

Unit 4 Pre-Test

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1

Constant rate of change

Determine whether each function is linear or nonlinear.

x
 Exponent
 is 2

- | Function | Linear | Nonlinear |
|-------------------------------------|----------------------------------|----------------------------------|
| {(-1, 2), (0, 3), (1, 4), (2, 5)} | <input checked="" type="radio"/> | <input type="radio"/> |
| {(-3, 9), (-2, 4), (3, 9), (4, 16)} | <input type="radio"/> | <input checked="" type="radio"/> |
| $y = -14x + 9$ | <input checked="" type="radio"/> | <input type="radio"/> |
| $y = x $ | <input type="radio"/> | <input checked="" type="radio"/> |

Handwritten table for the first function:

x	y
-1	2
0	3
1	4
2	5

Handwritten table for the second function:

x	y
-3	9
-2	4
3	9
4	16

2

This table of values represents a linear function.

x	y
1	5
5	17
7	23

Enter the rate of change of this function.

3

Handwritten calculation for rate of change:

$$\frac{\Delta y}{\Delta x} = \frac{\text{"change in" } y}{\text{"change in" } x}$$

$$\frac{12}{4} = 3$$

3

Donnie is considering two different DVD rental stores, both of which have a one-time membership fee and a fee per rented DVD.

The cost for renting DVDs at the first store is shown below:

Number of DVDs rented	Cost (\$)
1	5.50
2	7.00
3	8.50

cost per dvd

1 () 1.50

The cost for renting DVDs at the second store is modeled by the linear function $C = 5 + 2d$, where d is the number of DVDs rented and C is the cost.

Compare the rates of change for each function and explain what this means in terms of the context.

The first store charges \$1.50 per DVD.

The second store charges \$2.00 per DVD.

The first store is cheaper than the second store.

4

A popular music band performed in an auditorium filled to capacity with 400 people in the audience. When the performance was over, the people in the audience left the auditorium at a constant rate of 30 people per minute.

Determine whether each statement about the number of people in the auditorium is true. Select True or False for each statement.

- Statement *starting*
- The initial amount of people in the auditorium is 30 people.
 - One hundred fifty people leave the auditorium every 5 minutes.
 - The auditorium will be empty at 13 minutes.

- True False
- True False
 - True False $30 \times 5 = 150$
 - True False $30 \times 13 = 390$

5

Rate Not Constant
Which function is nonlinear?

x	y
-1	5
0	4
1	3
3	1

Handwritten notes: -1, -1, -2

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

x	y
-4	-7
-2	-6
2	-4
4	-3

Handwritten notes: +1, +2, +1

$$\frac{1}{2} = \frac{2}{4}$$

- A $\{(-2, -10), (0, -4), (2, 2), (4, 8)\}$
- B $\{(1, 1), (4, 2), (9, 3), (16, 4)\}$

$$3 = \frac{6}{2}$$

x	y
-2	-10
0	-4
2	2
4	8

Handwritten notes: +6, +6, +6

$y = \sqrt{x}$

x	y
1	1
4	2
9	3
16	4

6

Choose the option that would create an equation with infinite solutions.

- $2c + (3c - 4) = \square - 4$
- A $-4c$
 - B $-1c$
 - C $4c$
 - D $5c$

$$5c - 4 = \square - 4$$

7

Enter the value for x that makes the equation $-3(x-4) + x = 2x - 12$ true.

x =

$$\begin{aligned} -3x + 12 + x &= 2x - 12 \\ -2x + 12 &= 2x - 12 \\ +2x & \quad +2x \end{aligned}$$

8

Which expression is equivalent to $(9.5 \times 10^5) - (2.3 \times 10^5)$?

- A 7.2×10
- B 9.27×10
- C 7.2×10^5
- D 9.27×10^5

$$\begin{aligned} 12 &= 4x - 12 \\ +12 & \quad +12 \\ +12 &= 4x \\ 6 &= x \end{aligned}$$

$$(9.5) \times 10^5 - (0.23) \times 10^5$$

$$9.27 \times 10^5$$

Exponents must match!

9

Select all functions from the tables given below that show y as a function of x .

A

x	y
1	1
2	2
3	3
4	4

B

x	y
-1	0
0	2
3	4
4	5

C

x	y
-5	-8
-3	-6
-1	-4
1	-2

D

x	y
-4	5
-4	-1
2	0
3	7

E

x	y
0	-11
-5	-7
0	5
5	11

No repeating x's! (w/diff. y's)

10

Select two possible values for x in the equation $x^3 = 216$.

- A 6
- B $\sqrt[3]{216}$
- C $3\sqrt[3]{24}$
- D $6\sqrt[3]{6}$

11

Select all relations that are functions.

A $2x + y^2 = 5$

B $7x - 9y = 16$

C

x	y
0	3
1	1
2	-1
3	-3

D

x	y
-2	0
2	2
2	4
4	6

12

Is $\sqrt{15}$ located between points M and N on the number line below?



- A No, because it is not greater than 3 and less than 4.
 B No, because it is not greater than 9 and less than 16.
 C Yes, because it is greater than 3 and less than 4.
 D Yes, because it is greater than 9 and less than 16.

13

The radius of a carbon atom is 6.7×10^{-11} meters, while the radius of a sodium atom is 1.9×10^{-10} meters. Which of these statements is true based on this information?

- A The radius of a carbon atom is between 2 and 3 times the radius of a sodium atom.
 B The radius of a sodium atom is between 2 and 3 times the radius of a carbon atom.
 C The radius of a carbon atom is between 3 and 4 times the radius of a sodium atom.
 D The radius of a sodium atom is between 3 and 4 times the radius of a carbon atom.

↓
 $\frac{1.9 \times 10^{-10} - (-11)}{6.7 \times 10^{-11}}$
 0.28×10^1
 $= 2.8$

14

Which of the following equations is correct? Select three that apply.

$0.1\overline{2} = \frac{4}{33}$

$0.4 = \frac{2}{5}$

$0.5\overline{4} = \frac{6}{11}$

$0.7 = \frac{7}{9}$

$0.8\overline{3} = \frac{5}{6}$

$0.9\overline{1} = \frac{41}{45}$

15

Select all possible numbers that when replaced with the "?" in the set of ordered pairs $\{(3, 4), (-2, -5), (?, 0)\}$ would create a function.

A -5

B -2

C 0

D 3

E 7

16

Enter the value of n for the equation $(3^n \cdot 3^2)^4 = 3^{28}$.

$n =$

$$3^n \cdot 3^2 = 3^8$$

$$4n + 8 = 28$$

$$4n = 20$$

$$n = 5$$

17

This table of values represents a linear function.

x	y
2	-1
4	-5
6	-9

rate: $-\frac{4}{2} = -2$

Enter an equation in the form $y = mx + b$ that represents the function defined by this table of values.

$y = -2x + 3$

18

Enter the value for x that makes the equation $2(x - 3) + 21 = -3$ true.

$x = -9$

$2x - 6 + 21 = -3$
 $2x + 15 = -3$
 $2x = -18$
 $x = -9$

19

Two cars are traveling along the same highway. The distance, d , in miles, from San Francisco after h hours spent driving is described for each car below.

Car A:
 $d = 60h + 20$

rate: 60

$d = 60(4) + 20$
 $= 240 + 20$
 $= 260$

Car B:

$d = 50h + 60$

2 (

h	d
0	60
2	160
4	260

) 100

$r = \frac{100}{2} = 50$

Select all the statements that are true.

- A Car A is traveling at the same rate, in miles per hour, as Car B.
- B Car A is traveling at a faster rate, in miles per hour, than Car B.
- C Car A is traveling at a slower rate, in miles per hour, than Car B.
- D Car A is originally closer to San Francisco than Car B.
- E Car A is originally at the same distance from San Francisco as Car B.
- F Car A and Car B are at the same distance away from San Francisco after 4 hours.

20

The table and equation shown each represent a different linear function.

$y = 4x - 20$

x	y
2	-12
4	-4
6	4
8	12

$r = \frac{\Delta y}{\Delta x} = \frac{8}{2} = 4$

$y = -3x + 15$

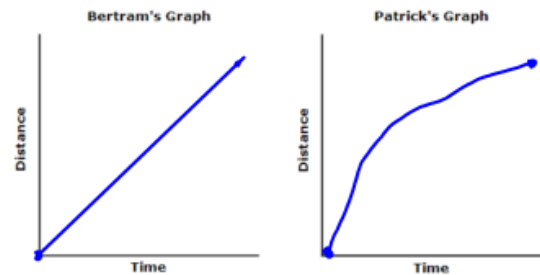
Enter the function below that has the greater rate of change.

$y = 4x - 20$

21

Two students, Bertram and Patrick, are running in a 5-kilometer race. Both students start and finish the race at the same time. Bertram runs at a constant pace through the entire race. Patrick starts off at a strong pace, but slows down toward the end of the race.

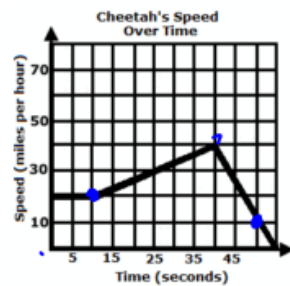
In the grids below, sketch graphs that represent Bertram and Patrick's progress through the race. "Distance" represents the distance that the students are from the start position.



Please answer on a separate page.

22

A zoologist is studying the behavior of a cheetah on an African plain. The zoologist recorded the cheetah's running speed and displayed it in the graph below.

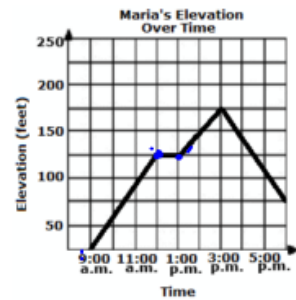


Which of the following best describes a functional relationship shown in the graph?

- A The cheetah is running faster at the 50-second mark than at the 10-second mark.
- B The cheetah increased its speed for a total of 40 seconds.
- C The cheetah's speed remained constant for the last 15 seconds.
- D The cheetah spent a longer time increasing its speed than decreasing its speed.

23

Maria and her parents are hiking in the mountains. During one hike, Maria monitored their changing elevation and displayed it in the graph below.

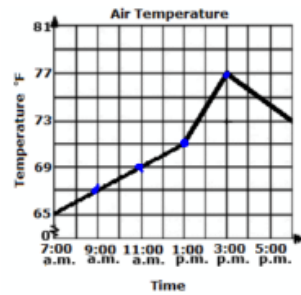


Which of the following best describes a functional relationship shown in the graph?

- A Maria's elevation remained constant for two hours.
- B Maria's elevation decreased between 1:00 and 3:00.
- C Maria's elevation increased between 9:00 and 12:00.
- D Maria spent more time decreasing her elevation than increasing her elevation.

24

This graph shows the change in the air temperature of a classroom over the course of a school day.



Based on the graph, determine whether each statement is true. Select True or False for each statement.

- | Statement | True | False |
|--|----------------------------------|----------------------------------|
| The air temperature is decreasing between 9:00 a.m. and 11:00 a.m. | <input type="radio"/> | <input checked="" type="radio"/> |
| The air temperature is constant between 1:00 p.m. and 3:00 p.m. | <input type="radio"/> | <input checked="" type="radio"/> |
| The air temperature is decreasing between 3:00 p.m. and 5:00 p.m. | <input checked="" type="radio"/> | <input type="radio"/> |

25

Select the equation that represents the function given in the table below.

x	y
-2	16
-1	11
1	1
2	-4

$+1 \left(\begin{array}{c} -2 \\ -1 \\ 1 \\ 2 \end{array} \begin{array}{c} 10 \\ 5 \\ -5 \\ -5 \end{array} \right) - 5$

rate = $-\frac{5}{1} = -5$

- A $y = -\frac{1}{5}x + 6$
- B $y = 6x - \frac{1}{5}$
- C $y = -5x + 6$
- D $y = 6x - 5$

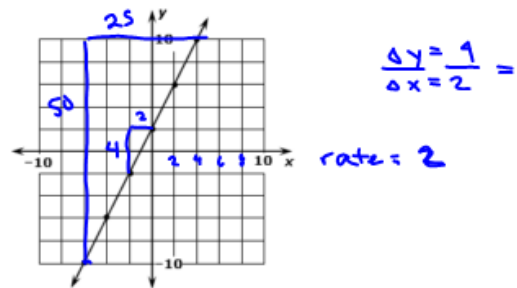
$y = -5x + 6$

26

Two linear functions are described below.

Function 1: $y = 10x - 1$ rate = 10

Function 2:



How much greater is the rate of change for Function 1 than the rate of change for Function 2?

times greater

27

Select all ordered pairs that satisfy the function $y = -\frac{1}{2}x + 9$.

- (2, 8)
- (8, 13)
- (-4, 7)
- (-6, 12)

28

Select all relations that represent a function.

- A $\{(-4, 3), (-2, 4), (0, 1), (-4, -1)\}$
- B $\{(5, 7), (2, 7), (9, 7), (8, 0)\}$
- C $\{(3, 1), (-4, 5), (3, -1), (0, 0)\}$
- D $\{(8, 0), (1, 4), (9, 4), (7, 8)\}$
- E $\{(-5, 4), (-4, 3), (-3, 2), (-2, 1)\}$
- F $\{(0, 0), (-1, 3), (-1, -1), (0, 5)\}$