

Part 1

HEART OF ALGEBRA

SAT PRACTICE

NO CALCULATOR

1

If $3r = 18$, what is the value of $6r + 3$?

- A) 6 $3r = 18$ $6(6) + 3$
 B) 27 $r = 6$ $36 + 3$
 C) 36 39
 D) 39

D

2

The number of states that joined the United States between 1776 and 1849 is twice the number of states that joined between 1850 and 1900. If 30 states joined the United States between 1776 and 1849 and x states joined between 1850 and 1900, which of the following equations is true?

- A) $30x = 2$ $2x = 30$
 B) $2x = 30$
 C) $\frac{x}{2} = 30$
 D) $x + 30 = 2$

B

3

$2x - 3y = -14$
 $3x - 2y = -6$

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

- A) -20 $-6x + 9y = 42$
 B) -8 $+ 6x - 4y = -12$
 C) -4 $5y = 30$
 D) 8 $y = 6$
 $2x - 3(6) = -14$
 $2x - 18 = -14$
 $2x = 4$
 $x = 2$

C

4

The line $y = kx + 4$, where k is a constant, is graphed in the xy -plane. If the line contains the point (c, d) , where $c \neq 0$ and $d \neq 0$, what is the slope of the line in terms of c and d ?

- A) $\frac{d-4}{c}$ $k = \frac{d-4}{c-0} = \frac{d-4}{c}$
 B) $\frac{c-4}{d}$
 C) $\frac{4-d}{c}$
 D) $\frac{4-c}{d}$

A

5

last step: $k = \frac{4}{3} = \frac{4}{3}$
 $kx - 3y = 4$
 $4x - 5y = 7$
 $5k = 12 \rightarrow k = \frac{12}{5}$

In the system of equations above, k is a constant and x and y are variables. For what value of k will the system of equations have no solution?

- A) $\frac{12}{5}$ no solution when // and no intersection!
 B) $\frac{16}{7}$
 C) $\frac{16}{7}$
 D) $\frac{12}{5}$

A

6

$C = \frac{5}{9}(F - 32) \rightarrow \frac{9}{5}C + 32 = F$
 or $1.8C + 32 = F$

The equation above shows how a temperature F , measured in degrees Fahrenheit, relates to a temperature C , measured in degrees Celsius. Based on the equation, which of the following must be true?

- I. A temperature increase of 1 degree Fahrenheit is equivalent to a temperature increase of $\frac{5}{9}$ degree Celsius. ✓
 II. A temperature increase of 1 degree Celsius is equivalent to a temperature increase of 1.8 degrees Fahrenheit. ✓
 III. A temperature increase of $\frac{5}{9}$ degree Fahrenheit is equivalent to a temperature increase of 1 degree Celsius. ✗
 A) I only
 B) II only
 C) III only
 D) I and II only

D

$kx - 3y = 4 \rightarrow -3y = -kx + 4 \rightarrow y = \frac{k}{3}x - \frac{4}{3}$
 $4x - 5y = 7 \rightarrow -5y = -4x + 7 \rightarrow y = \frac{4}{5}x - \frac{7}{5}$
 what value of k would make the slope of the 1st equation $\frac{4}{5}$?

7

$$f(x) = \frac{3}{2}x + b$$

In the function above, b is a constant. If $f(6) = 7$, what is the value of $f(-2)$?

A) -5
B) -2
C) 1
D) 7

$7 = \frac{3}{2}(6) + b$
 $7 = 9 + b$
 $-2 = b$
 $f(x) = \frac{3}{2}x - 2$
 $f(-2) = \frac{3}{2}(-2) - 2 = -5$

A

8

Which of the following expressions is equal to 0 for some value of x ?

A) $|x - 1| - 1$
B) $|x + 1| + 1$
C) $|1 - x| + 1$
D) $|x - 1| + 1$

output of Abs value always +.
Always Greater than 0.

A

9

While preparing to run a marathon, Amelia created a training schedule in which the distance of her longest run every week increased by a constant amount. If Amelia's training schedule requires that her longest run in week 4 is a distance of 8 miles and her longest run in week 16 is a distance of 26 miles, which of the following best describes how the distance Amelia runs changes between week 4 and week 16 of her training schedule?

A) Amelia increases the distance of her longest run by 0.5 miles each week.
B) Amelia increases the distance of her longest run by 2 miles each week.
C) Amelia increases the distance of her longest run by 2 miles every 3 weeks.
D) Amelia increases the distance of her longest run by 1.5 miles each week.

$m = \frac{26 - 8}{16 - 4} = \frac{18}{12} = \frac{6}{4} = \frac{3}{2} = 1.5$

D

10

$$\frac{x}{y} = 6 \quad x = 6y$$

$$4(y + 1) = x$$

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

A) 2
B) 4
C) 12
D) 24

$4(y + 1) = 6y$
 $4y + 4 = 6y$
 $4 = 2y$
 $2 = y$

A

11

Ken and Paul each ordered a sandwich at a restaurant. The price of Ken's sandwich was x dollars, and the price of Paul's sandwich was \$1 more than the price of Ken's sandwich. If Ken and Paul split the cost of the sandwiches evenly and each paid a 20% tip, which of the following expressions represents the amount, in dollars, each of them paid? (Assume there is no sales tax.)

A) $0.2x + 0.2$
B) $0.5x + 0.1$
C) $1.2x + 0.6$
D) $2.4x + 1.2$

Ken = x , Paul = $x + 1$
Combined total = $1.2(2x + 1)$
with tax = $0.4x + 1.2$
Individual total with tax = $\frac{2.4x + 1.2}{2} = 1.2x + 0.6$

C

12

Which of the following equations represents a line that is parallel to the line with equation $y = -3x + 4$?

A) $6x + 2y = 15$
B) $3x - y = 7$
C) $2x - 3y = 6$
D) $x + 3y = 1$

same slope $m = -\frac{6}{2} = -3$

A

13

If $\frac{7}{9}x - \frac{4}{9}x = \frac{1}{4} + \frac{5}{12}$, what is the value of x ?

$\frac{3}{9}x = \frac{3}{12} + \frac{5}{12}$
 $\frac{3}{9}x = \frac{8}{12}$
 $x = \frac{8}{3} = \frac{72}{36} = 2$

2

14

$$\begin{cases} -3x + 4y = 20 \\ 6x + 3y = 15 \end{cases}$$

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

$2(-3x + 4y = 20) \rightarrow -6x + 8y = 40$
 $6x + 3y = 15 \rightarrow (1)6x + 3y = 15$
 $11y = 55$
 $y = 5$
 $6x + 3(5) = 15$
 $6x + 15 = 15$
 $6x = 0$
 $x = 0$

0