The Weekly Rigor

No. 213

"A mathematician is a machine for turning coffee into theorems."

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16 Problems in Finding Linear Functions (Part 3)

9. The slope of the given line is $\frac{1}{2}$, and our line is perpendicular to the given line. Hence, our slope is the *negative reciprocal*, namely, $m = -\frac{2}{1} = -2$. Now we can use the slope-intercept form equation, y = mx + b, to find what b is. We can use the given point, (-3,6), and substitute in the values of x, y, and m:

$$y = mx + b$$

$$6 = -2(-3) + b$$

$$6 = 6 + b$$

$$0 = b$$

Now that we know the slope *m* and the *y*-intercept *b*, we can write the equation of the line:

$$y = -2x + 0 = -2x$$

11. <u>Step 1:</u> Using the slope formula, $m = \frac{y_2 - y_1}{x_2 - x_1}$, we can let $(x_1, y_1) = (3, -8)$ and $(x_2, y_2) = (-3, 0)$. Hence, $m = \frac{0 - (-8)}{-3 - 3} = \frac{0 + 8}{-6} = \frac{8}{-6} = -\frac{4}{3} = \frac{-4}{3}$.

<u>Step 2:</u> Next we can use the slope-intercept form equation, y = mx + b, to find what b is. We can use either given point and substitute in the values of x, y, and m:

$$y = mx + b$$
$$-8 = \frac{-4}{3}(3) + b$$
$$-8 = -4 + b$$
$$-4 = b$$

Now that we know the slope *m* and the *y*-intercept *b*, we can write the equation of the line:

$$y = \frac{-4}{3}x - 4$$

13. The slope of the given line is -1, and our line is perpendicular to the given line. Hence, our slope is the *negative reciprocal*, namely, $m = -\frac{1}{-1} = 1$. Now we can use the slope-intercept form equation, y = mx + b, to find what *b* is. We can use the given point, (1,10), and substitute in the values of *x*, *y*, and *m*:

$$y = mx + b$$
$$10 = 1(1) + b$$
$$10 = 1 + b$$
$$9 = b$$

Now that we know the slope *m* and the *y*-intercept *b*, we can write the equation of the line:

$$y = x + 9$$

15. <u>Step 1:</u> Using the slope formula, $m = \frac{y_2 - y_1}{x_2 - x_1}$, we can let $(x_1, y_1) = (2, 4)$ and $(x_2, y_2) = (3, 9)$. Hence, $m = \frac{9-4}{3-2} = \frac{5}{1} = 5$.

<u>Step 2:</u> Next we can use the slope-intercept form equation, y = mx + b, to find what b is. We can use either given point and substitute in the values of x, y, and m:

$$y = mx + b$$
$$4 = 5(2) + b$$
$$4 = 10 + b$$
$$-6 = b$$

Now that we know the slope *m* and the *y*-intercept *b*, we can write the equation of the line:

$$y = 5x - 6$$

"Only he who never plays, never loses."

Written and published every Saturday by Richard Shedenhelm	WeeklyRigor@gmail.com