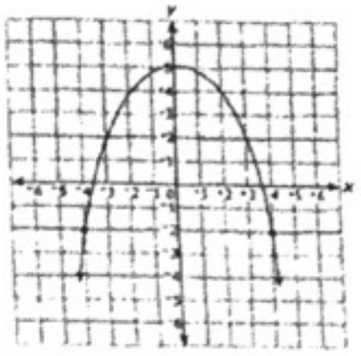
Function Study Guide

Student

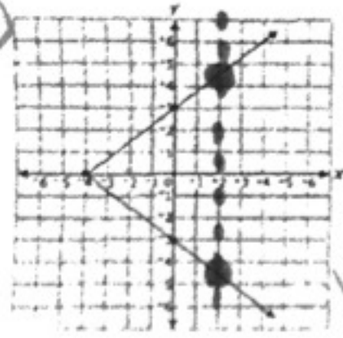
Date

1. In which graph is y *not* a function of x?

A.

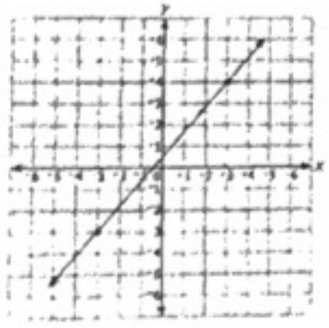


B.



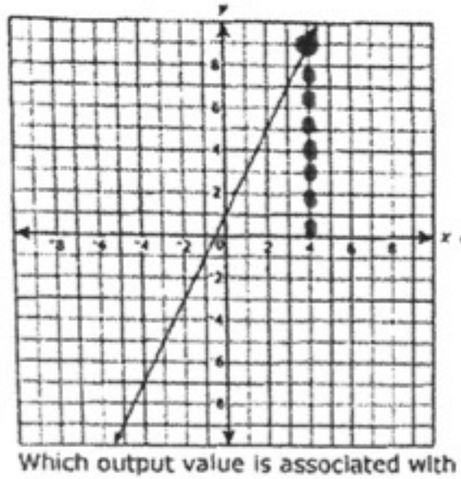
← Does not pass Vertical Line Test

C.



↑ Use the vertical line (pencil) test! Your pencil can only touch one point at a time.

2. A linear function is graphed on the coordinate plane below.



← input

Which output value is associated with the input value of 4?

output - y value

A. 1

B. 1.5

C. 2

D. 9

3. The table below shows a linear relationship between x and y.

x	y
0	b
2	1
4	9
6	17
8	25

+2, +2, +2, +2 ; +8, +8, +8

$b = -7$ because $-7 + 8 = 1$

What is the value of b?

A. −15

B. −11

C. −7

D. −3

4. Which of these relations is NOT a function?

x values cannot repeat!

A. $R = \{(0, 0), (2, 6), (-4, -12), (-5, -15)\}$

B. $R = \{(-2, 2), (2, -2), (-4, 4), (4, -4)\}$

C. $R = \{(4, 5), (4, 8), (5, 10), (5, 12)\}$ 4's repeat

D. $R = \{(2, 3), (4, 3), (6, 3), (5, 3)\}$

5. Function V contains the points in the table below.

x	y
3	6
5	10
7	14

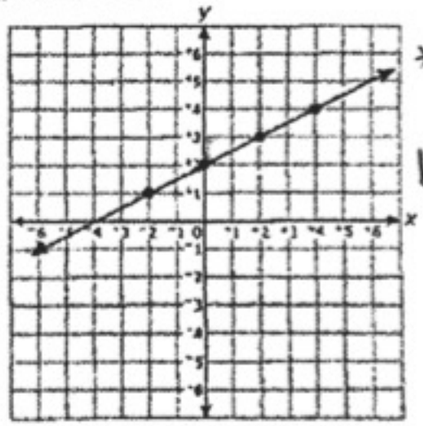
+2, +2 ; +4, +4

$\Delta x = 2$ $\Delta y = 4$

$\frac{\Delta y}{\Delta x} = \frac{4}{2}$ C.

$m = 2$

Function W is shown on the graph below.



*Work below

$b = 2$ D.

What is the difference in the y-intercepts of the two functions?

A. 0

B. 1

C. 2

subtract y-intercepts

$2 - 0 = 2$

6. Which table contains only coordinates that satisfy the equation $y = 3x^2 - 4$?

A.

x	y
−2	−16
1	?
0	−4
1	−1
2	−8

B.

x	y
−2	−16
−1	1
0	4
1	1
2	−16

C.

x	y
−2	−8
−1	−1
0	4
1	−1
2	8

D.

x	y
2	5
−1	−1
0	4
1	−1
2	8

*Plug in x values to equation to see if it gives you the y-values.

$y = 3x^2 - 4$

OR

Type equation into y= screen on calculator and look at the table for the list of x and y values.

* Function V: Finding y-intercept

$m = 2$ point $= (3, 6)$

$y = 2x + b$

$6 = 2(3) + b$

$6 = 6 + b$

$6 - 6 = 6 + b - 6$

$0 = b$

① Plug in slope

② Plug in 1 point and solve for b.

7 Two stores sell used DVDs. Both stores charge a flat fee for shipping, plus the same price for any used DVD. Store A charges a total of $20.99 for 4 used DVDs and $32.99 for 7 used DVDs. Store B's costs are represented in the table below.

Store B

Number of DVDs	Total Cost ($)
4	20.99
6	29.49
9	42.24

Which statement is true?

A. Store A charges $0.25 more per DVD than Store B.

B. Store A charges $1.00 more for shipping than Store B.

C. Store B charges $0.25 more for shipping than Store A.

D. Store B charges $1.00 more per DVD than Store A.

8. A parking deck for a museum uses the equation $y = 2.75x + 5$ to calculate the cost, y, to park a car x number of hours. A parking deck for a hotel uses the table below to calculate the cost to park a car hourly.

Hotel Parking Deck

Hours	Cost
3	$14.75
6	$21.50
10	$30.50

Which parking deck charges the most per hour and by how much?

A. The parking deck for the hotel charges $1.50 more per hour.

B. The parking deck for the museum charges $1.50 more per hour.

C. The parking deck for the hotel charges $0.50 more per hour.

D. The parking deck for the museum charges $0.50 more per hour.

9. If the coordinates from each table are graphed, which will form a linear pattern?

A.

x	y	
-1	2	+2
0	4	+4
1	8	+8
2	16	

(+1, +1)

B.

x	y	
2	2	-1
3	1	+1
4	2	+1
5	3	

(+1, +1)

C.

x	y	
3	7	+1
5	8	+2
6	10	+3
8	13	

(+2, +1, +2)

D.

x	y	
2	5	+1
4	6	+1
6	7	+1
8	8	

(+2, +2, +2)

x	y	
-3	-7	+1
0	-6	+1
3	-5	

(+3, +3) Linear

x	y	
-2	-1	-2
0	-3	-2
4	-5	

(+2, +4) Non-Linear

x	y	
-4	6	+3
0	9	+3
4	12	

(+4, +4) Linear

10. Which set of points is nonlinear?

A. {(-3, -7), (0, -6), (3, -5)}

B. {(-2, -1), (0, -3), (4, -5)}

C. {(-4, 6), (0, 9), (4, 12)}

* you can graph or put in tables

11. Which numerical pattern is nonlinear?

A. 3, 11, 19, 27, ...

B. 1, 3, 9, 27, ...

C. 1, 4, 7, 10, ...

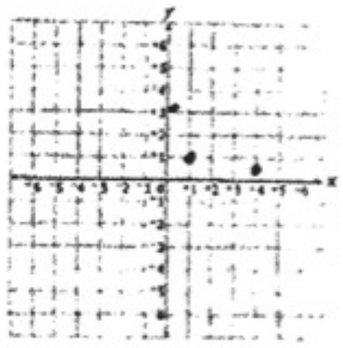
D. 2, 3, 4, 5, ...

not a common sum or difference

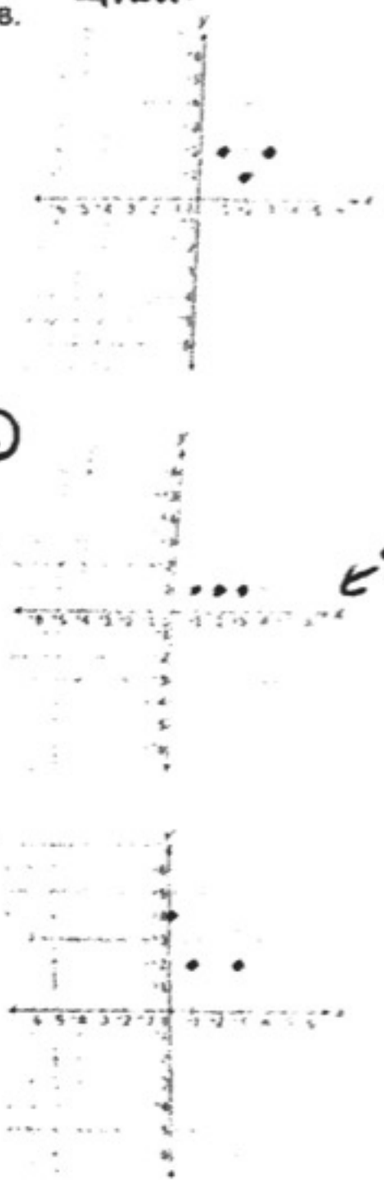
Linear should have constant rate of change

12. Which set of data could be represented by a linear function?

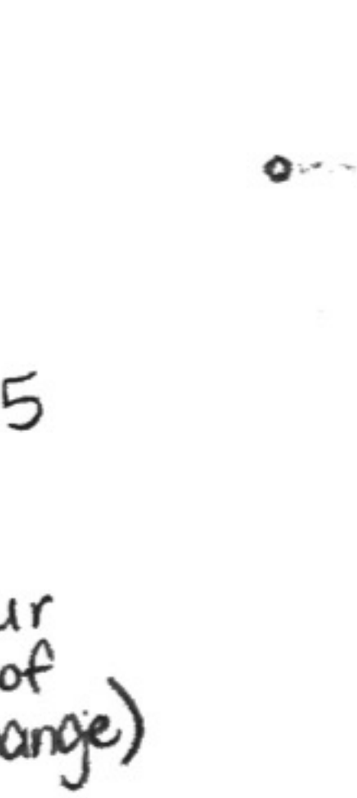
A.



B.



C.



D.

← straight line

Linear = constant rate of change

← rate of change

← y-int

← y-int

← rate of change

A. $\frac{x}{-1}\ \frac{y}{2}$ (+1, +1) $\frac{0}{1}\ \frac{4}{8}$ (+1, +1) $\frac{2}{16}$ → +2, +4, +8

B. $\frac{x}{2}\ \frac{y}{2}$ (+1, +1) $\frac{3}{4}\ \frac{1}{2}$ (+1, +1) $\frac{5}{3}$ → -1, +1, +1

C. $\frac{x}{3}\ \frac{y}{7}$ (+2, +1) $\frac{5}{6}\ \frac{8}{10}$ (+2, +2) $\frac{8}{13}$ → +1, +2, +3

$\frac{\Delta y}{\Delta x} = \frac{1}{2}$ > Not the same $\frac{\Delta y}{\Delta x} = \frac{2}{1}$

D. $\frac{x}{2}\ \frac{y}{5}$ (+2, +2, +2) $\frac{4}{6}\ \frac{6}{7}\ \frac{8}{8}$ → +1, +1, +1

rate of change (slope)

(7) Store A

(DVDs, cost)

(4, 20.99) (7, 32.99)

x_1 y_1 x_2 y_2

$$\frac{32.99 - 20.99}{7 - 4} = \frac{12}{3} = \$4 \text{ per DVD}$$

$y = 4x + b$

$20.99 = 4(4) + b$

$20.99 = 16 + b$

$b = 4.99$ shipping

Store B

(4, 20.99) (6, 29.49)

x_1 y_1 x_2 y_2

$$\frac{29.49 - 20.99}{6 - 4} = \frac{8.5}{2} = \$4.25 \text{ per DVD}$$

$y = 4.25x + b$

$20.99 = 4.25(4) + b$

$20.99 = 17 + b$

$3.99 = b$

(8) Museum

$y = 2.75x + 5$

↑ cost per hour (rate of change)

Hotel

(3, 14.75) (6, 21.50)

x_1 y_1 x_2 y_2

$$\frac{21.50 - 14.75}{6 - 3} = \frac{6.75}{3} = 2.25$$

13 Sean and Julie are landscapers. Each person charges a one-time fee plus an hourly fee. Sean uses the equation $y = 20x + 30$ to determine the charge, y, in dollars for working x hours. Julie uses this table to determine the charge, y, for working x hours.

Charges for Julie

Number of Hours Worked	0	1	2	3	4
Total Charge in Dollars	26	48	70	92	114

Which statement is true for these two landscapers?

A. Sean charges a greater one-time fee because the equation shows a greater rate of change than the table.

B. Julie charges a greater one-time fee because the table shows a greater rate of change than the equation.

C. Sean charges a greater one-time fee because the equation shows a greater y-intercept than the table.

D. Julie charges a greater one-time fee because the table shows a greater y-intercept than the equation.

14. The cost to join a gym includes a one-time membership fee, plus a monthly fee.
- John joined the gym and paid $325 for 6 months.
- Abigail joined the gym and paid $475 for 9 months.

What is the monthly fee after a person joins the gym?

A. $25

B. $50

C. $55

D. $150

15. Which equation represents a line with a slope of $-\frac{2}{3}$ that passes through point $(5, -2)$?

A. $2x + 3y = -11$

B. $2x + 3y = -4$

C. $2x + 3y = 4$

D. $2x + 3y = 11$

16. Which function table represents the equation $y = 2x + 1$?

A.

x	y
0	1
1	3
2	5
5	11

← y-intercept

B.

x	y
1	0
3	1
5	2
7	15

C.

x	y
0	2
1	5
2	8
4	9

D.

x	y
2	0
5	1
8	2
10	21

17. Which table of values below represents a linear relationship?

A.

x	y
-8	8
-4	4
0	8
4	4
8	8

(-4, +4, +4, +4)

Common sum or difference

B.

x	y
7	7
5	7
9	7
1	7
-7	7

(+0, +0, +0, +0) (-2, +4, -8, -8)

$\frac{\Delta y}{\Delta x} = \frac{0}{-2} = 0$

$\frac{\Delta y}{\Delta x} = \frac{0}{4} = 0$

* constant rate of change of 0.

C.

x	y
6	2
3	4
0	7
-3	11
-6	16

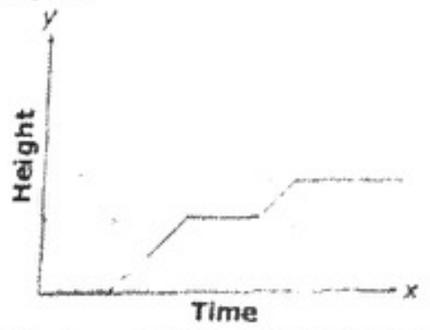
(+4, +3) (-3, -3, -3, -3)

D.

x	y
5	8
4	7
3	5
2	4
1	2

(-1, -2) (-1, -1, -1, -1)

18. The graph below represents a Height (y) vs. Time (x) of an object.



Which scenario *best* matches the graph?

A. A plane takes off, flies at a certain altitude, then lands.

B. A plane taxis on the run way, lifts off, ascends to a certain altitude, and flies for a while.

C. A plane takes off, ascends to an altitude and flies for a while, then ascends to another altitude, and flies for a while.

D. A plane taxis on the run way, lifts off, ascending to a certain altitude, flies for a while, ascends to a higher altitude, and flies at the new altitude.

(13) Sean

$Y = 20X + 30$

20 → rate of change

30 → one-time fee (y-int.)

Julie

x	0	1	2	
y	26	48	70	

↑ y-intercept

$b = 26$ $m = 22$

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{48 - 26}{1 - 0} = \frac{22}{1}$

$(0, 26)(1, 48)$

$x_1\ y_1\ x_2\ y_2$

(14) John - (6, 325) (x_1, y_1) month cost

Abigail - (9, 475) (x_2, y_2)

What is the monthly fee.. rate of change!

$\frac{475 - 325}{9 - 6} = \frac{150}{3} = 50$

(B)

(15) $m = -\frac{2}{3}$ $(5, -2)$ x y

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

$-2 = -\frac{2}{3}(5) + b$

$-2 = \frac{-10}{3} + b$

$-2 + \frac{10}{3} = b$

$\frac{4}{3} = b$

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

* change to standard form

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

$3y = -2x + 4$

$3y = -2x + 4$

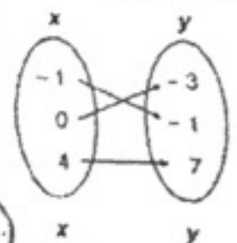
$2x + 3y = 4$

19. Which relation best represents a linear function?

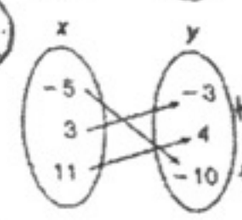
x	y
-1	-1
0	-3
4	7

-1 < 0 > -2, 0 > 4 +10

A.



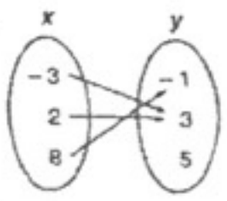
B.



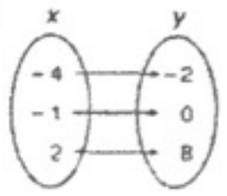
x	y
-5	-10
3	-3
11	4

-5 +8 3, 3 +8 11, -10 > -3 > 4, +7 +7

C.

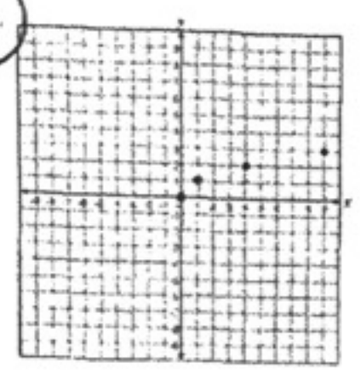


D.

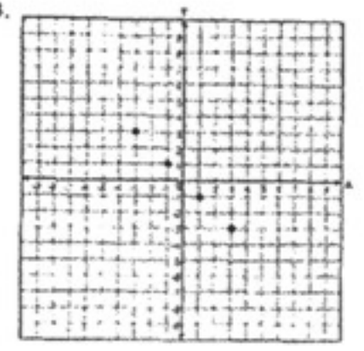


20. Which coordinate plane contains plotted points that represent the graph of a nonlinear function?

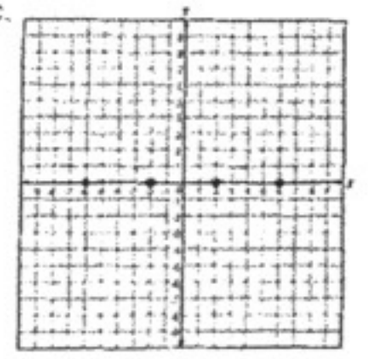
A.



B.



C.



21. What is the slope formula?

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

22. What are some characteristics of linear functions?
Straight line (non-vertical), can be put in y=mx+b, common sum/difference or constant rate of change

23. What are some characteristics of non-linear functions?
not straight, exponents for x and/or y are not 1. Not constant rate of change

24. What is an equation of the line passing through the points (1,3) and (4,-6)?

25. Find the rate of change and y-intercepts.

a) $-2x - y + 7 = 14$

b) $4x + 2y = 3x + 4$

(24) (1,3) (4,-6)
$x_1\ y_1\ x_2\ y_2$

① Find slope

$$m = \frac{-6-3}{4-1} = \frac{-9}{4}$$

② Find b (y-int.)

$y = \frac{-9}{4}x + b$

$3 = \frac{-9}{4}(1) + b$

$3 = \frac{-9}{4} + b$

$3 + \frac{9}{4} = b$

$\frac{21}{4} = b$

③ Write in slope-intercept form.

$y = -\frac{9}{4}x + \frac{21}{4}$

(25) a) $-2x - y + 7 = 14$

$-2x - y = 14 - 7$

$-2x - y = 7$

$-y = 2x + 7$

$\frac{-y}{-1} = \frac{2x}{-1} + \frac{7}{-1}$

$y = -2x - 7$

b) $4x + 2y = 3x + 4$

$2y = 3x - 4x + 4$

$2y = -x + 4$

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

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