

Foundations of Math I
Final Exam Study Guide

1.) Water is drained from a 10-foot cylindrical tank at a constant rate.

- The depth of the water is decreasing linearly.
- At ~~1:30~~ PM, the water depth was 4.5 feet.
- At ~~4:00~~ PM, the water depth was 3.9 feet.

(0, 4.5) (2.5, 3.9)

If the linear pattern continues, what will the depth (in feet) of the water be at ~~5:00~~ PM?

$$\frac{3.9 - 4.5}{2.5 - 0} = \frac{-0.6}{2.5} = -\frac{6}{25}$$

$$y = -\frac{6}{25}x + 4.5$$

← plug in
3.5

$$\boxed{3.66\text{ft}}$$

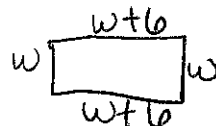
2.) The length of rectangle is six inches more than its width. If the perimeter of the rectangle is 24 inches, find the width.

A. 9 inches

B. 4 inches

C. 9 inches

D. 3 inches



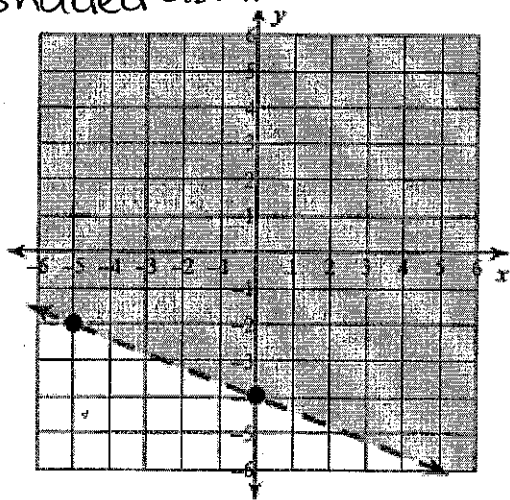
$$4w + 12 = 24$$

$$\begin{array}{r} 4w + 12 = 24 \\ -12 \quad -12 \\ \hline 4w = 12 \\ \frac{4}{4} \quad \frac{12}{4} \\ w = 3 \end{array}$$

$$w = 3$$

3.) Write the inequality that matches the graph below.

Dotted line
shaded above



$$\boxed{y > -\frac{2}{5}x - 4}$$

4.) "Three times the difference of a number and 9 is 18 more than 8 times the number." What is **twice** the number?

$$3(x - 9) = 18 + 8x$$

$$\begin{array}{r} 3x - 27 = 18 + 8x \\ -8x \quad \quad -8x \\ \hline \end{array}$$

$$-5x - 27 = 18$$

$$\begin{array}{r} -5x - 27 = 18 \\ +27 \quad +27 \\ \hline \end{array}$$

$$\begin{array}{r} -5x = 45 \\ \frac{-5}{-5} \quad \frac{45}{-5} \\ \hline \end{array}$$

$$x = -9$$

$$-9(2) = \boxed{-18}$$

5.) This summer, Shane plans to join a swim club for \$40. He has to pay an additional \$4.00 per visit. If Shane does not want to spend more than \$120, what is the maximum number of times he can visit the pool this summer?

x = # of visits

$$4x + 40 \leq 120$$

$$\begin{array}{r} 4x + 40 \leq 120 \\ -40 \quad -40 \\ \hline \end{array}$$

$$\begin{array}{r} 4x \leq 80 \\ \frac{4}{4} \quad \frac{80}{4} \\ \hline \end{array}$$

$$x \leq 20$$

$$\boxed{20 \text{ visits}}$$

6.) A company charges \$18 plus \$4 per hour to rent a boat. Destiny and Janay want to rent a boat but do not want to spend more than \$30 each. What is the maximum number of hours the girls can rent a boat?

\$30 each → \$60

x = # of hours

$$4x + 18 \leq 60$$

$$\begin{array}{r} 4x + 18 \leq 60 \\ -18 \quad -18 \\ \hline \end{array}$$

$$\begin{array}{r} 4x \leq 42 \\ \frac{4}{4} \quad \frac{42}{4} \\ \hline \end{array}$$

$$x \leq 10.5$$

$$\boxed{10 \text{ hours at maximum}}$$

7.) The area of a cone is found using the formula, $A = \frac{Bh}{3}$ where B represents the area of the base and h represents the height. Write a formula that represents the height h of the cone in terms of the area and base.

$$(3) A = \frac{Bh}{3}$$

$$A. h = \frac{3B}{A}$$

$$B. h = \frac{A}{3B}$$

$$\frac{3A}{B} = \frac{Bh}{B}$$

$$h = \frac{3A}{B}$$

$$C. h = \frac{3A}{b}$$

$$D. h = \frac{b}{3A}$$

8.) Jack stopped at the gas station to fill his car with gas.

- The truck can hold 26 gallons of gas.
- The tank had 4 gallons of gas in it when Jack stopped.
- The gas pump fills at a rate of 8 gallons per minute

Write an equation that represents the amount of gas, g , in the car t minutes after Jack starts pumping the gas.

$$g = 8t + 4$$

9.) Kiera and Trina joined a gym. The gym offers two different payment plans. Kiera chose Plan 1 and pays \$40 a month and no fee to join. Trina chose Plan 2 and pays \$15 a month, plus a \$75 joining fee. Write two equations that model Kiera's total payments, t_1 , and Trina's total payments, t_2 , after m months.

$$\begin{array}{l} \text{Kiera} \quad \text{Trina} \\ t_1 = 40m \quad t_2 = 15m + 75 \end{array}$$

10.) What is the value of x in the equation $f(x) = \frac{x}{4} + 7$, if the value of $f(x) = 12$?

$$12 = \frac{x}{4} + 7$$

$$\frac{-7}{-7} \quad \frac{-7}{-7}$$

$$(4) 5 = \frac{x}{4} (4)$$

$$\boxed{x = 20}$$

11.) Identify the domain of the relation.

$\{-1, 4\}, \{4, 2\}, \{3, 4\}, \{-1, 2\}, \{0, 3\}$

$$\{-1, 0, 3, 4\}$$

Domain \rightarrow
x-values

12.) What is the average rate of change from $x = -1$ to $x = 2$?

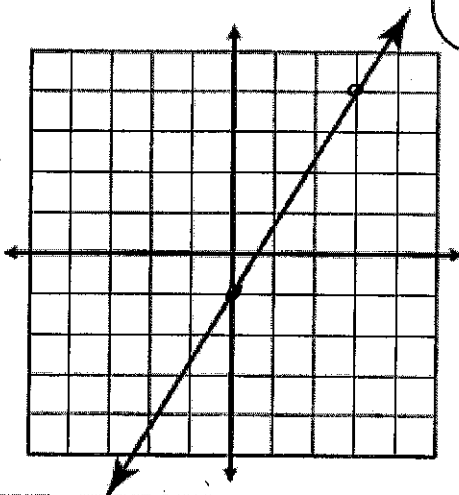
| X | -1 | 0 | 1 | 2 | 3 |
|---|----|----|---|---|----|
| Y | -3 | -2 | 1 | 6 | 13 |

$$\frac{6 - (-3)}{2 - (-1)} = \frac{9}{3} = \boxed{3}$$

13.) Identify the equation of the line graphed below.

$$m = \frac{5}{3}$$

$$b = -1$$



D

$$A. 3x + 5y = 5$$

$$B. 3x - 5y = 5$$

14.) Which situation could be modeled by the function $f(x) = 50x + 90$?

A. Gene has \$50, and the MP3 player he wants costs \$90. Let y equal the amount of money he needs to be able to purchase the player.

B. A lawyer charges \$50 for the initial consultation and \$90 for every additional hour. Let y equal the total amount the lawyer charges, in dollars.

C. Del makes a \$90 down payment, and then makes \$50 monthly payments on a computer. Let y equal the total amount he paid for the computer.

D. Shawna wants to buy new speakers for her car. There is a \$50 labor charge for installation, plus the \$90 cost of the speakers. Let y equal the amount she paid for the new speakers, including the installation.

$$\begin{array}{r} 5y = -3x + 5 \\ \underline{5} \quad \underline{5} \quad \underline{5} \\ 11 = -21x + 11 \end{array}$$

$$\begin{array}{r} -5y = -3x + 5 \\ \underline{-5} \quad \underline{-5} \quad \underline{-5} \\ 11 = -21x + 11 \end{array}$$

$$-\frac{5}{3}x + 1$$

$$y = \frac{5}{3}x - 1$$

C. $5x + 3y = 3$

D. $5x - 3y = 3$

15.) Which is the equation of the line that passes through the points $(-4, 3)$ and $(2, -6)$?

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

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

~~C. $y = \frac{3}{2}x + 3$~~

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

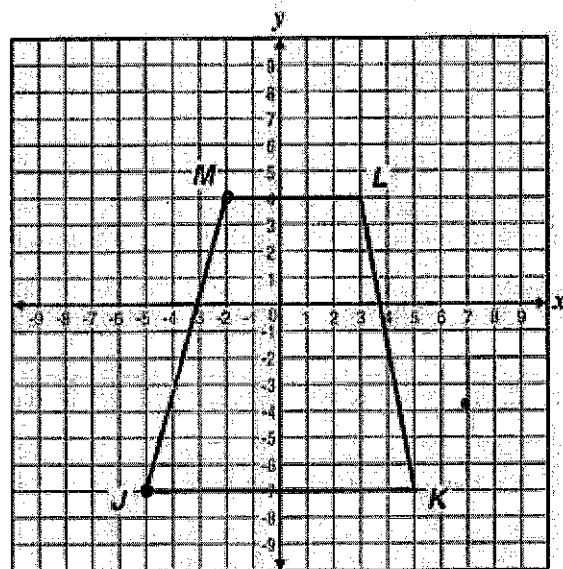
$$\frac{-6-3}{2+4} = \frac{-9}{6} = -\frac{3}{2}$$

$$y - 3 = -\frac{3}{2}(x + 4)$$

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

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

16.) Trapezoid $JKLM$ is shown below. The coordinates of J , K , L , and M are $(-5, -7)$, $(5, -7)$, $(3, 4)$ and $(-2, 4)$, respectively.



$$m = \frac{11}{3}$$

What is the equation of the line \overline{JM} ?

$$y = \frac{11}{3}x + \frac{34}{3}$$

$$\begin{aligned} 4 + 7 &= \frac{11}{3}(x + 5) \\ 4 + 7 &= \frac{11}{3}x + \frac{55}{3} \\ -7 & \quad -7 \end{aligned}$$

17.) Isaac rented a movie but forgot to return it on time. The table below shows the total amount of money that Isaac owed after different numbers of days.

| Number of Days (x) | Total Owed (y) |
|------------------------|--------------------|
| 2 | \$4.50 |
| 5 | \$9.00 |
| 6 | \$10.50 |
| 8 | \$13.50 |

Which function models the amount of money Isaac owed after x days?

A. $y = 1.50x + 1.75$

B. $y = 1.50x + 3$

C. $y = 1.50x$

D. $y = 1.50x + 1.50$

18.) A sequence is shown below:

$$\begin{aligned} &-7, -9, -11, -13 \\ &\quad \downarrow \quad \downarrow \quad \downarrow \\ &\quad -2 \quad -2 \quad -2 \end{aligned}$$

Write an explicit formula can be used to determine the n th term of the sequence.

$$\begin{aligned} f(n) &= -7 - 2(n-1) \\ &= -2n + 2 - 7 \\ f(n) &= -2n - 5 \end{aligned}$$

19.) John is saving to buy a television that costs \$1250. John currently has \$200 saved. He plans to save an additional \$50 each week. Write a linear equation to model John's savings.

$$1250 = 50x + 200$$

20.) The function $g(x) = 20x + 100$ models the balance of Liz's savings account after x months. What is the meaning of the y -intercept of the function?

A. the initial amount Liz starts with each year in the account

B. the initial amount in Liz's bank account

C. the additional amount Liz saves per month

D. the additional amount Liz saves per year

21.) The function below shows the cost of a hamburger with different numbers of toppings (t). $f(t) = 1.90 + 1.40t$. What is the y-intercept, and what does it mean?

\$1.90 is the y-intercept.
It represents the cost of a hamburger with no toppings.

22.) Which of the following expressions represents the sequence 12, 13.50, 15, 16.50 written explicitly for $n = 1, 2, 3, \dots$?

A. $f(n) = 12 + 1.5(n - 1)$ B. $f(n) = 1.5n + 12$

C. $f(n) = 12 + n$ D. $f(n) = 12n$

23.) Solve the inequality:

$$\begin{array}{r} 3x - 6 \leq -2x + 4 \\ +2x \quad +2x \\ \hline 5x - 6 \leq 4 \\ +6 \quad +6 \\ \hline 5x \leq 10 \\ \frac{5x}{5} \leq \frac{10}{5} \\ \boxed{x \leq 2} \end{array}$$

24.) At SeptemberFest, the first dance of the year, the Students' Council charged \$3 for couples and \$2 for singles. If 365 tickets were sold and the total receipts were \$925, which pair of equations would determine the number of each ticket sold?

$x = \text{couples}$
 $y = \text{singles}$

A. $x - y = 365$
 $3x + 2y = 925$

C. $3x + 2y = 365$
 $x + y = 925$

B. $x + y = 925$
 $x - y = 365$

D. $3x + 2y = 925$
 $x + y = 365$

25.) The total cost, in dollars, of membership in a basketball league is given by the function $m(x) = 25x + 50$, where m is the number of months a person is a member. In dollars, how much is the cost of membership for two years? 2 yrs = 24 months

$25(24) + 50$

$\boxed{\$650}$

26.) Which of the following is equivalent to the equation $4x + 7y = z$?

A. $x = 4z - 28y$ $\frac{4x}{4} = \frac{z - 7y}{4}$
C. $y = 7z + 28x$ $x = \frac{z - 7y}{4}$

B. $x = \frac{(z - 7y)}{4}$

D. $y = \frac{(z + 4x)}{7}$

27.) A manufacturer makes two kinds of computers, laptops and desktops. The company has equipment to manufacture any number of laptops up to 600 per month or any number of desktops up to 800 per month. However, the company can manufacture at most 1,000 computers of both kinds per month in all. It takes 35 hours to manufacture either type of computer and the manufacturer has available 25,000 hours per month. Which system of inequalities models this scenario? $x = \text{laptops}$ $y = \text{desktops}$

A.

$x \leq 600$

$y \leq 800$

$x + y \leq 1000$

$35x + 35y \geq 25000$

B.

$x \leq 600$

$y \leq 800$

$x + y \leq 1000$

$35x + 35y \leq 25000$

C.

$x \leq 600$

$y \leq 800$

$x + y \geq 1000$

$35x + 35y \geq 25000$

D.

$x \geq 600$

$y \geq 800$

$x + y \geq 1000$

$35x + 35y \geq 25000$

28.) Find the y-coordinate of the systems of equations:

$$\begin{array}{r} 4x + 2y = 10 \\ 2(x - y) = 13 \\ \hline 4x + 2y = 10 \\ + 2x - 2y = 26 \\ \hline 6x = 36 \\ x = 6 \end{array}$$

$$\begin{array}{r} 6 - y = 13 \\ -6 \quad -6 \\ \hline -y = 7 \\ \frac{-y}{-1} = \frac{7}{-1} \\ \boxed{y = -7} \end{array}$$

29.) What value of x satisfies the equation

$$\begin{array}{r} 5(x - 3) - 2(x + 1) = 4 \\ 5x - 15 - 2x - 2 = 4 \\ 3x - 17 = 4 \\ +17 \quad +17 \\ \hline 3x = 21 \\ \boxed{x = 7} \end{array}$$

30.) MATCHING - Three systems of equations are in the table below. Draw a line to identify the choice that describes the number of solutions of each system.

| | |
|---|---------------------------|
| $\begin{array}{rcl} 5(2x + 8y = 6) & 10x + 40y = 30 \\ 2(-5x - 20y = -15) & -10x - 40y = -30 \\ \hline & 0 = 0 \end{array}$ | One Solution |
| $\begin{array}{rcl} -3x + 3y = 4 & -3x + 3y = 4 \\ 3x - 3y = -9 & -3(-x + y = 3) \\ \hline & 0 = -5 \end{array}$ | Infinitely Many Solutions |
| $\begin{array}{rcl} -15x + 10y = -10 & -5(3x - 2y = 2) \\ 15x - 15y = 30 & 5x - 5y = 10 \\ \hline -5y = 20 \\ y = -4 \end{array}$ $\begin{array}{rcl} 3x - 2(-4) = 2 & 3x + 8 = 2 & 3x = -6 \\ & & x = -2 \end{array}$ | No Solution |

31.) Two stores have movies to rent.

- The first store charges a \$12.00 per month membership fee plus \$2.50 per movie rented.
- The second store has no membership fee but charges \$4.50 per movie rented.

What is the minimum number of movies a person would need to rent in a month for the first store to be a better deal?

7

MAKE TABLE TO COMPARE

33.) The function $a(n) = 7n - 3$ represents the value of the n th term in a sequence. What is the sum of the second and the sixth term in the sequence?

$$\begin{array}{l} 7(2) - 3 = 11 \\ 7(6) - 3 = 39 \end{array}$$

$$11 + 39$$

50

32.) Ann and Betty together have \$60. Ann has \$9 more than twice Betty's amount. How much money does Ann have? $a = \text{Ann}$ $b = \text{Betty}$

$$a + b = 60 \quad (9 + 2b) + b = 60$$

$$a = 9 + 2b \quad -9 + 3b = 60$$

$$\begin{array}{r} -9 \\ 3b = 51 \\ b = 17 \end{array}$$

$$a = 9 + 2(17)$$

$$a = 43$$

\$43.00

34.) The width of a rectangle is $\frac{3}{4}$ its length. If the perimeter is 252 cm. Find the dimensions of the rectangle.

$$\frac{3}{4}l \quad l \quad \frac{3}{4}l$$

$$\frac{7}{2}l = 252$$

$$l = 72$$

$$w = 72(\frac{3}{4})$$

length = 72 cm
width = 54 cm

35.) Allyson has taken four tests and made 82, 77, 75, and 84. Allyson really wants to make a B in the class, which means she needs an overall average of 80. What does Allyson need to make on the final to get a B in the class?

$$\frac{318 + x}{5} = 80$$

$$318 + x = 400$$

$$x = 82$$

82%

36.) Two functions are shown below.

$$f(x) = 4x + 1$$

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

Graph
or
set equations
equal to
each other

What is the value of x where the graphs of $f(x)$ and $g(x)$ intersect?

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

37.) A function is shown below:

What is the value of $h(20)$?

$$h(x) = 14.35 - 0.7x$$

$$h(20) = 14.35 - 0.7(20)$$

$$h(20) = 0.35$$

0.35

31

$$y = 2.50x + 12$$

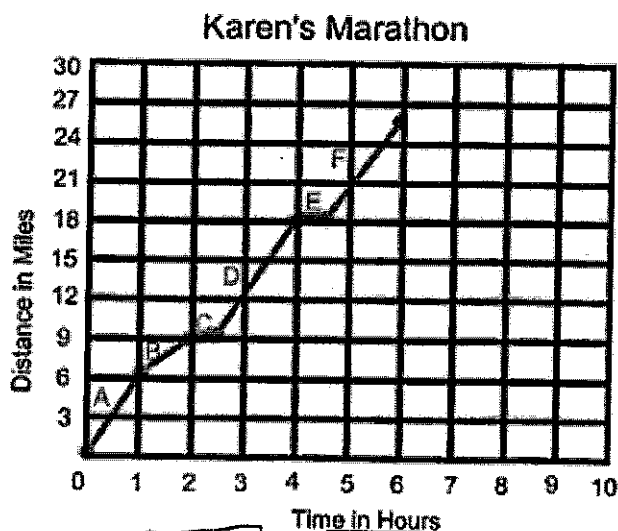
| X | Y |
|---|-------|
| 1 | 14.50 |
| 2 | 17 |
| 3 | 19.50 |
| 4 | 22 |
| 5 | 24.50 |
| 6 | 27 |
| 7 | 29.50 |
| 8 | 32 |
| 9 | 34.50 |

$$y = 4.50x$$

| X | Y |
|---|-------|
| 1 | 4.50 |
| 2 | 9.00 |
| 3 | 13.50 |
| 4 | 18.00 |
| 5 | 22.50 |
| 6 | 27.00 |
| 7 | 31.50 |
| 8 | 36 |
| 9 | 40.50 |

Better deal if
getting 7 movies

38.) The following graph represents Karen's marathon.



compare
the
slopes
for each
answer
choice

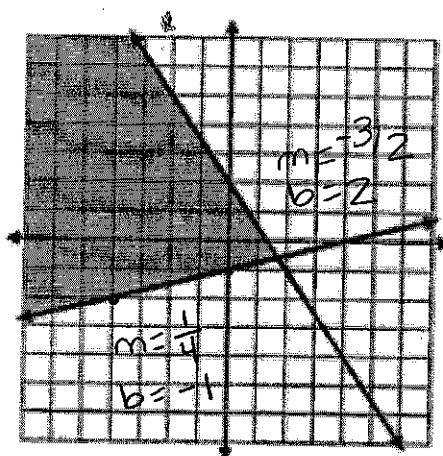
During which interval did Karen have the greatest rate of change?

A. 0 - 2 hours $\frac{9}{2}$

B. 1 - 3 hours $\frac{6}{2}$

C. 3 - 4 hours $\frac{6}{1}$

39.) Which system of inequalities is represented by the graph below?



a) $y \leq \frac{2}{3}x + 2$

$y \geq 4x + 1$

c) $y \leq \frac{2}{3}x - 2$

$y \geq 4x + 5$

b) $y \geq \frac{2}{3}x + 2$

$y \leq 2x + 1$

d) $y \leq -\frac{3}{2}x + 2$

$y \geq \frac{1}{4}x - 1$

40.) Circle the first incorrect step in solving the equation below.

$3 - 2(x + 4) = -17$

$3 - 2x - 8 = -17$

$5 - 2x = -17$

$2x = -22$

$x = 11$

when combining
3 and -8 the
sum should be
-5 not 5