

Unit 1 Finals Review

After you complete each concept → give yourself a rating → ☺ ☹ ☹

Concept 1.1: Order of Operations:

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1. $15 \div 5 + 2 - (5 + 3)$

$15 \div 5 + 2 - (8)$

$3 + 2 - 8$

$5 - 8$

$\boxed{-3}$

2. $4 - [8 - (2 - 5)^2]$

$4 - [8 - (-3)^2]$

$4 - [8 - 9]$

$4 - [-1]$

$4 + 1$

$\boxed{5}$

Concept 1.2: Number Sets Closure

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3. Classify the following Numbers (Counting (natural), Whole, Integers, Rational, Irrational)

- a. 7
- Counting
 - Whole
 - Integer
 - Rational

b. $\frac{2}{3}$ *rational*

c. $\sqrt{2}$ *irrational*

4. Are negative integers *closed* under subtraction?
If no, provide a counter-example.

$$\begin{aligned} -3 - (-5) \\ -3 + 5 \\ 2 \end{aligned}$$

 $\boxed{\text{NO}}$ 5. Are Counting numbers *closed* under subtraction?
If no, provide a counter-example.

$5 - 7 = -2$

 $\boxed{\text{NO}}$ Concept 1.3: Solving Equations:

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6. $8x - 2(4x + 3) = 9$

$8x - 8x - 6 = 9$

$-6 \neq 9$

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

7. $4y - (y - 4) = -20$

$4y - y + 4 = -20$

$3y + 4 = -20$

$3y = -24$

$\boxed{y = -8}$

8. $\frac{1}{5}(10x - 5) = 4x - (2x + 1)$

$2x - 1 = 4x - 2x - 1$

$2x - 1 = 2x - 1$

$-1 = -1$

 $\boxed{\text{All real \#s}} \quad \mathbb{R}$

9. $-\frac{4}{5}d + 5 = -9$

$-\frac{5}{4} \cdot -\frac{4}{5}d = -14 \cdot -\frac{5}{4}$

$\boxed{d = \frac{35}{2}}$

10. $10 - 2z = 8 - (3z + 2)$

$10 - 2z = 8 - 3z - 2$

$10 - 2z = 6 - 3z$

$\boxed{z = -4}$

11. $3x - 7 + 4x = 6x - 7 + x$

$7x - 7 = 7x - 7$

 $\boxed{\text{All real \#s}} \quad \mathbb{R}$

Concept 1.4: Solving Proportions: ☺ ☹ ☹

$$12. \frac{x-5}{-3} = -\frac{2x}{8}$$

$$8(x-5) = 6x$$

$$8x - 40 = 6x$$

$$2x = 40$$

$$\boxed{x = 20}$$

Concept 1.5: Solving Percent Problems: ☺ ☹ ☹

13. What is 20% of 30?

$$15 = \% \text{ of}$$

$$x = .20(30)$$

$$\boxed{x = 6}$$

14. 75 is 30% of what number?

$$15 = \% \text{ of}$$

$$75 = .30x$$

$$\boxed{x = 250}$$

Concept 1.6: Solving Literal Equations: ☺ ☹ ☹

Solve for y:

$$15. -2x + y = -3$$

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

Solve for x:

$$16. -3x + 6y = 18$$

$$\begin{array}{r} -6y \quad -6y \\ \hline -3x = -6y + 18 \\ -3 \quad -3 \quad -3 \\ \hline x = 2y - 6 \end{array}$$

Solve for P:

$$17. 2P - K = C$$

$$\begin{array}{r} +K \quad +K \\ \hline 2P = \frac{C+K}{2} \\ \hline P = \frac{C}{2} + \frac{K}{2} \end{array}$$

Concept 1.7: Solving with Square Roots: ☺ ☹ ☹

$$18. \sqrt{x^2} = 121$$

$$\boxed{x = \pm 11}$$

$$19. 4x^2 - 25 = 75$$

$$\begin{array}{r} +25 \quad +25 \\ \hline 4x^2 = 100 \\ \frac{4}{4} \quad \frac{4}{4} \\ \hline x^2 = 25 \\ \hline \boxed{x = \pm 5} \end{array}$$

Unit 2 Finals Review

Concept 2.1: Solve Absolute Value Equations: ☺ ☹ ☹

$$20. 7|n+5| = 28$$

$$\begin{array}{r} 7 \quad 7 \\ \hline |n+5| = 4 \end{array}$$

$$\begin{array}{l} \swarrow \quad \searrow \\ n+5 = 4 \quad n+5 = -4 \\ \hline \boxed{n = -1} \quad \boxed{n = -9} \end{array}$$

$$21. 3|6-3x| - 18 = -9$$

$$\begin{array}{r} 3|6-3x| = 9 \\ \hline 3 \quad 3 \\ \hline |6-3x| = 3 \end{array}$$

$$\begin{array}{l} \swarrow \quad \searrow \\ 6-3x = 3 \quad 6-3x = -3 \\ \hline -3x = -3 \quad -3x = -9 \\ \hline \boxed{x = 1} \quad \boxed{x = 3} \end{array}$$

Concept 2.2: Solve Linear Inequalities, write answers in Interval Notation, and Graph:



☹

22. $x - 3(1 - 4x) \leq -81$

$$x - 3 + 12x \leq -81$$

$$13x - 3 \leq -81$$

$$\frac{13x}{13} \leq \frac{-78}{13}$$

$$x \leq -6$$

23. $54 \geq -6(3 + 6r)$

$$\begin{array}{r} 54 \geq -18 - 36r \\ +18 \quad +18 \end{array}$$

$$\frac{72}{-36} \geq \frac{-36r}{-36}$$

$$-2 \leq r$$

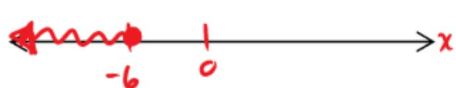
$$r \geq -2$$

24. $4(-2 + 4n) < 12 + 16n$

$$\begin{array}{r} -8 + 16n < 12 + 16n \\ -16n \quad -16n \end{array}$$

$$-8 < 12$$

True... ALL real #'s

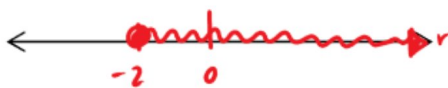


Inequality notation:

$$\boxed{x \leq -6}$$

Interval notation:

$$\boxed{(-\infty, -6]}$$



Inequality notation:

$$\boxed{r \geq -2}$$

Interval notation:

$$\boxed{[-2, \infty)}$$



Inequality notation:

$$\boxed{\text{TR}}$$

Interval notation:

$$\boxed{(-\infty, \infty)}$$

Concept 2.3: Solve Compound Inequalities (Inequality & interval notation) then graph:



25. $10 + 12n < 70$ or $-3 + 5n \leq -13$

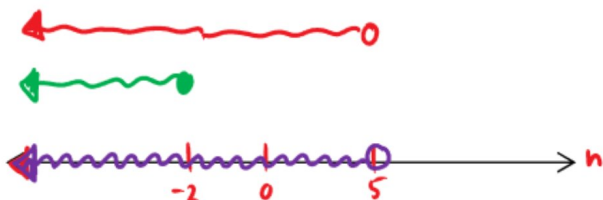
$$\begin{array}{r} -10 \quad -10 \quad +3 \quad +3 \\ \hline 12n < 60 \quad 5n \leq -10 \end{array}$$

$$\frac{12n}{12} < \frac{60}{12} \quad \frac{5n}{5} \leq \frac{-10}{5}$$

$$n < 5 \quad \text{or} \quad n \leq -2$$

↑

"everything"



Inequality notation:

$$\boxed{n < 5}$$

Interval notation:

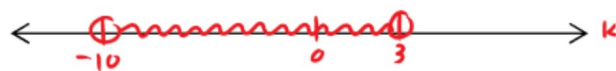
$$\boxed{(-\infty, 5)}$$

26. $-79 < 7k - 9 \leq 12$

$$\begin{array}{r} +9 \quad +9 \quad +9 \\ \hline -70 < 7k \leq 21 \end{array}$$

$$\frac{-70}{7} < \frac{7k}{7} \leq \frac{21}{7}$$

$$-10 < k \leq 3$$



Inequality notation: $-10 < k \leq 3$

Interval notation:

$$\boxed{(-10, 3]}$$

Unit 3 Finals Review

Concept 3.1: Definition of a Function: ☺ ☹ ☹

27. What is the definition of a function? *Each input (x) has exactly one output (y)*

28. Which of the following are functions?

a. **no**

Input	Output
1	4
2	8
2	3
4	12

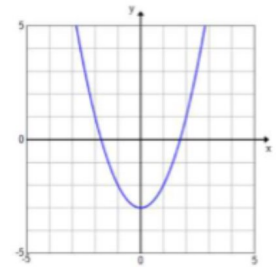
b. **NO**

Input Output

```

graph LR
    subgraph Input
        0
        5
        10
    end
    subgraph Output
        2
        3
        4
    end
    0 --> 2
    5 --> 3
    10 --> 3
    10 --> 4
    
```

c. **yes** ← use vertical line test



Concept 3.2: Evaluating a Function: ☺ ☹ ☹

29. Find $f(-4)$.

$$f(x) = -2x - 5 \text{ when } x = -4$$

$$f(-4) = -2(-4) - 5$$

$$f(-4) = 8 - 5$$

$$f(-4) = 3$$

30. Find x .

$$f(x) = -3x^2 + 2 \text{ when } f(x) = -25$$

$$\begin{array}{r} -25 = -3x^2 + 2 \\ -2 \quad \quad -2 \\ \hline -27 = -3x^2 \end{array}$$

$$-27 = -3x^2$$

$$9 = x^2$$

$$\pm 3 = x$$

Concept 3.3: Evaluating a function graphically: ☺ ☹ ☹

31. $a(1) = 2$

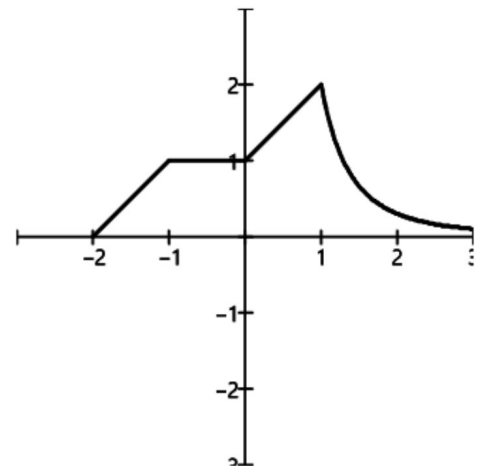
32. $a(-2) = 0$

33. Find x when $a(x) = 2$

$$x = 1$$

34. Find x when $a(x) = 0$

$$x = -2 \text{ or } x = 3$$



Concept 3.4: Find the slope between two points: ☺ ☹ ☹

Find the slope of the line and identify the line as horizontal, vertical, or diagonal.

35. (2, -4) and (2, -3)

$$\begin{array}{l} (2, -4) \\ (2, -3) \end{array} \quad m = \frac{-3 - (-4)}{2 - 2} = \frac{1}{0} = \boxed{\text{undefined}} \\ \boxed{\text{vertical}}$$

36. (-3, -6) and (3, 2)

$$\begin{array}{l} (-3, -6) \\ (3, 2) \end{array} \quad m = \frac{2 - (-6)}{3 - (-3)} = \frac{8}{6} = \boxed{\frac{4}{3}} \\ \boxed{\text{diagonal}}$$

Find the value of y so that the line passing through the given points has the given slope.

37. (5, y), (9, 7); $m = -\frac{5}{4}$

$$\begin{array}{l} (5, y) \\ (9, 7) \end{array} \quad \frac{7 - y}{9 - 5} = \frac{-5}{4} \\ \frac{7 - y}{4} = \frac{-5}{4} \quad \begin{array}{l} 4(7 - y) = -20 \\ 28 - 4y = -20 \\ -4y = -48 \\ \boxed{y = 12} \end{array}$$

Concept 3.5: Find the x and y intercepts of an equation: ☺ ☹ ☹

38. $5x - 8y = 40$

$$\begin{array}{l} \text{x int} \\ y = 0 \\ 5x - 8(0) = 40 \\ 5x = 40 \\ x = 8 \\ \boxed{(8, 0)} \end{array}$$

$$\begin{array}{l} \text{y int} \\ x = 0 \\ 5(0) - 8y = 40 \\ -8y = 40 \\ y = -5 \\ \boxed{(0, -5)} \end{array}$$

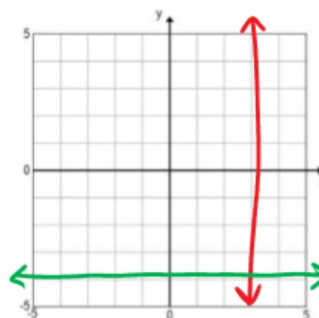
39. $y = 2x - 5$

$$\begin{array}{l} \text{x int} \\ 0 = 2x - 5 \\ 5 = 2x \\ \frac{5}{2} = x \\ \boxed{(5/2, 0)} \end{array}$$

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

Concept 3.6: Graph a vertical or horizontal line: ☺ ☹

40. Graph $x = 3$ and $y = -4$ on the same graph

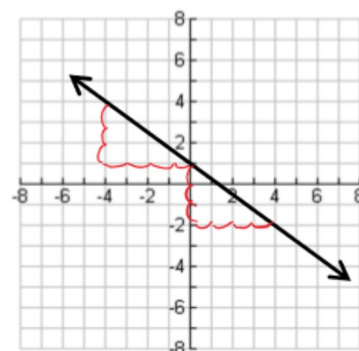


Concept 3.7: Identify the slope and y intercept from a graph or equation: ☺

41. Write the equation of the given line:

$$\begin{array}{l} m = -\frac{3}{4} \\ b = 1 \end{array}$$

$$\boxed{y = -\frac{3}{4}x + 1}$$

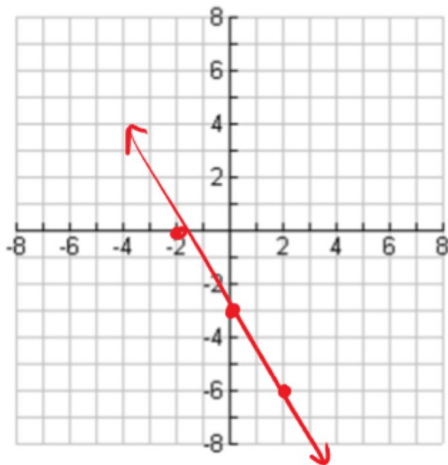


Concept 3.8: Graph from slope intercept form, point slope form, or using intercepts (standard): ☺

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

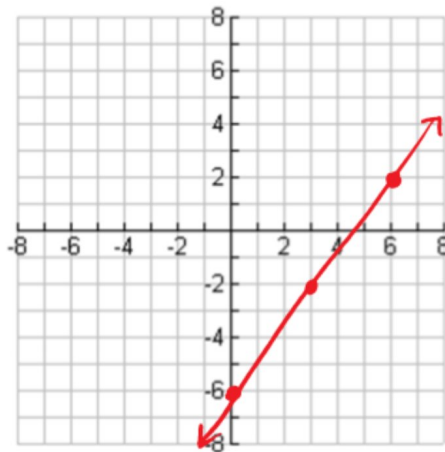
$m = -\frac{3}{2}$ $b = -3$



43. $4x - 3y = 18$

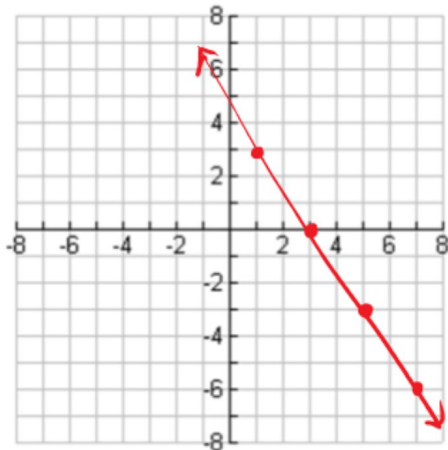
$-3y = -4x + 18$
 $y = \frac{4}{3}x - 6$

$m = \frac{4}{3}$ $b = -6$



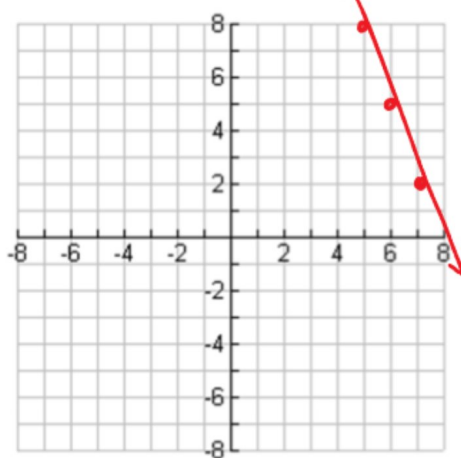
44. $y + 3 = -\frac{3}{2}(x - 5)$

$m = -\frac{3}{2}$ $pt = (5, -3)$



45. $y - 5 = -3(x - 6)$

$m = -3$ $pt = (6, 5)$

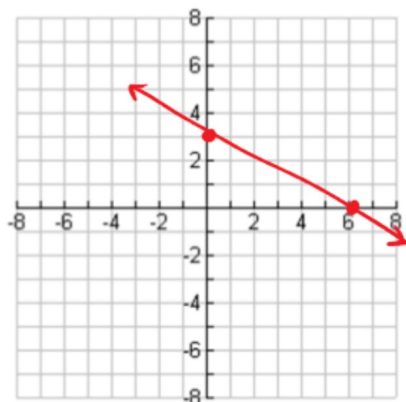


Graph using the INTERCEPTS METHOD.

46. $-3x - 6y = -18$

x-int: $(6, 0)$

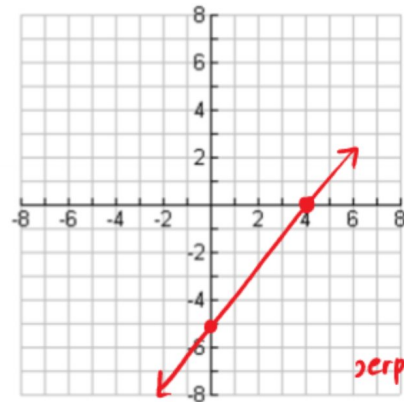
y-int: $(0, 3)$



47. $5x - 4y = 20$

x-int: $(4, 0)$

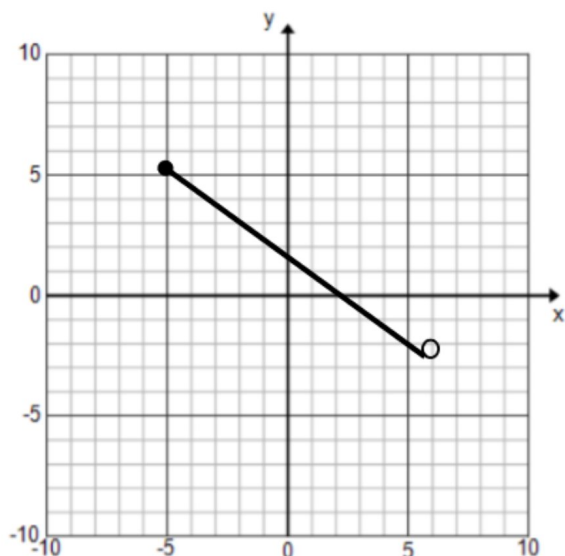
y-int: $(0, -5)$



Concept 3.9: Recognizing Domain and Range Graphically:



48. State the Domain and Range of the given graph:



Inequality:

Interval:

Domain: $-5 \leq x < 6$

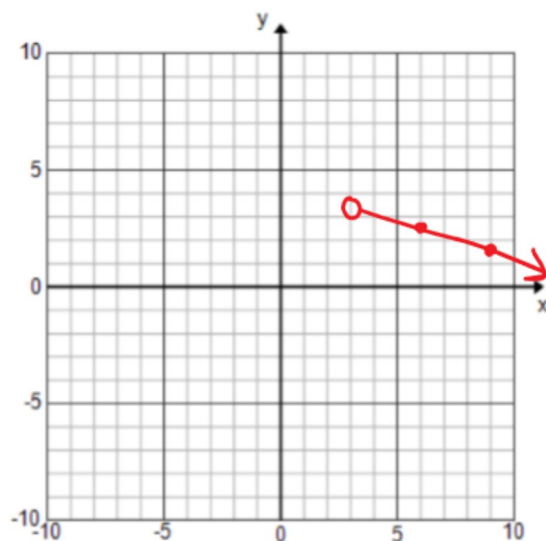
$[-5, 6)$

Range: $-3 < y \leq 5$

$(-3, 5]$

49. Graph: $y = -\frac{1}{3}x + 4$ with domain: $x > 3$

Then state the resulting range:



Range: $(-\infty, 3)$

$y < 3$

Unit 4 Finals Review

Quick Mental Check



- slope formula: $m = \frac{y_2 - y_1}{x_2 - x_1}$ or $\frac{y_1 - y_2}{x_1 - x_2}$ or $\frac{\Delta y}{\Delta x}$
- slope intercept form : $y = mx + b$
- point – slope form: $y - y_1 = m(x - x_1)$
- The slope of a vertical line is undefined
- The slope of a horizontal line is zero
- To find a y intercept you plug in 0 for x
- To find an x intercept you plug in 0 for y

Concept 4.1: Write an equation in Slope Intercept Form

50. Write an equation of the line that passes through (6, -5) with a slope of $\frac{3}{2}$

$$\begin{aligned} y &= mx + b \\ -5 &= \frac{3}{2}(6) + b \\ -5 &= 9 + b \\ -14 &= b \end{aligned}$$

$$\boxed{y = \frac{3}{2}x - 14}$$

51. Write an equation of the line that contains (-6, 2) and (-2, -10) in slope-intercept form.

$$\begin{aligned} (-6, 2) & \quad m = \frac{2 + 10}{-6 + 2} = \frac{12}{-4} = -3 \\ (-2, -10) & \end{aligned}$$

$$\begin{aligned} y - 2 &= -3(x + 6) \\ y - 2 &= -3x - 18 \\ +2 & \quad +2 \end{aligned}$$

$$\boxed{y = -3x - 16}$$

Concept 4.2: Write an equation in Point Slope Form

52. Write the equation of a line that contains (4, 7) and (-3, -6) in point-slope form:

$$\begin{aligned} (4, 7) & \quad m = \frac{7 + 6}{4 + 3} = \frac{13}{7} \\ (-3, -6) & \end{aligned}$$

$$\boxed{y - 7 = \frac{13}{7}(x - 4)}$$

or

$$\boxed{y + 6 = \frac{13}{7}(x + 3)}$$

Concept 4.3: Write an equation in Standard Form

53. Write the equation of the line $y - 3 = \frac{3}{4}(2x - 3)$ in standard form.

$$\begin{aligned} 4(y - 3) &= \frac{3}{2}x - \frac{9}{2} \\ 4y - 12 &= 6x - 9 \end{aligned}$$

$$\boxed{-6x + 4y = 3}$$

$$\rightarrow \boxed{6x - 4y = -3}$$

54. Write the equation of the line in standard form given that it runs through (-2, 2) and (-4, -6)

$$\begin{aligned} (-2, 2) & \quad m = \frac{2 + 6}{-2 + 4} = \frac{8}{2} = 4 \\ (-4, -6) & \end{aligned}$$

$$\begin{aligned} y - 2 &= 4(x + 2) \\ y - 2 &= 4x + 8 \end{aligned}$$

$$\boxed{-4x + y = 10}$$

$$\rightarrow \boxed{4x - y = -10}$$

Concept 4.4: Writing Equations of Parallel and Perpendicular Lines

Are lines a and b parallel, perpendicular, or neither?

55. Line a : $y = -5x + 3$

$$\boxed{m = -5}$$

Line b : $y - 5x = -2$

$$y = 5x - 2$$

$$\boxed{m = 5}$$

neither

56. Line a : $-5x + y = -3 \rightarrow y = 5x - 3$

$$\boxed{m = 5}$$

Line b : $-2x - 10y = 20$

$$-10y = 2x + 20$$

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

$$\boxed{m = -\frac{1}{5}}$$

perp

57. Write the equation of the line that is perpendicular to $-5x - 15y = -3$ and passes through the point $(-1, 4)$ in slope-intercept form.

$$\begin{aligned} y - 4 &= 3(x + 1) \\ y - 4 &= 3x + 3 \\ \boxed{y} &= \boxed{3x + 7} \end{aligned}$$

$$\begin{aligned} &\begin{array}{r} +5x \quad +5x \\ -15y = 5x - 3 \\ \hline -15 \quad -15 \quad -15 \\ y = -\frac{1}{3}x + \frac{1}{5} \end{array} \\ &m = -\frac{1}{3} \\ &\perp m = 3 \end{aligned}$$

Concept 4.5: Solve Linear Applications

58. Mr. Griffin's beard grows at a rate of 3 centimeters per week. He started with a beard that was 2.5 centimeters long (crazy how it just started that way, right?). At this rate, how long with his beard be after 2 months? (be careful with units)

a. Write a linear equation $y = 3x + 2.5$

$x = \# \text{ of weeks}$

b. predict the length of his beard after 2 months $y = 3(8) + 2.5$

$2 \text{ months} \approx 8 \text{ weeks}$

$$\begin{aligned} y &= 24 + 2.5 \\ \boxed{y} &= \boxed{26.5 \text{ cm}} \end{aligned}$$

59. In 2000, people charged \$1,243 billion on the four most used types of credit cards. In 2005, people charged \$1,838 billion on these same four credit cards. $m = \frac{\Delta y}{\Delta x} = \frac{\$}{\text{year}}$ $(0, 1243)$ $(5, 1838)$

a. What is the rate of change?

$$m = \frac{1838 - 1243}{5 - 0} = \frac{595}{5} = \frac{119}{1}$$

Each year the amount on these credit cards increases by \$119 billion

b. Write a linear equation that represents this scenario (slope intercept form).

$$\begin{aligned} y - 1243 &= 119(x - 0) \\ y - 1243 &= 119x \\ \boxed{y} &= \boxed{119x + 1243} \end{aligned}$$

c. How much would you predict people to spend in 2015.

$$\begin{aligned} y &= 119(15) + 1243 \\ \boxed{y} &= \boxed{\$3028 \text{ billion}} \end{aligned}$$

d. In what year would you predict the amount spent to be \$2490 billion.

$$2490 = 119x + 1243$$

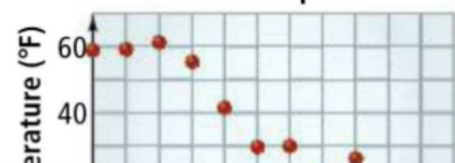
$$1247 = 119x$$

$$x \approx 10.5$$

Somewhere between 2010 and 2011

Concept 4.6: Calculate a Line of Best Fit and Make Predictions

60. Write a sentence that describes the correlation of the



scatter plot:

As the plane altitude increases, the temperature outside decreases.
(negative correlation)

61. a. Given the data set to the write, use your calculator to calculate the linear regression (line of best fit)

$$y = 4.92x - 2.55$$

$r = .99 \rightarrow$ strong pos correl.



Weight of a Panda

Age (months)	Weight (lb)
1	2.5
2	7.6
3	12.5
4	17.1
6	24.3
8	37.9
10	49.2
12	54.9

a. What does the slope represent?

Pandas gain 4.92 pounds per 1 month.

b. What would you predict the weight of the Panda to be at 7 months

$$4.92(7) - 2.55 = \boxed{31.89 \text{ pounds}}$$

Interpolation

c. What would you predict the weight of the Panda to be at 20 months?

$$4.92(20) - 2.55 = 95.85$$

d. Is your line of best fit the best a good predictor at 20 months? Why or why not?

Less reliable because extrapolation

Unit 5 Finals Review – Solving Systems

Concept 5.1: Recognize a solution to a system of Equations

62. Is $(-3, 1)$ a solution for the system?

$$x + y = -2$$

$$x + 5y = -2$$

$$-3 + 1 = -2$$

$$-2 = -2 \checkmark$$

$$-3 + 5(1) = -2$$

$$2 \neq -2 \times$$

No

63. 2 parallel lines have No solution(s).

2 intersecting lines have One solution(s).

2 equations that represent the same line have

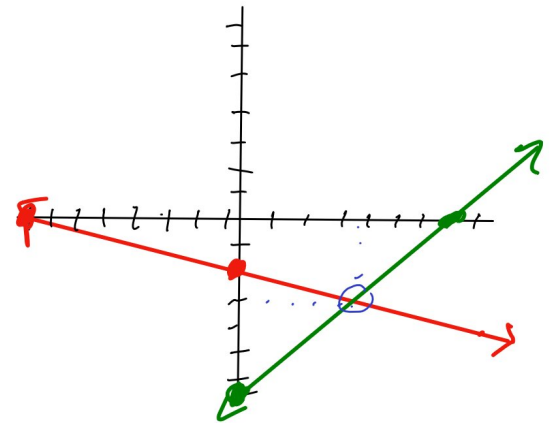
Infinite solution(s).

Concept 5.2: Solve a System by Graphing

64. $x + 4y = -8$ ●
 $-x + y = -7$ ●

$$\begin{aligned} 5y &= -15 \\ y &= -3 \\ -x + 3 &= -7 \\ -x &= -10 \quad x = 10 \end{aligned}$$

$(10, -3)$



Concept 5.3: Solve a System using Substitution or Elimination

Solve the system of linear equations by substitution or elimination

65. $y = 3x + 2$
 $x + 2y = 11$

$$\begin{aligned} x + 2(3x + 2) &= 11 \\ x + 6x + 4 &= 11 \\ 7x &= 7 \\ x &= 1 \end{aligned}$$

$$\begin{aligned} y &= 3(1) + 2 \\ y &= 5 \end{aligned}$$

$(1, 5)$

66. $\begin{cases} 2x - 3y = -5 \\ 5x + 2y = 16 \end{cases}$
 $\times 2 \rightarrow 4x - 6y = -10$
 $\times 3 \rightarrow 15x + 6y = 48$

$$19x = 38$$

$$x = 2$$

$(2, 3)$

$$\begin{aligned} 2(2) - 3y &= -5 \\ -3y &= -9 \\ y &= 3 \end{aligned}$$

Concept 5.4: Solve Applications of Linear Systems

67. A hotel offers two activity packages. One costs \$192 and includes 3 hours of horseback riding and 2 hours of parasailing. The second costs \$213 and includes 2 hours of horseback riding and 3 hours of parasailing. What is the cost for an hour of each activity?

Let x = horse back cost
 y = parasailing cost

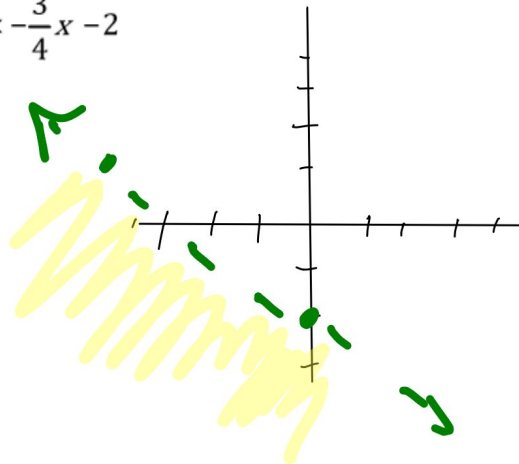
$$\begin{aligned} (3x + 2y = 192) \times 2 &\rightarrow 6x + 4y = 384 \\ (2x + 3y = 213) \times 3 &\rightarrow 6x + 9y = 639 \\ \hline &-5y = -255 \\ &y = 51 \end{aligned}$$

$2x + 3(51) = 213$
 $2x = 60$
 $x = 30$

Concept 5.5: Graph a Linear Inequality
 Inequality

Concept 5.6 Write Equation of a Linear

68. $y < -\frac{3}{4}x - 2$



69.

Concept 5.7: Graph a system of Linear Inequalities

$$y < 2x + 4$$

$$-3x - 2y \geq 6$$

70. $y > -1$

Concept 5.8 Write a System of
from a graph

71.

Steps for Getting Ready for the Midterm:

1. First – have you graded and corrected your study guide???

2. Go back through you packet and pick the top 3 concepts you had the most trouble with:

1. _____

2. _____

3. _____

3. Now go back through your notes, the website, and your quizzes and find similar problems to try.

4. Consider “retaking” old quizzes (or at least problems that you may have missed the first time)

5. Still Stuck? Call a friend, open your textbook, visit the website, and ASK YOUR TEACHER