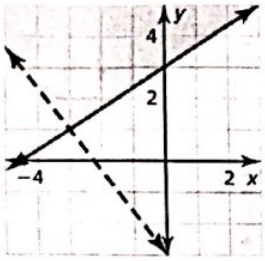
$y \geq -\frac{1}{2}x + 3$

(31)



Write a system of linear inequalities represented by the graph.

32.



solid line = $\geq$ or $\leq$
y-int = 3
Slope = $\frac{2}{3}$
Shaded above

$$\boxed{y \geq \frac{2}{3}x + 3}$$

dotted line = $>$ or $<$
y-int = -3
Slope = $-\frac{4}{3}$
Shaded above

$$\boxed{y > -\frac{4}{3}x - 3}$$

KEY FORMULAS / IDEAS

SLOPE $m = \frac{y_2 - y_1}{x_2 - x_1}$

SLOPE INTERCEPT $y = mx + b$

POINT SLOPE $y - y_1 = m(x - x_1)$

$\leq$ $\geq$ $\longleftrightarrow$

$<$ $>$ $\leftarrow - - - - \rightarrow$

PARALLEL = SAME SLOPE

PERPENDICULAR = OPPOSITE RECIPROCAL SLOPE

DISCRETE → POINTS ONLY

CONTINUOUS → LINE THROUGH POINTS

X-INT → PLUG ZERO IN FOR Y

Y-INT → PLUG ZERO IN FOR X