Name _____ Block _____ Date _____

Unit 2: Linear Functions STUDY GUIDE

1.) Select the relation that does **not** represent a function. → X Repeats!

A. (18, 11), (−14, 9), (−11, 5), (2, −7)

B. (5, 3), (−3, 9), (12, −11), (4, −3),

C. (5, −3), (0, −1), (9, 2), (5, −7)

D. (−2, 10), (−3, 7), (14, 2), (3, −8)

2.) The table below displays the amount of gas used and the miles driven in a truck.

Gas Used (gallons)	Miles Driven
1	15
2	32
3	46
4	58
5	69
6	79
7	85

What is the average miles driven from 4 gallons to 7 gallons?

A. 7 gallons

B. 9 gallons

C. 13 gallons

D. 11 gallons

$\frac{85-58}{7-4} = \frac{27}{3}$

3.) Leonard compared the cost of purchasing a gallon of gas at two different gas stations. The function $C(x) = 0.07x + 3.25$ models the average cost of a gallon of gas at the first gas station after x months. The table below shows the average cost of a gallon of gas at the second gas station after different numbers of months. Which statement is true about the two gas stations?

Numbers of Months	Cost at Second Station
2	$3.40
4	$3.46
6	$3.52
8	$3.58

+2 +2 +2

+.06 +.06 +.06

m = .03

b = 3.28

y C(x) = .03x + 3.28

↳ initial price

A. The first station had a higher initial price per gallon and increased at a greater amount per month than the second station.

B. The second station had a higher initial price per gallon and increased at a greater amount per month than the first station.

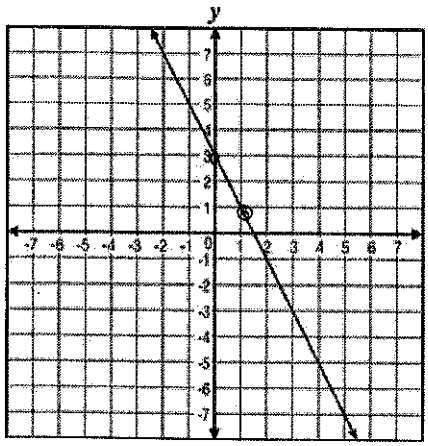
C. The first station had a higher initial price per gallon but increased at a smaller amount per month than the second station

D. The second station had a higher initial price per gallon but increased at a smaller amount per month than the first station.

4.) Which equation is represented by the graph?

~~A. $2x - y = 3$~~ B. $2x + y = 3$

C. $2x + y = -3$ D. $2x - y = -3$



$b = 3$

$m = -2$

$y = -2x + 3$

$2x - y = 3$

$-2x \quad -2x$

$-y = -2x + 3$

$-1 \quad -1 \quad -1$

$y = 2x - 3$

$2x + y = 3$

$-2x \quad -2x$

$y = -2x + 3$

5.) An ordered pair is missing from the table below.

x	$f(x)$
-1	10
1	8
3	6
5	4
?	?

Write an ordered pair that would prevent the relation in the table from being a function. (3, 2)

6.) The function $f(x) = 4x + 12$ models the yearly membership cost for a movie rental club, where x is the number of movies rented.

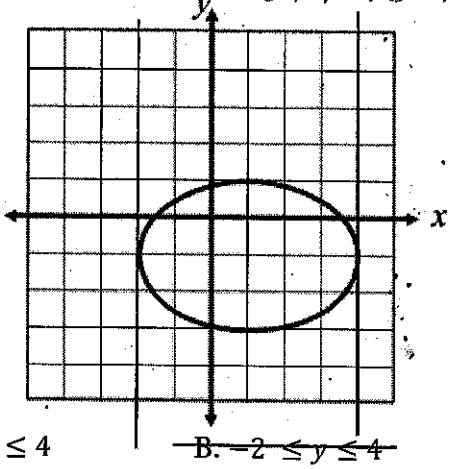
- Last year, Sarah rented 24 movies. $4(24)+12$ → \$108
- Last year, Tim rented twice the amount of movies as Sarah. → $4(48)+12$ → \$204

How much more did Tim pay last year than Sarah?

$204 - 108 = \$96$

7.) What is the domain of the graph shown below?

→ x left to right



A. $-2 \leq x \leq 4$ ~~B. $-2 \leq y \leq 4$~~

C. $-3 \leq x \leq 1$ ~~D. $-3 \leq y \leq 1$~~

8.) A sequence is shown below.

32, 26, 20, 14, ...

Which explicit formula can be used to determine the nth term in the sequence?

A. $a_n = 6n + 32$ B. $a_n = 6n + 38$

C. $a_n = -6n + 32$ D. $a_n = -6n + 38$

$a_n = d(n-1) + a_1$

$a_n = -6(n-1) + 32$

$= -6n + 6 + 32$

$a_n = -6n + 38$

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

$m = \frac{-6-3}{2-(-4)}$

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

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

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

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

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

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

$+3 \quad +3$

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

10.) Which table of values represents a linear function? → constant rate of change

x	f(x)
-3	2.75
-2	4.25
-1	6
0	7.25

x	f(x)
5	8
8	23
9	28
11	38

+3 → +15; +1 → +5; +2 → +10

$\frac{15}{3} = \frac{10}{2} = 5$

x	f(x)
3	14
4	15
5	13
6	14

x	f(x)
-6	12
-5	10
-4	7.25
-3	5.4545

11.) A 4-pound bag of popcorn costs \$7.00, and a 9-pound bag of popcorn costs \$15.75. Assuming the cost of popcorn follows a linear trend, how much would a 3-pound bag of popcorn cost?

(4,7)(9,15.75)

$\frac{15.75-7}{9-4} = \frac{8.75}{5}$

$m = 1.75$

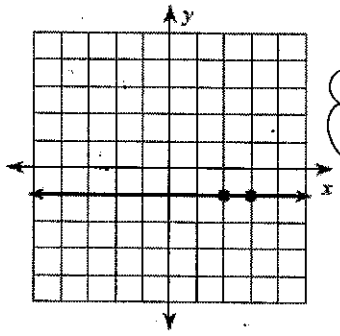
$y = 1.75x$

$y - 7 = 1.75(x-4)$

$y - 7 = 1.75x - 7$

$y = \$5.25$

12.) Write the equation of the line graphed below.



$y = -1$

13.) Ashtyn is saving the same amount of money each week from babysitting. After 3 weeks, she saves \$105. After 5 weeks, she saves \$165. Which equation models the amount of money Ashtyn will have saved, y, after x weeks?

$m = \frac{165-105}{5-3} = \frac{60}{2} = 30$

$y - 105 = 30(x-3)$

$y - 105 = 30x - 90$

$+105 \quad +105$

A. $y = 30x + 45$

~~C. $y = 60x - 20$~~

B. $y = 30x + 15$

~~D. $y = 60x + 45$~~

14.) The graph of a linear function passes through the points (6,11) and has a slope of $m = 3$. Which is an equation of the function?

$y - 11 = 3(x-6)$

$y - 11 = 3x - 18$

~~A. $f(x) = \frac{1}{3}x + \frac{11}{3}$~~

C. $f(x) = 3x - 7$

~~B. $f(x) = \frac{1}{3}x - \frac{11}{3}$~~

D. $f(x) = 3x + 7$

15.) Write the equation of a line with a slope of -3 that passes through the point $(0, -7)$.

A. $y = -7x - 3$

B. $y = 7x - 3$

C. $y = -3x + 7$

D. $y = -3x - 7$

16.) What explicit equation represents the pattern in the table below?

x	y
-4	18
-1	9
3	-3
7	-15

+3 → -9; +4 → -12; +4 → -12

$m = -3$

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

C. $y = 3x + 9$

B. $y = -\frac{1}{3}x + 3$

D. $y = -3x + 6$

17.) Jamie earns income through tips and a weekly salary. Her average weekly income can be approximated by the function $I(x) = 10x + 150$, where x is the number of customers she serves per week. Which statement is true?

A. Jamie earns an average of \$10.00 in tips per customer she serves and is paid a weekly salary of ~~\$350.~~ \$150

B. Jamie serves an average of 10 customers per week and is paid a weekly salary of \$150.

C. Jamie serves an average of 10 customers per week and earns \$150 in tips each week.

D. Jamie earns an average of \$10.00 per week and earns \$150 in tips each week.

18.) Use the sequence $-7, -3, 1, 5, \ldots$ to complete the following exercises:

A. Write the explicit formula:

$a_n = 4(n-1)-7$ $a_n = 4n-11$

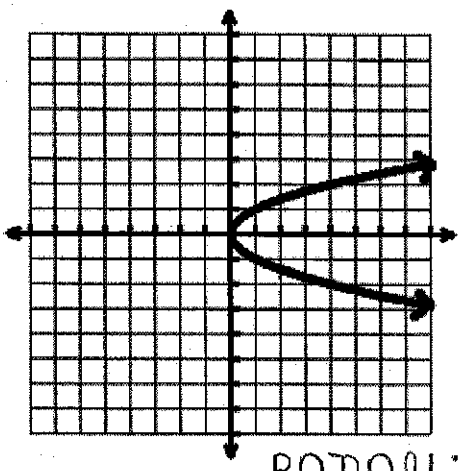
$a_n = 4n-4-7$

B. Write the recursive formula:

$a_n = a_{n-1} + 4$

C. Find a_{14}. $4(14)-11 = 45$

19.) Find the range from the graph below.



RANGE: ARN

20.) What is the approximate rate of change for $f(x) = 6x - 5$ for the interval $-2 \leq x \leq 4$?

6

21.) The function $C(x) = 25x + 99$ models the total cost for a carpet cleaning company to clean a house, where x number of hours it takes to clean the carpet. What is the average rate of change between 2 hours and 8 hours?

\$25

22.) Kaylee works at a car dealership where she earns \$300 each week in addition to 5% of her weekly sales. Write and solve a linear equation to determine what Kaylee would earn if she sold \$120,000 worth of cars this week

$y = .05x + 300$ x = weekly sales

$y = .05(120{,}000) + 300$

$y = 6000 + 300$

$y = 6300$

23.) The function $g(x) = 20x + 100$ model the balance of Liz's savings account after x weeks. What is the meaning of the slope in the function?

A. The initial amount Liz starts with at the beginning of each year.

B. The initial amount in Liz's bank account.

C. The additional amount Liz saves each month.

D. The additional amount Liz saves each year.

24.) The total cost, in dollars, of membership in a basketball league is given by the function $(m) = 35m + 60$, where m is the number of months a person is a member. In dollars, how much is the cost of a membership for 1 year?

12 months

$35(12)+60$

$420+60$

$480

25.) Water is being pumped into a 10-foot tall cylindrical tank at a constant rate.

- The depth of the water is increasing linearly.
- At 1:30 pm, the water depth was 2.4 feet.
- It is now 4:00 pm, and the depth of the water is 3.9 feet. (1.5, 2.4)(4, 3.9)

$m = \frac{1.5}{2.5} = .6$ ft per hour

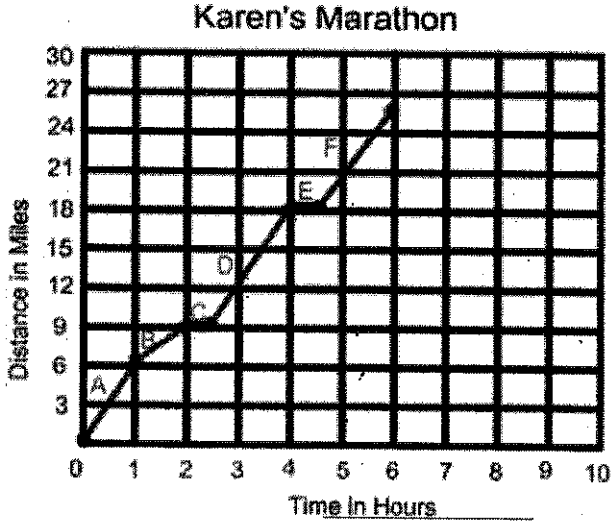
What will the depth (in feet) of the water be at 5:00 pm? $3.9 + 0.6 = 4.5$ ft.

26.) Two stores have movies to rent.

- The first store charges a \$12 per month membership fee plus \$2.50 per movie rented. → $2.50x + 12$
- The second store has no membership fee but charges \$4.50 per movie rented. → $4.50x$

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 movies

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



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

A. 0 – 2 hours 4.5

B. 1 – 3 hours 3

C. 3 – 4 hours 6

D. 2 – 5 hours 4

28.) The function $a(n) = 3k + 2$ represents the value of the nth term in a sequence. What is the sum of the 1st and 4th terms of the sequence?

$3(1)+2 \quad 3(4)+2$

$5 + 14 = 19$

29.) A function is shown below.

$g(x) = 16.90 - 1.32x$

What is the value of $g(17)$?

$16.90 - 1.32(17)$

$16.90 - 22.44$

-5.54

30.) What is the slope of the line that fits this table?

X	Y	
-2	-3	
0	3	+6
2	9	+6
6	21	+12
10	33	

+2, +2, +4

m = 3

31.) Find the fourth term of the arithmetic sequence:

$a_1 = 7$

$a_n = a_{n-1} - 1.5$

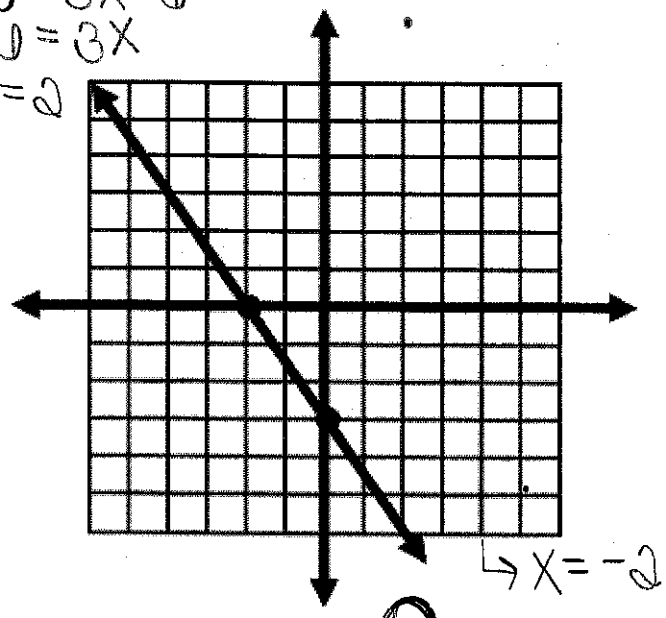
7, 5.5, 4, 2.5 → a_4

32.) Given the function $f(x) = 3x - 6$ and the graph of the function $g(x)$ below, determine the greatest x-intercept.

$0 = 3x - 6$

$6 = 3x$

$x = 2$



$x = -2$

A. $(0, -6)$

B. $(-2, 0)$

C. $(2, 0)$

D. $(0, -3)$