1 Watch Video

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

The table above shows some values of x and their corresponding values of y. Which of the following equations shows a possible relationship between x and y?

A) $y = x + 2$

B) $y = x - 2$

C) $y = 2x + 3$

D) $y = 3x - 2$

Linear

$y = mx + b$

m: $\frac{1}{1}$

b: y-int ($x = 0$)

$y = 1x + 2$

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The function f is defined by $f(x) = x^2 - 5x + 6$. What is the value of $f(4)$?

A) 0

B) 2

C) 12

D) 30

$f(4) = 4^2 - 5(4) + 6$

$= 16 - 20 + 6$

$= -4 + 6$

$= 2$

4 Watch Video

Aracely can spend up to a total of $20 on streamers and balloons for a party. Streamers cost $1.49 per pack, and balloons cost $4.39 per pack. Which of the following inequalities represents this situation, where s is the number of packs of streamers Aracely can buy, and b is the number of pack of balloons Aracely can buy? (Assume there is no sales tax.)

A) $1.49s - 4.39b \leq 20$

B) $1.49s + 4.39b \leq 20$

C) $1.49s - 4.39b \geq 20$

D) $1.49s + 4.39b \geq 20$

$1.49s + 4.39b \leq 20$

$1.49s$: \$ for streamers (s = # streamers)

$4.39b$: \$ for all balloons (b = # balloons)

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Bill is planning to drive 1,000 miles to visit his family. If he plans to drive 250 miles per day, which of the following represents the remaining distance d, in miles, that Bill will have to drive to reach his family after driving for n days?

A) $d = 1{,}000 + 250n$

B) $d = 1{,}000n - 250$

C) $d = 250n - 1{,}000$

D) $d = 1{,}000 - 250n$

$d = 1000 - 250n$

Initial miles

total miles driven after n days

$250n$: miles

$\frac{\text{miles}}{\text{day}} \cdot \text{day}$

n	d
0	1000
1	750
2	500
3	250

$+1$, -250

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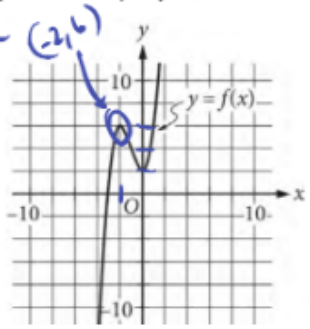
x	$f(x)$
−2	−2
−1	3
0	2
1	7
2	30

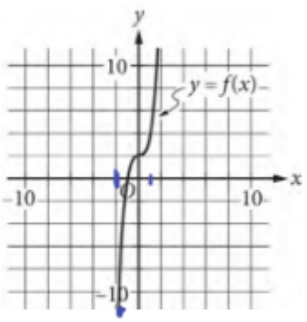
y-int

The table gives some values of x and the corresponding values of $f(x)$ for polynomial function f. Which of the following could be the graph of f in the xy-plane, where $y = f(x)$?

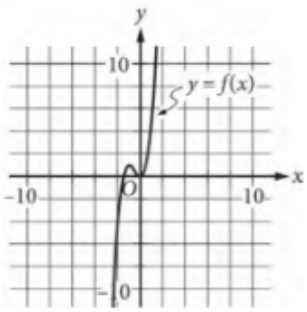
A) (−2, 6)



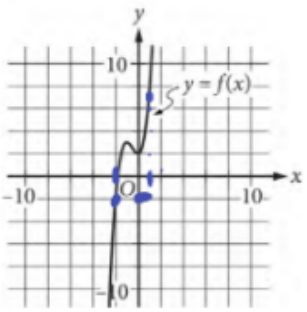
B)



C)



D)



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Which of the following is an equation of the line in the xy-plane that contains the points $(1, 3)$ and $(5, 15)$?

A) $y = 3x$ = 3 · 15

B) $y = 2x + 5$ = 7

C) $y = x + 2$ = 5 = 7

D) $y = \frac{1}{3}x$ = $\frac{1}{3}$

optional → substitute both points

option 2 → $y = mx + b$

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

$\frac{3 - 15}{1 - 5} = \frac{-12}{-4} = 3$

$x + 1 = x + 1$ ✓

Always True for all x values

10 Watch Video

$\frac{4x + b}{2} = (2x + 8) \cdot 2$

In the given equation, b is a constant. If the equation has infinitely many solutions, what is the value of b ?

A) 2

B) 4

C) 8

D) 16

$4x + b = 4x + 16$

$b = 16$

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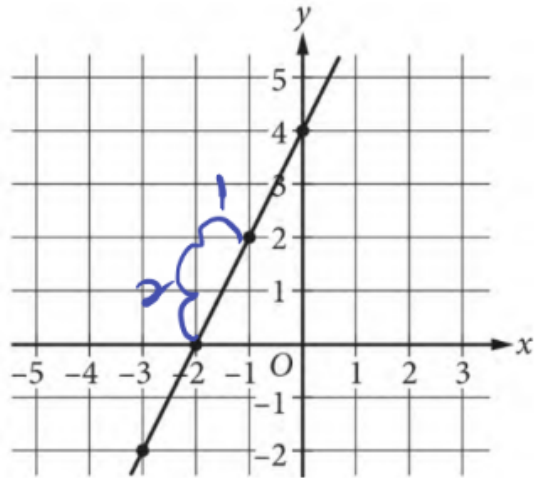
slope y-int

The graph of $y = mx + b$, where m and b are constants, is shown in the xy-plane.



$m = \frac{\text{Rise}}{\text{Run}}$

What is the value of m ?

$m = 2$

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$3x - 0.6 = 1.8$

What value of x satisfies the equation above?

solve for x

$3x - 0.6 = 1.8$

$+0.6 \quad +0.6$

$\frac{3x}{3} = \frac{2.4}{3}$

$x = 0.8$ or $\frac{4}{5}$

1 Watch Video

If $s = 4$, what is the value of $20s - 15s$?

A) 4

B) 5

C) 15

D) 20

$5s$ ← 4

$5 \cdot 4$

20

8 Watch Video

Speed (km/h)	Pulse (bpm)
4	77
6	87
8	97

$\times 2$ (4 → 8), $+10$, $+10$ (77 → 87 → 97)

The table lists selected values of Sam's walking speed, in kilometers per hour (km/h), and his corresponding pulse, in beats per minute (bpm). There is a linear relationship between Sam's speed, x, and his pulse, $f(x)$. Which of the following equations describes $f(x)$?

A) $f(x) = x + 57$ ✗ (4 + 57 ≠ 77)

B) $f(x) = -x + 97$ ✗

C) $f(x) = 5x + 57$ (20 + 57 = 77)

D) $f(x) = -5x + 97$ ✗

$y = mx + b$

slope, y-int ($x = 0$)

(4, 77)

(6, 87)

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{87 - 77}{6 - 4}$

$= \frac{10}{2}$

$= 5$

17 Watch Video

$\frac{5}{2}$

1 $x + y = 5$

2 $2x = 5$ → $\frac{2x}{2} = \frac{5}{2}$, $x = \frac{5}{2}$

If (x, y) is the solution to the given system of equations, what is the value of y?

$\frac{5}{2} + y = 5$

$-\frac{5}{2} \quad -\frac{5}{2}$

$y = \frac{2 \cdot 5}{2 \cdot 1} - \frac{5}{2}$

$= \frac{10}{2} - \frac{5}{2}$

$= \frac{5}{2}$ or 2.5

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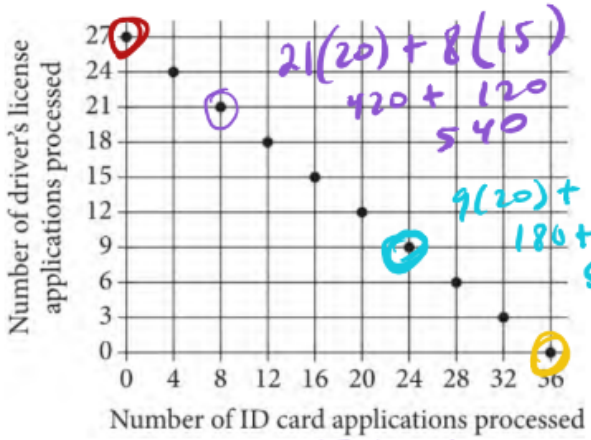


For her job, Natasha spent a total of n minutes processing ID card applications and driver's license applications. It takes Natasha 15 minutes to process an ID card application and 20 minutes to process a driver's license application. The graph above represents all possible combinations for the number of ID card applications and the number of driver's license applications that Natasha could have processed in the n minutes. What is the value of n?

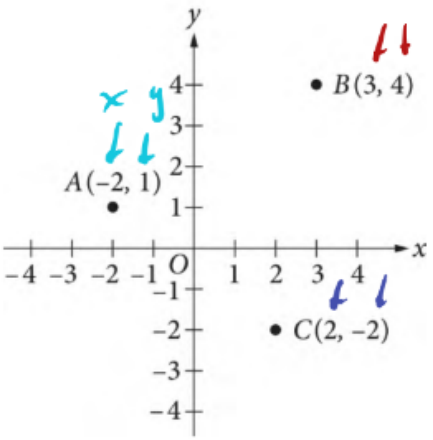
A) 720

B) 540

C) 420

D) 360

15 Watch Video part 1 Watch Video part 2



The coordinates of points A, B, and C are shown in the xy-plane above. For which of the following inequalities will each of the points A, B, and C be contained in the solution region?

A) $y > -x - 2$

B) $y \geq -x$

C) $y < x + 3$

D) $x < 3$

18

A sports store had 60 backpacks in stock, some with wheels and some without wheels, before a new shipment of backpacks arrived. The number of wheeled backpacks in the new shipment was twice the number of wheeled backpacks already in stock, and the number of backpacks without wheels in the new shipment was five times the number of backpacks without wheels already in stock. After the new shipment arrived, there were 330 backpacks in the store. Before the shipment, there were x wheeled backpacks and y backpacks without wheels. Which of the following equations can be used with $x + y = 60$ to solve for x and y?

A) $2x + 5y = 330$

B) $2x + 5y = 270$

C) $5x + 2y = 270$

D) $5x + 2y = 330$

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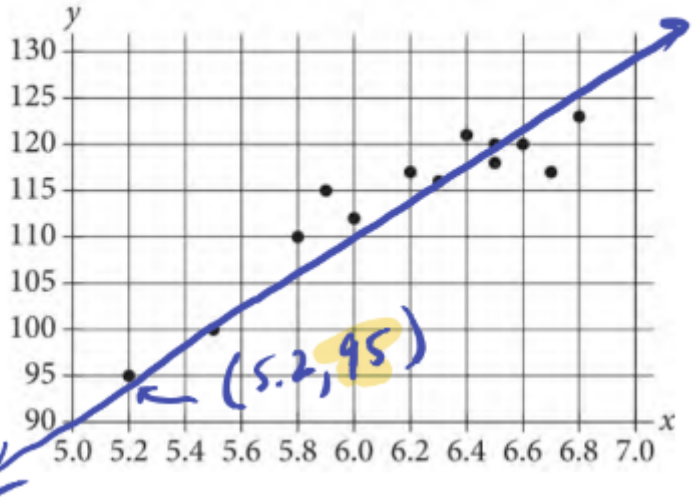

A set of data is represented by the scatterplot in the portion of the xy-plane shown. Which of the following linear equations best fits the data?

A) $y = -15.2 + 1.6x$

B) $y = 15.2 + 1.6x$

C) $y = -15.2 + 16x$

D) $y = 15.2 + 16x$

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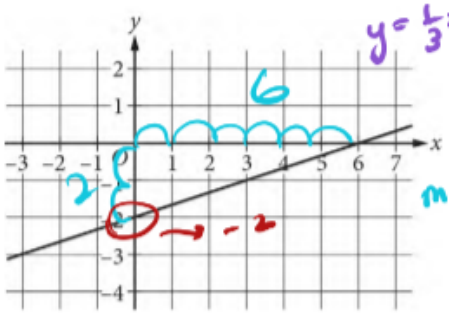

An equation of the graph shown is $ax + by = 6$, where a and b are constants. What is the value of b?

A) −3
B) −1
C) 1
D) 3

$Ax + By = C$ $\quad ax + by = 6$

$y = mx + b$ $\quad -ax \quad -ax$

$\frac{by}{b} = \frac{-ax}{b} + \frac{6}{b}$

$y = \frac{1}{3}x - 2$ $\quad y = \frac{-a}{b}x + \frac{6}{b}$

-3

$-\frac{2}{1} = \frac{6}{b}$

$\frac{-2b}{-2} = \frac{6}{-2}$

$b = -3$

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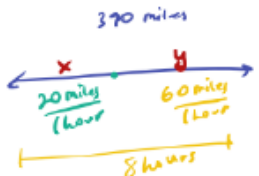
Minato drove 390 miles. Part of the drive was along local roads, where his average speed was 20 miles per hour, and the rest was along a highway, where his average speed was 60 miles per hour. The drive took 8 hours. What distance, in miles, did Minato drive along local roads?

A) 30
B) 45
C) 90
D) 120



r · t = d

1 $20x + 60y = 390$

2 $x + y = 8$

$d = r \cdot t$ (rate / hour)

$= 20\left(\frac{9}{4}\right)$

$= 45$

$2x + 6y = 39$

$-6(x + y = 8)$

$-6x - 6y = -48$

$-4x = -9$

$\frac{-4x}{-4} = \frac{-9}{-4}$

$x = \frac{9}{4}$ hours

53

27

The function f is defined for all real numbers, and the graph of $y = f(x)$ in the xy-plane is a line with a negative slope. Which of the following must be true?

I. If $a < b$, then $f(a) > f(b)$.
II. If $a < 0$, then $f(a) > 0$.
III. If $a > 0$, then $f(a) < 0$.

A) I only
B) II only
C) I and III only
D) II and III only

29 Watch Video

$$\frac{1}{3}(x - k) = kx \cdot 3$$

In the given equation, k is a constant. If the equation has no solution, what is the value of k?

A) −1
B) $-\frac{1}{3}$
C) 0
D) $\frac{1}{3}$

option 1

$1x - K = 3Kx$

$\frac{1}{3} = \frac{3K}{3}$

$\frac{1}{3} = K$

option 2

$\frac{1}{3}(x - k) = kx$

$\frac{1}{3}x - \frac{1}{3}k = kx$

$K = \frac{1}{3}$

No solution

$0 = 5$

$4x + 1 = 4x + 3$

$4x + 1 = 4x + 3$

$-4x \quad -4x$

$1 = 3$

33 Watch Video

$$4x + y = 4$$
$$-1(8x + y = 5)$$

If (x, y) is the solution of the system of equations above, what is the value of x?

$4x + y = 4$

$-8x - y = -5$

$-4x = -1$

$\frac{-4x}{-4} = \frac{-1}{-4}$

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

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The linear function f is defined by $f(x) = cx + d$, where c and d are constants. If $f(50) = 27{,}000$ and $f(100) = 38{,}000$, what is the value of c?

$f(x) = y$

(x, y)

$f(x) = cx + d$

$y = mx + b$

$f(50) = 27{,}000$

$(50, 27{,}000)$

$f(100) = 38{,}000$

$(100, 38{,}000)$

$m = \frac{38{,}000 - 27{,}000}{100 - 50}$

$= \frac{11000}{50}$

$= 220$