

The Weekly Rigor

No. 134

“A mathematician is a machine for turning coffee into theorems.”

January 14, 2017

SAT Math Test Problem Children: Systems of Linear Equations (Part 2)

6. 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) $x + 3y = 1$

7.

$$\begin{aligned}y &= x - 4 \\4x - 4y &= 12\end{aligned}$$

The system of equations above consists of two equations, and the graph of each equation in the xy -plane is a line. Which of the following statements is true about these two lines?

- A) The lines are parallel.
- B) The lines are the same.
- C) The lines are perpendicular.
- D) The lines intersect at $(-4, -3)$.

Now for the solutions:

1. Using the “elimination method,” we have

$$\begin{array}{r}x + y = 1 \\5x - y = 23 \\ \hline6x = 24\end{array}$$

Hence,

$$\frac{6x}{6} = \frac{24}{6}.$$

So,

$$x = 4.$$

Thus,

$$4 + y = 1 \Rightarrow y = 1 - 4 = -3.$$

Alternative solution:

Using the “substitution method,” we could begin as follows:

$$y = 1 - x.$$

Hence,

$$5x - (1 - x) = 23,$$

by substitution. So,

$$5x - 1 + x = 23 \Rightarrow 6x = 24 \Rightarrow x = 4.$$

Thus,

$$y = 1 - 4 = -3.$$

2. Using the “elimination method,” we have

$$\begin{aligned} (-2)(2x - 3y) &= -14(-2) \\ (3)(3x - 2y) &= -6(3) \end{aligned}$$

Hence,

$$\begin{array}{r} -4x + 6y = 28 \\ \underline{9x - 6y = -18} \\ 5x = 10 \end{array}$$

So,

$$\frac{5x}{5} = \frac{10}{5}.$$

Thus,

$$x = 2.$$

Hence,

$$2(2) - 3y = -14 \Rightarrow 4 - 3y = -14 \Rightarrow -3y = -18.$$

So,

$$y = 6.$$

Therefore,

$$x - y = 2 - 6 = -4,$$

which is option C.

“Only he who never plays, never loses.”