Exploring Linear Relations

Name: _____ **Date:** _____

1 Ginger showed Sheronda the following table of the amounts of money that Ginger earned babysitting.

Money Earned Babysitting

Hours Worked	Amount Earned (dollars)
3	$24
4	$32
5	$40

How should Sheronda determine how much money Ginger earned each hour?

A. Subtract the number of hours worked from the amount earned.

B. Multiply the amount earned by the number of hours worked.

C. Divide the amount earned by the number of hours worked.

D. Add the number of hours worked to the amount earned.

2 Michelle bought the same fabric on 3 different occasions and recorded the data below.

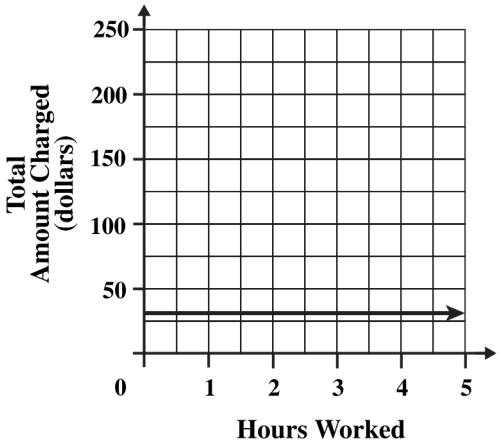
Yards of Fabric	**Total Cost**
2.2	$2.53
3.6	$4.14
4.2	$4.83

What was the price per yard of fabric?

A. $1.05 B. $1.10 C. $1.15 D. $1.50

3 Amy works as a computer consultant. She charges $30 per hour for her work. Which graph shows the relationship between the number of hours Amy works and the amount of money she charges for her work?

A.



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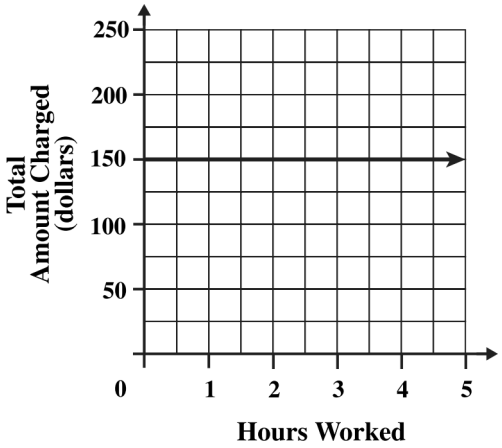
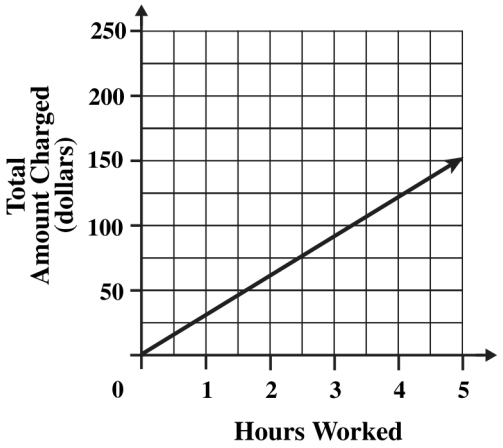


C.



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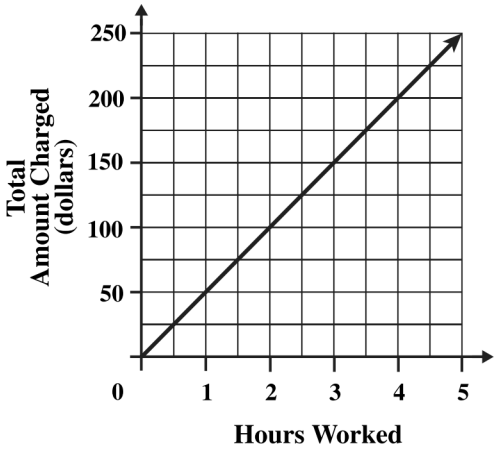
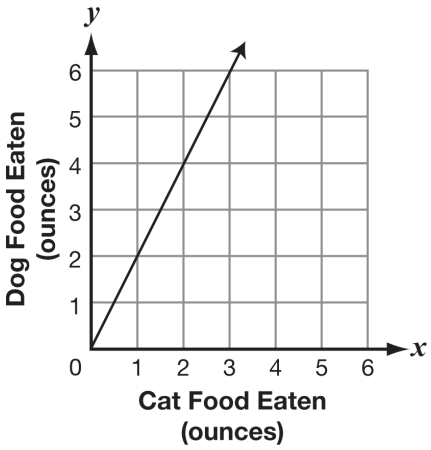
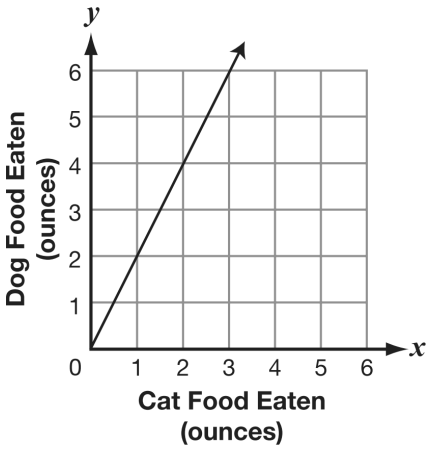


4 Elena has a cat and a dog. For every 1 ounce of food the cat eats, the dog eats 2 ounces of food. She creates a graph to show this. The graph has a unit rate of 2. Which could be the graph Elena created?

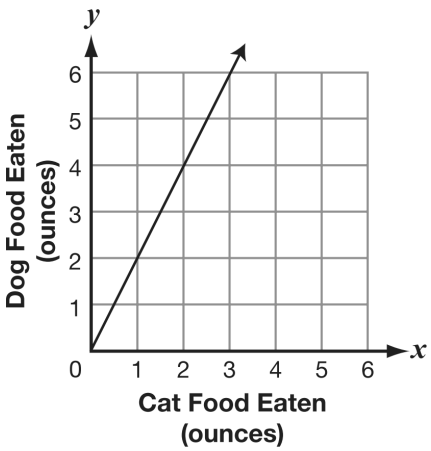
A. **Food Eaten by Elena's Pets**



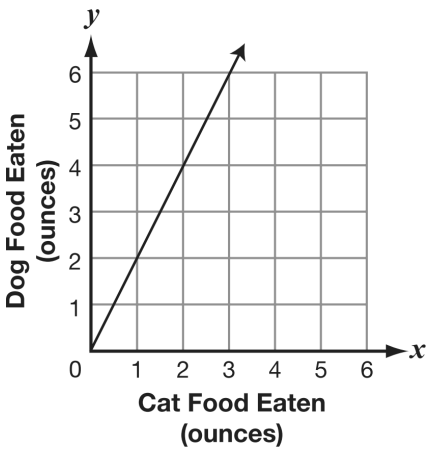
B. **Food Eaten by Elena's Pets**



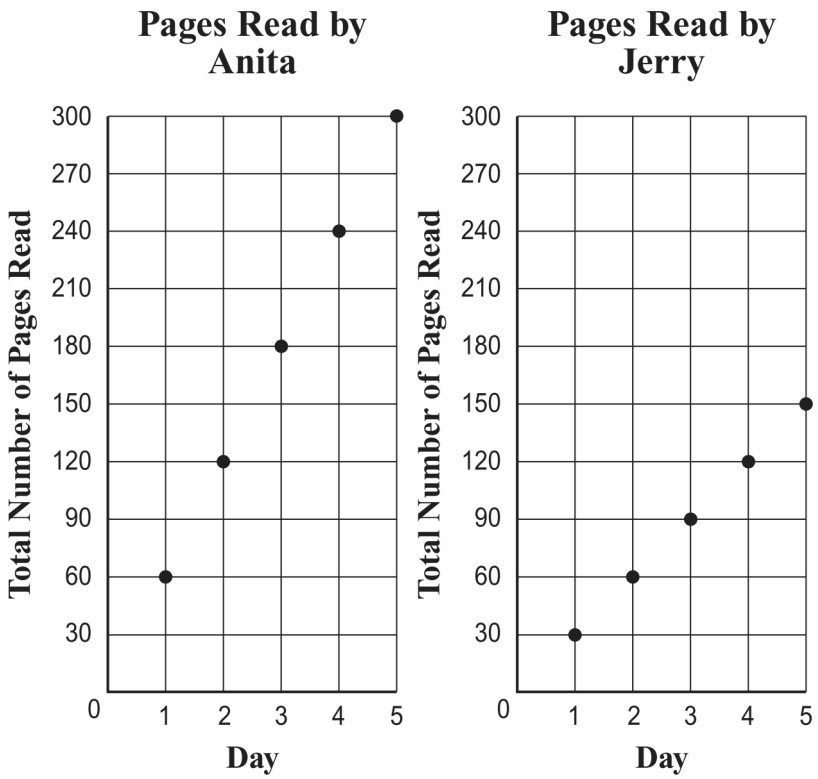
C. **Food Eaten by Elena's Pets**



D. **Food Eaten by Elena's Pets**



5 Anita and Jerry are reading the same book. The graphs below show the numbers of pages Anita and Jerry read each day for five days.



What is the relationship between the number of pages Anita read each day and the number of pages Jerry read each day?

A. Anita read half the number of pages Jerry read each day.

B. Anita read the same number of pages Jerry read each day.

C. Anita read two times the number of pages Jerry read each day.

D. Anita read three times the number of pages Jerry read each day.

6 Which situation can be represented by the equation $y = 8x$?

A. Nilay bought x items at a store. Each item costs \$8. Nilay spent a total of y dollars at the store.

B. Nilay baked y batches of cookies. There were 8 cookies in each batch. Nilay baked a total of x cookies.

C. Nilay correctly answered x questions on a quiz. Each question was worth y points. Nilay received a total of 8 points on the quiz.

D. Nilay earned \$8 for babysitting. He also earned x dollars for mowing lawns. Nilay earned a total of y dollars for babysitting and mowing lawns.

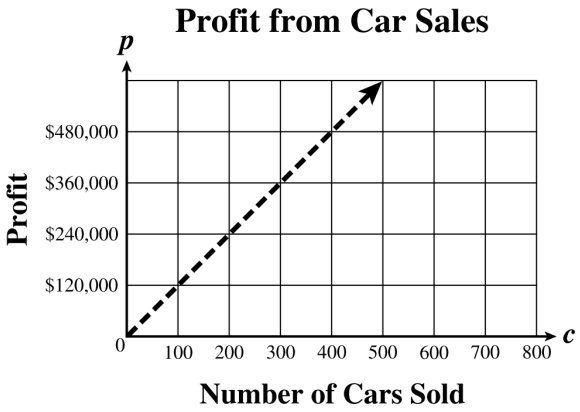
7 The table below shows the relationship between t, the number of tickets to a school social, and c, the total cost, in dollars, of the tickets.

Total Cost of Tickets

Number of Tickets (t)	Total Cost in Dollars (c)
1	5
2	10
3	15
4	20

Write an equation that represents the relationship between t and c for the data shown in the table.

8 The graph below shows p, a company's profit, in terms of c, the number of cars it sells.



If c is a positive integer, which of the following equations best represents the company's profit?

A. $p = 1,200c + 120,000$

B. $p = 1,200c$

C. $p = 600c$

D. $p = 120,000c + 100$

9 The table shows prices for different numbers of pencils. The price continues to increase in this pattern.

Number of Pencils	Price
5	\$0.60
10	\$1.20
24	\$2.88

x = number of pencils
y = total price

Which equation models this situation?

A. $y = 0.12x$

B. $y = 0.6x$

C. $y = 0.12x + 5$

D. $y = 0.6x + 5$

10 Gil is studying the perimeters of the figures in the tile pattern below.

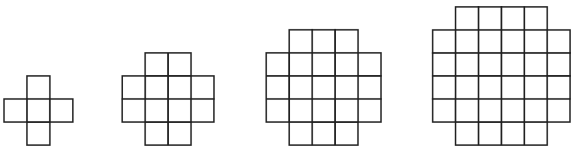


Figure 1 Figure 2 Figure 3 Figure 4

TILE PATTERN

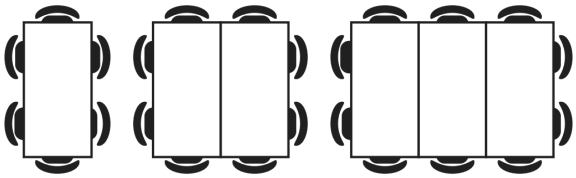
Figure	1	2	3	4
Perimeter	12	16	20	24

Which of these equations represents the perimeter (P) of figure (n)?

A. $P = 4n + 8$ B. $P = 4n + 4$

C. $P = n^2 + 2n$ D. $P = n^2 + 4n$

11 Tables in a restaurant can be combined to seat people as shown in the arrangements below.



1 table seats 6 2 tables seat 8 3 tables seat 10

Which equation can be used to find the number of people, p, that can sit together when n tables are used?

A. $p = n + 2$ B. $p = 2n + 4$

C. $p = 2n + 6$ D. $p = 6n + 2$

12 Look at this chart.

Term	Model	Number of Boxes
1		3
2		7
3		11
4		15
. . . n	. . . ?	. . . ?

Use words or symbols to describe how to find the *number* of boxes in Term n.

13 The weight of a newborn tiger is shown in the table below.

Weight of Tiger

Age (weeks)	**Weight (pounds)**
0	3
1	5
2	7
3	9
4	11

Which equation *best* represents the relationship between the age (a) of the tiger and its weight (w)?

A. $w = 2a + 3$ B. $w = 3a + 2$

C. $a = 2w + 3$ D. $a = 3w + 2$

14 Corey used the following table when making iced tea.

Iced Tea Ingredients

Cups of Water	Tea Bags
2	5
3	7
6	13
7	15
9	19
10	21

Which equation shows the relationship between the number of cups of water (x) and the number of tea bags needed (y)?

A. $y = 2x + 1$ B. $y = 2x + 5$

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

15 The table below shows the number of hours Tory worked (h) and the total amount of money (m) she earned.

TORY'S EARNINGS

Hours (h)	**Money** (m)
2	17.50
3	23.75
4	30.00
5	36.25

Which equation represents the information from the table above?

A. $h = 6.25m$ B. $h = 6.25m + 5$

C. $m = 6.25h$ D. $m = 6.25h + 5$

16 The data in the table show the cost of renting a bicycle by the hour, including a deposit.

Renting a Bicycle

Hours *(h)*	Cost in dollars *(c)*
2	15
5	30
8	45

If hours, h, were graphed on the horizontal axis and cost, c, were graphed on the vertical axis, what would be the equation of a line that fits the data?

A. $c = 5h$ B. $c = \frac{1}{5}h + 5$

C. $c = 5h + 5$ D. $c = 5h - 5$

17 **The Bicycle Factory**

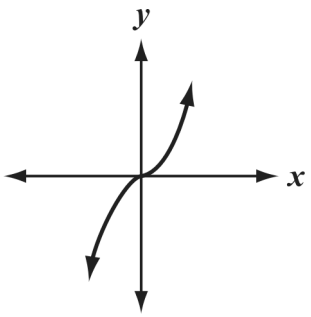
The table below shows that a small bicycle factory produced 29 bicycles during the first five days of production.

Day (D)	1	2	3	4	5
Total Built (B)	5	11	17	23	29

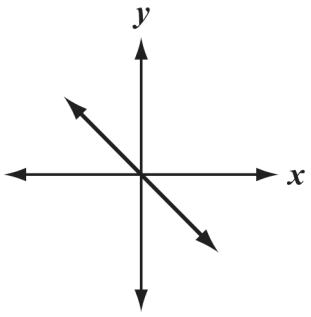
Write an equation that expresses the total number of bicycles (B) built in a given number of days (D).

18 Which of the following graphs shows a linear function?

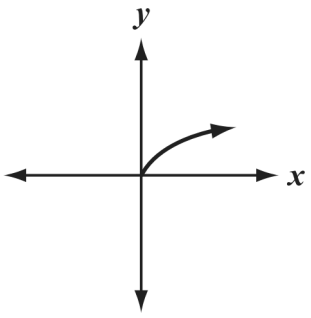
A.



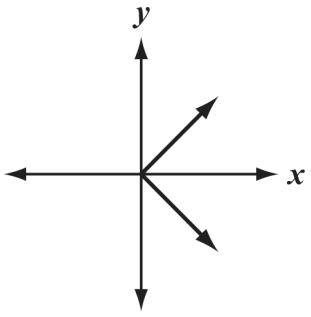
B.



C.



D.



19 In which table is y a nonlinear function of x?

A.

x	y
1	5
2	6
3	7

B.

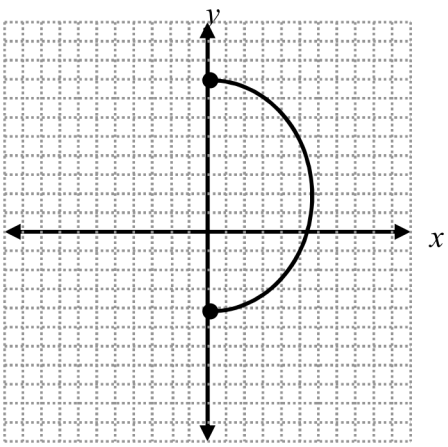
x	y
1	4
2	7
3	12

C.

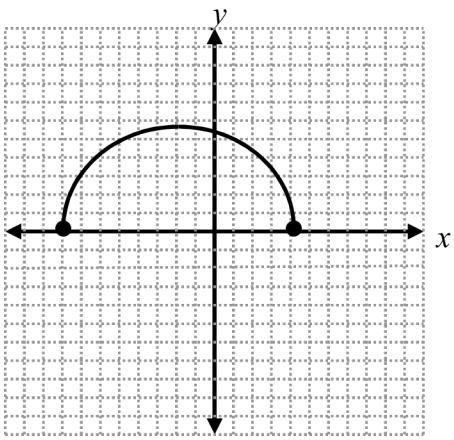
x	y
1	2
2	4
3	6

20 Which of the following is *not* a function of x?

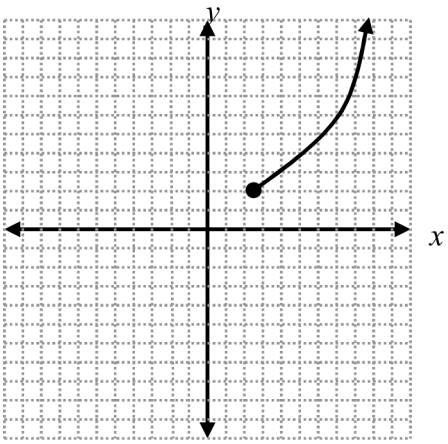
A.



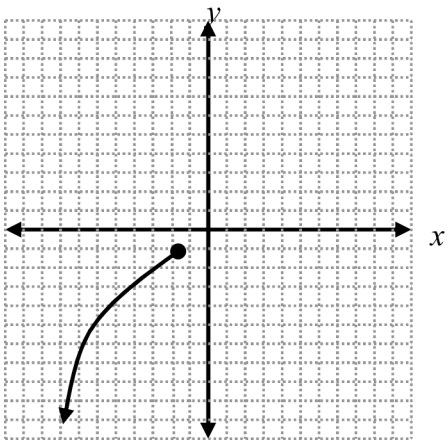
B.



C.

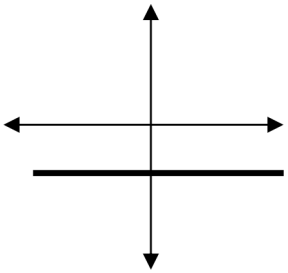


D.

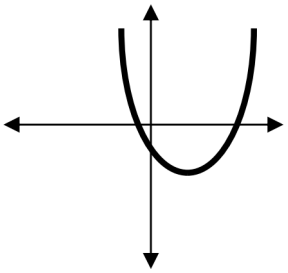


21 Which graph does *not* represent a function?

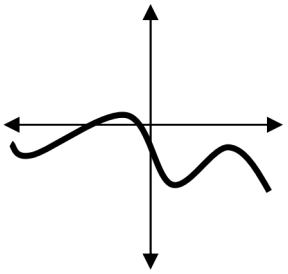
A.



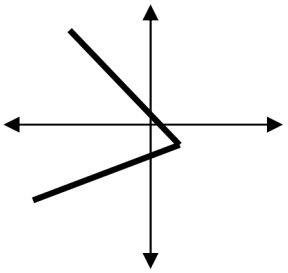
B.



C.

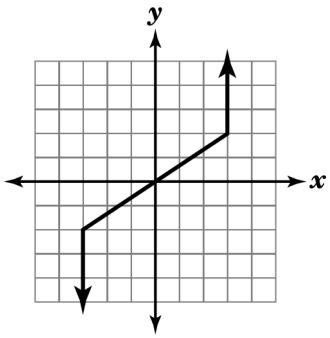


D.

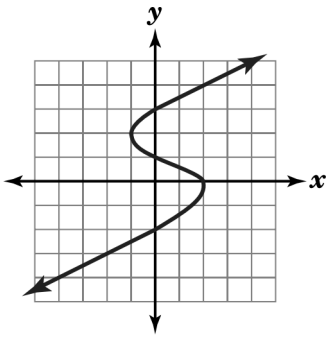


22 Which of these graphs shows a functional relationship?

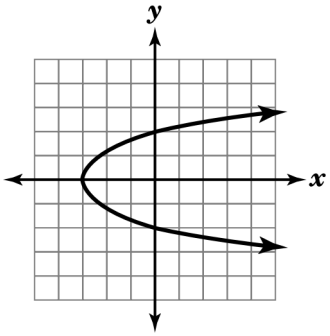
A.



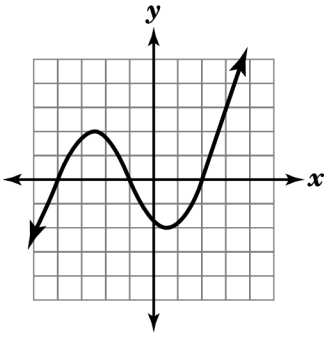
B.



C.



D.



23 Which table represents y as a function of x?

A.

x	−2	−1	0	−1	3
y	2	3	4	6	7

B.

x	0	1	2	3	5
y	4	6	4	6	8

C.

x	0	1	0	−1	3
y	2	4	6	8	8

D.

x	−4	−2	0	−2	3
y	−6	−4	0	4	9

24 Which relation is a function?

A. $\{(-1, 3), (-2, 6), (0, 0), (-2, -2)\}$

B. $\{(-2, -2), (0, 0), (1, 1), (2, 2)\}$

C. $\{(4, 0), (4, 1), (4, 2), (4, 3)\}$

D. $\{(7, 4), (8, 8), (10, 8), (10, 10)\}$

25 In which table is y a function of x?

A.

x	y
−3	6
2	5
3	2
2	3

B.

x	y
−1	0
5	2
7	3
5	4

C.

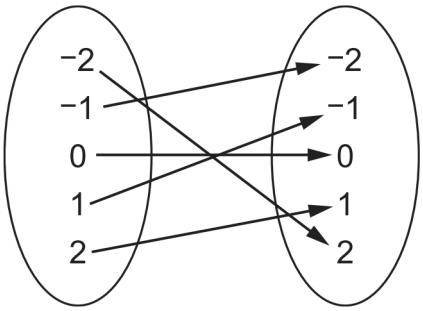
x	y
2	−1
3	0
4	−5
5	7

D.

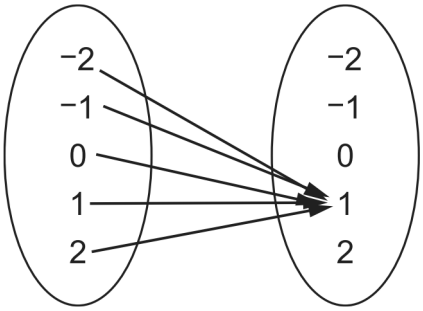
x	y
0	6
−1	3
2	4
−1	5

26 Which model is *not* a function?

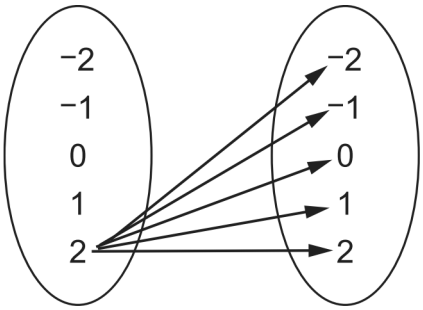
A.



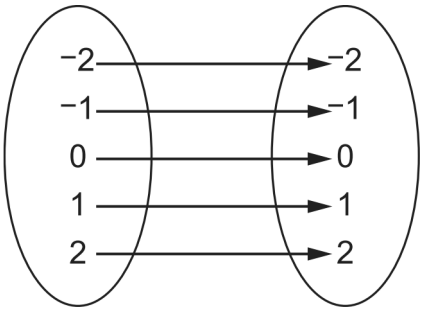
B.



C.



D.



27 Which of the following tables does *not* represent a function?

A.

x	y
−3	5
−2	5
−1	5
0	5

B.

x	y
−1	−1
0	0
1	1
2	2

C.

x	y
3	0
4	1
5	2
5	3

D.

x	y
2	8
3	6
6	4
8	2

28 The table shows a relation.

Input	**Output**
−1	2
3	−1
1	2
−2	3
−1	1

Which statement about the relation is correct?

A. The relation is a function because each input has exactly one output.

B. The relation is a function because each output has exactly one input.

C. The relation is not a function because one input has more than one output.

D. The relation is not a function because one output has more than one input.

29 A tank of gallons of water was drained at a constant rate. The table shows the number of gallons of water left in the tank after being drained for two amounts of time.

Draining Time (minutes)	Water in Tank (gallons)
10	450
30	330

Part A

What is the rate at which the water was drained from the tank?

A. 6 gallons of water per minute

B. 11 gallons of water per minute

C. 45 gallons of water per minute

D. 120 gallons of water per minute

Part B

What was the total amount of water in the tank before it was drained?

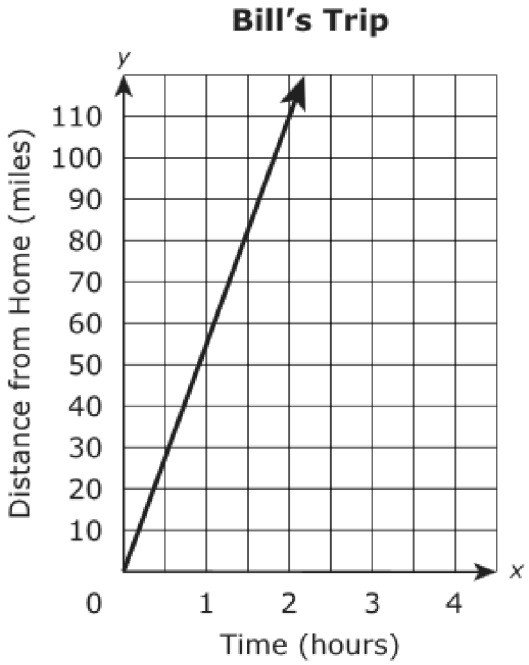
A. 450 gallons

B. 510 gallons

C. 560 gallons

D. 570 gallons

30 Bill drove his car at a constant speed while on a trip. Kevin drove his car at a different constant speed while on the same trip. The graph and the table show information about the trips Bill and Kevin took.



Kevin's Trip

Time (hours)	Distance from Home (miles)
0	0
2	90
3	135
5	225
6	270

Which sentence correctly compares the rates Bill and Kevin drove on their trips?

A. Bill drove at a rate that was 10 miles per hour slower than the rate Kevin drove.

B. Bill drove at a rate that was 10 miles per hour faster than the rate Kevin drove.

C. Bill drove at a rate that was 20 miles per hour slower than the rate Kevin drove.

D. Bill drove at a rate that was 20 miles per hour faster than the rate Kevin drove.

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1.
Answer: C

2.
Answer: C

3.
Answer: C

4.
Answer: A

5.
Answer: C

6.
Answer: A

7.
Answer: $c = 5t$ or equivalent

8.
Answer: B

9.
Answer: A

10.
Answer: A

11.
Answer: B

12.
Answer:

13.
Answer: A

14.
Answer: A

15.
Answer: D

16.
Answer: C

17.
Answer:

18.
Answer: B

19.
Answer: B

20.
Answer: A

21.
Answer: D

22.
Answer: D

23.
Answer: B

24.
Answer: B

25.
Answer: C

26.
Answer: C

27.
Answer: C

28.
Answer: C

29.
Answer: A; B

30.
Answer: B