Algebra I Semester 1 Study Guide Name:_____

1. Create a sequence that has a common difference of 3 4, 7, 10, 13...

   Create a sequence that has a common difference of 6 2, 8, 14, 20...

2. The table displays the hourly rental cost of a bowling lane…

Hours	1	+2	2	+2	3	+2	4
Cost	3	→	5	→	7	→	9

explicit formula for arithmetic sequence: $a_n = a_1 + (n-1)(d)$ ← 1st term

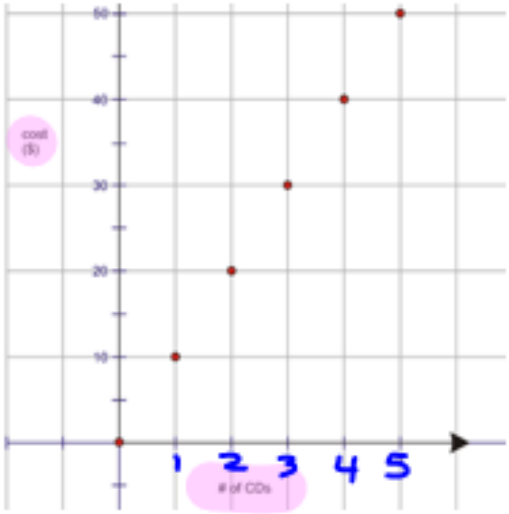
Write an expression to model the cost of bowling after *n* hours?

$a_n = 3 + (n-1)(2)$ OR $a_n = 3 + 2(n-1)$ OR $3 + 2n - 2$, $1 + 2n$

3. The graph below shows the number of CDs purchased and their total cost…

Determine the cost of the CDs when you purchase two, four and five CDs?

{20, 40, 50}



4. Jennifer has a lemonade stand. She charges $1.25 for a glass of lemonade. It costs her $0.60 to make each glass of lemonade plus $15 a day for other expenses. Which equation can be used to determine how many glasses of lemonade, *g*, Jennifer needs to sell each day in order to break even?

income = expenses

$1.25g = 0.60g + 15$

5. Jerry is trying to find a landscaping service for his home. He finds two companies near him that offer what he needs but have different rates.

He sets up the equation $4.55f + 32.50 = 3.80f + 45.00$ to find out after how many square feet, f, the companies will charge the same amount. What is the difference in the per square feet costs for the two companies?

1st company 2nd company

subtract

$$4.55 - 3.80 = \$0.75$$

6. UPS charges $7 flat fee and $0.20 for each additional pound. FedEx charges $5 flat fee and $0.30 for each additional pound. How many pounds will it take for UPS and FedEx to cost the same?

UPS = FedEx

$7 + 0.20x = 5 + 0.30x$

$-0.20x \quad -0.20x$

$7 = 5 + .10x$

$-5 \quad -5$

$\frac{2}{.10} = \frac{.10x}{.10}$

$20 = x$

20 pounds

7. How many solutions do the following equations have?

Solving Eqns.
- all variables cancel
  - true: IMS
  - false: NS
- variables don't cancel: 1 Soln

- $9x + 3x - 10 = 3(3x + x)$

$12x - 10 = 9x + 3x$

$12x - 10 = 12x$

$-12x \quad -12x$

$-10 = 0$ false

No Solution

- $-8a + 10 = 2(5 - 4a)$

$-8a + 10 = 10 - 8a$

$+8a \quad +8a$

$10 = 10$ true

infinitely many solutions

- $4(x - 4) = 2x + 6$

$4x - 16 = 2x + 6$

$-2x \quad -2x$

$2x - 16 = 6$

1 solution

8. Solve the following for the given variable:

Solve $6w + 12d = 36$ for d.

$6w + 12d = 36$

$-6w \quad -6w$

$\frac{12d}{12} = \frac{36 - 6w}{12}$

$d = 3 - \frac{1}{2}w$

$4h + 16a = 32$

$-16a \quad -16a$

$\frac{4h}{4} = \frac{32 - 16a}{4}$

Solve $4h + 16a = 32$ for h.

$h = 8 - 4a$

9. What is a solution of the inequality $3 - 4x \leq 11$? -4, -3, -2

$-3 \quad -3$

$\frac{-4x}{-4} \leq \frac{8}{-4}$

$x \geq -2$

If you mult. or div. BOTH sides by a NEG, FLIP the inequality sign.

What is a solution of the inequality $6 - 3(x + 2) > 15$? -6, -5, -4

$6 - 3x - 6 > 15$

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

$x < -5$

What is a solution to the inequality $2(x + 5) < 8(x - 4)$? 6, 7, 8

$2x + 10 < 8x - 32$

$-8x \quad -8x$

$-6x + 10 < -32$

$-10 \quad -10$

$\frac{-6x}{-6} < \frac{-42}{-6}$

$x > 7$

10. Two rival cleaning companies charge to dust houses. Captain Dustsalot charges $20 per house call plus $12 per room, and Dedusters charges $30 per house call plus $10 per room. Abigail wants to know how many rooms she must get dusted so that Captain Dustsalot is more expensive than Dedusters. Set up an inequality showing Captain Dustsalot is more expensive than Dedusters.

$CD > Dd$

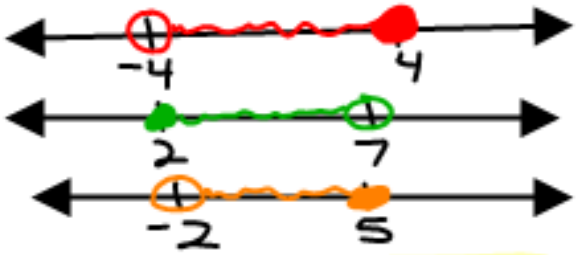
$20 + 12r > 30 + 10r$

11. Graph the following inequalities

$-4 < x \leq 4$

$2 \leq x < 7$

$-2 < x \leq 5$



12. Solve the equation $-5|x - 3| = -12$.

$\frac{-5|x-3|}{-5} = \frac{-12}{-5}$

$|x-3| = \frac{12}{5}$

$x - 3 = \frac{12}{5}$ or $x - 3 = -\frac{12}{5}$

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

$x = \frac{27}{5}$ $\qquad$ $x = \frac{3}{5}$

Solving Abs. Value Eqns.

- get abs. value alone
- $|| = \#$ (split it up)
  - $|| = +\#$
  - $|| = -\#$
- then solve

Unit 2 Final Exam Review

Function
- x does not repeat
- graph moves forward (passes VLT)

13. Function or not a function? Explain why…
    - {(5, -2), (-2, 5), (2, -5), (-5, 2)} Yes, b/c x doesn't repeat.
    - {(5, -2), (-2, 5), (5, 2), (-5, 2)} No, b/c x repeats.

14. The function that describes a sequence is $f(x) = 12.3 - 2.6x$. What is $f(4)$?

$f(4) = 12.3 - 2.6(4) = 1.9$

plug in for x (calc → sto)

15. The graph shows the distance Tom traveled in his race.

Answer True or False for the following questions:

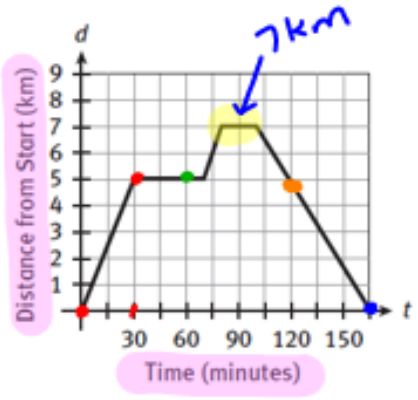
Tom ran 5 Km over the first 30 mins of the race ___T___

After 60 mins, Tom had run 7 km ___F___

Tom was 10 Km from the start after 120 minutes ___F___

Over his 165 minute run, Tom ran 14 km ___T___

7+7



y only (2,1) min. value = 1

16. Use a graphing calculator to graph the function $y = x^2 - 4x + 5$. What is the minimum value of the function?

Y= enter function Graph

2nd calc 3 then left & right bound

↳ 4 for MAX

LB RB

17. A bowling alley charges \$2.00 for shoe rental and \$3.00 per game bowled. The cost for x games bowled is given by the function $f(x) = 2 + 3x$. What is a reasonable domain and range?

D= {0, 1, 2, 3...} = {all whole #s}

R= {2, 5, 8, 11...}

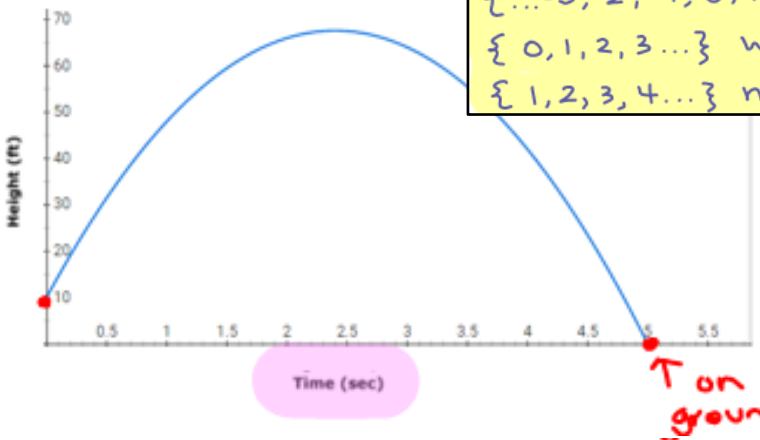
18. The function $h(t) = -10t^2 + 48t + 10$ represents the height of an arrow shot through the air from an initial height.

all real #s (ℝ)

{...-3, -2, -1, 0, 1, 2, 3...} integers

{0, 1, 2, 3...} whole

{1, 2, 3, 4...} natural



↑ on ground

Approximately how long will the arrow be in the air? 5 sec.

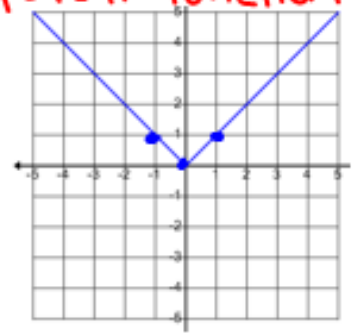
Transforming Graphs

$y = -(x + \leftrightarrow) + \updownarrow$ (+ / −)

− reflects over x-axis

19. This is the graph of $f(x) = |x|$.

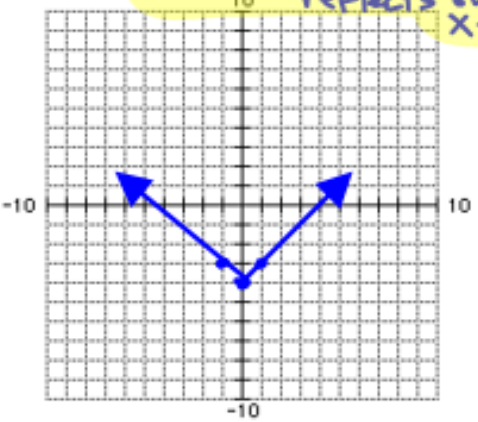
Parent function



Graph

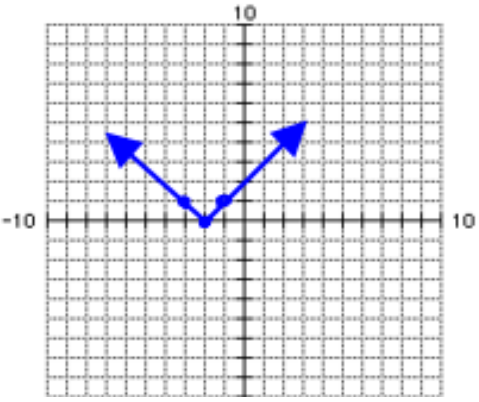
a. $g(x) = |x| - 4$

down 4



b. $h(x) = |x + 2|$

left 2



20. The table represents a linear function. → same slope

x	y
5	16
7	10
10	1
14	a

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

$m = \frac{10-16}{7-5} = \frac{-6}{2} = -3$

$\frac{a-1}{14-10} = -3$

$\frac{a-1}{4} = -3 \cdot 4$

$a - 1 = -12$

$+1 \quad +1$

$a = -11$

What is the value of a?

21. The graph of a direct variation function passes through the point (8, 67). What is the constant of variation for this function?

x y

direct variation: $y = k \cdot x$

indirect variation: $y = \frac{k}{x}$

$y = k \cdot x$

$\frac{67}{8} = \frac{k \cdot 8}{8}$

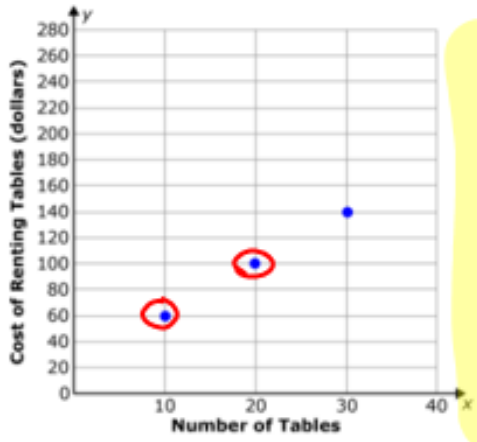
$k = \frac{67}{8} \approx 8.375$

22. The cost for renting tables at a local flea market is shown on the graph.

(10, 60)

(20, 100)

How much will it cost to rent 22 tables?



$m = \frac{100-60}{20-10} = \frac{40}{10} = 4$

Slope-Intercept Form

$y = mx + b$

Standard Form

$Ax + By = C$

- A is positive
- A, B, C are integers

Point-Slope Form

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

opposite

$y - 60 = 4(x - 10)$

$y - 60 = 4(22 - 10)$

$y - 60 = 48 + 60 = \$108$

$+60$

23. What is the inverse of $f(x) = 2x - 7$?

$f^{-1}(x) =$

y

$x = 2y - 7$

$+7 \quad +7$

$\frac{x+7}{2} = \frac{2y}{2}$

$f^{-1}(x) = \frac{x+7}{2}$

To find the inverse of a function:

- switch x & y
- solve for y
- $f^{-1}(x)$

24. This is an arithmetic sequence.

10, 9.4, 8.8, 8.2, 7.6 ……..

next to arithmetic seq.

Write a function that describes the sequence?

instead of a_n use $f(n)$

common difference = $a_2 - a_1$

$= 9.4 - 10 = -0.6$

$f(n) = 10 + (n-1)(-0.6)$

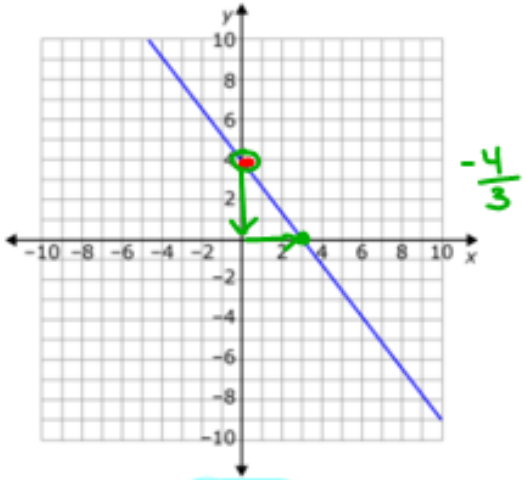
$= 10 + -0.6n + 0.6$

$\Rightarrow f(n) = -0.6n + 10.6$

25. Which is the equation, in slope-intercept form, of the line graphed below?

$y = mx + b$

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



26. Write the equation of the line, in point-slope form, with a slope of -2 and passes through the point (4, - 2).

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

27. Line j passes through the points $(6, -12)$and $(3, -11)$, while line k passes through $(4, 13)$ and $(2, 7)$. How would you describe the relationship between lines j and k?

$m_j = \frac{-11 - -12}{3 - 6} = \frac{1}{-3}$

$m_k = \frac{7 - 13}{2 - 4} = \frac{-6}{-2} = 3$

opposite reciprocals, so... the lines are perpendicular

parallel → same slopes (diff. y-int)

perpendicular → opposite reciprocal slopes

28. Enter the following data into a graphing calculator.

(32, 55), (75, 28), (80, 14), (48, 36) (19, 66)

Stat, Edit, $x \to L_1$, $y \to L_2$

Stat, → calc, 4(LnReg)

What is the equation of the line of best fit? Round your answer to the nearest hundredth.

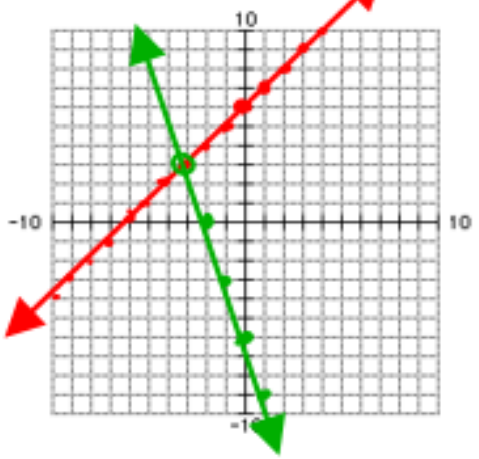
$y = -0.76x + 78.61$

29. Solve the system by graphing. $\begin{cases} y = x + 6 \\ -3x = y + 6 \end{cases}$ ✓

(-3,3)

$-6 \quad -6$

$-3x - 6 = y$



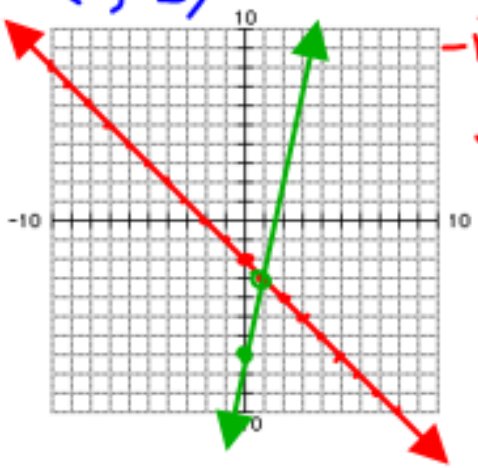
30. Solve the system by graphing. $\begin{cases} x + y = -2 \\ y = \frac{1}{3}x - 7 \end{cases}$ ✓

(1,-3)

$x + y = -2$

$-1x \quad -1x$

$y = -1x - 2$



31. Tell whether the ordered pair is a solution of the given system.

$(6,-2); \begin{cases} 3x - 2y = 14 \\ 5x - y = 32 \end{cases}$ → $3(6) - 2(-2) = 14$

$18 + 4 = 14$

$22 = 14$ No

x y

*must work for BOTH eqns.

answer: (1,-2)

32. Solve using substitution.

$\begin{cases} 3x - 2y = 7 \\ x + 3y = -5 \end{cases}$

$-3y \quad -3y$

$x = -3y - 5$

$3(-3y - 5) - 2y = 7$

$-9y - 15 - 2y = 7$

$+15 \quad +15$

$-11y = 22$

$\frac{-11y}{-11} = \frac{22}{-11}$

$y = -2$

$x = -3(-2) - 5$

$x = 1$

Substitution

1. get x = OR y = ← look for coefficient of 1
2. sub. this into other eqn. to get 1 variable
3. sub. this value into x= or y= eqn. to get 2nd variable
4. (x, y)

33. Carla and Benicio work in a men's clothing store. They earn commission from each suit and each pair of shoes they sell. For selling 3 suits and one pair of shoes, Carla has earned $47 in commission. For selling seven suits and two pairs of shoes, Benicio has earned $107 in commission. How much do the salespeople earn for the sale of a suit? How much do they earn for the sale of a pair of shoes? x y

$2(3x + 1y = 47)$

$1(7x + 2y = 107)$

$-6x - 2y = -94$

$7x + 2y = 107$

$x = 13$

$39 + y = 47$

$-39 \quad -39$

$y = 8$

#13 suit

#8 pair of shoes

Elimination

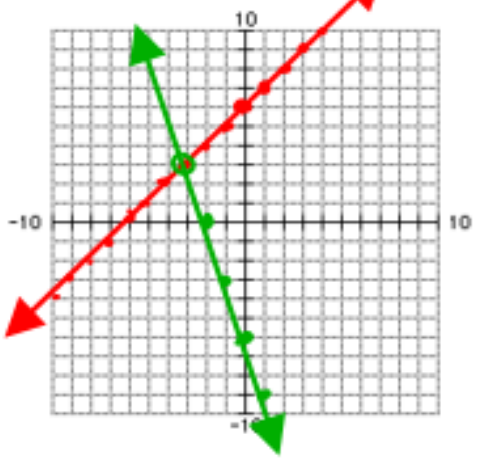
1. see if x or y eliminate or if they elim. by changing signs
2. If not, mult. BOTH eqns (flip-flop coefficients)
3. Elim. X OR Y & get other variable
4. Sub this value into any eqn to get other variable
5. (x, y)

29. Solve the system by graphing. $\begin{cases} y = x + 6 \\ -3x = y + 6 \end{cases}$ ✓

(-3,3)

$-6 \quad -6$

$-3x - 6 = y$



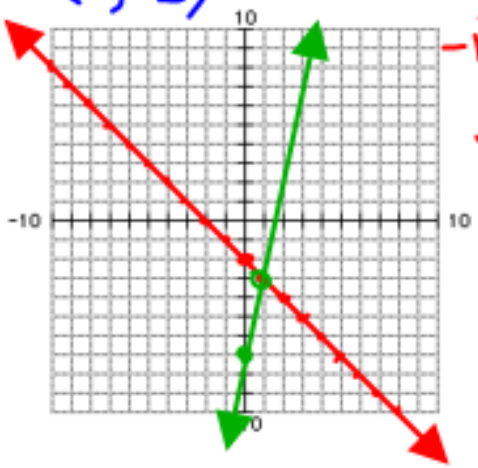
30. Solve the system by graphing. $\begin{cases} x + y = -2 \\ y = \frac{1}{3}x - 7 \end{cases}$ ✓

(1,-3)

$x + y = -2$

$-1x \quad -1x$

$y = -1x - 2$



31. Tell whether the ordered pair is a solution of the given system.

$(6,-2); \begin{cases} 3x - 2y = 14 \\ 5x - y = 32 \end{cases}$ → $3(6) - 2(-2) = 14$

$18 + 4 = 14$

$22 = 14$ No

x y

*must work for BOTH eqns.

answer: (1,-2)

32. Solve using substitution.

$\begin{cases} 3x - 2y = 7 \\ x + 3y = -5 \end{cases}$

$-3y \quad -3y$

$x = -3y - 5$

$3(-3y - 5) - 2y = 7$

$-9y - 15 - 2y = 7$

$+15 \quad +15$

$-11y = 22$

$\frac{-11y}{-11} = \frac{22}{-11}$

$y = -2$

$x = -3(-2) - 5$

$x = 1$

Substitution

1. get x = OR y = ← look for coefficient of 1
2. sub. this into other eqn. to get 1 variable
3. sub. this value into x= or y= eqn. to get 2nd variable
4. (x, y)

33. Carla and Benicio work in a men's clothing store. They earn commission from each suit and each pair of shoes they sell. For selling 3 suits and one pair of shoes, Carla has earned $47 in commission. For selling seven suits and two pairs of shoes, Benicio has earned $107 in commission. How much do the salespeople earn for the sale of a suit? How much do they earn for the sale of a pair of shoes? x y

$2(3x + 1y = 47)$

$1(7x + 2y = 107)$

$-6x - 2y = -94$

$7x + 2y = 107$

$x = 13$

$39 + y = 47$

$-39 \quad -39$

$y = 8$

#13 suit

#8 pair of shoes

Elimination

1. see if x or y eliminate or if they elim. by changing signs
2. If not, mult. BOTH eqns (flip-flop coefficients)
3. Elim. X OR Y & get other variable
4. Sub this value into any eqn to get other variable
5. (x, y)