To find the x-intercept, let $y = 0$.

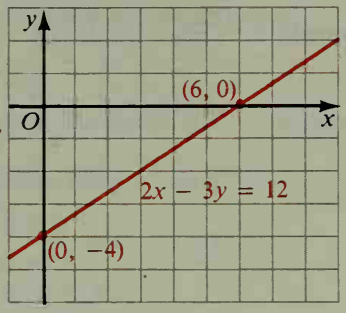
$$2x - 3(0) = 12$$
$$x = 6$$

Thus $(6, 0)$ is a point on the line.

To find the y-intercept, let $x = 0$.

$$2(0) - 3y = 12$$
$$y = -4$$

Thus $(0, -4)$ is a point on the line.

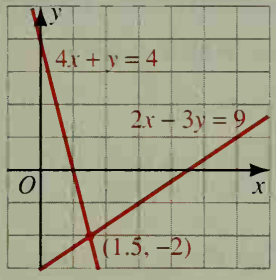


Example 2 Use algebra to find the intersection of the lines $2x - 3y = 9$ and $4x + y = 4$. Illustrate by drawing the graphs of the two lines.

Solution

$$\begin{array}{rll} 2x - 3y = 9 & & \text{(First equation)} \\ \underline{12x + 3y = 12} & & \text{(Second equation} \times 3\text{)} \\ 14x = 21 & & \text{(Add to eliminate } y\text{.)} \\ x = 1.5 & & \\ 4(1.5) + y = 4 & & \text{(Substitution)} \\ y = -2 & & \end{array}$$

The point of intersection is $(1.5, -2)$.



The equations in Examples 1 and 2 are all written in standard form. These equations can also be written in the *slope-intercept form* $y = mx + b$. This form tells you at a glance what the line's slope and y-intercept are.

standard form	*slope-intercept form*	*slope*	*y-intercept*
$2x - 3y = 12$	$y = \frac{2}{3}x - 4$	$\frac{2}{3}$	-4
$2x - 3y = 9$	$y = \frac{2}{3}x - 3$	$\frac{2}{3}$	-3
$4x + y = 4$	$y = -4x + 4$	-4	4

Theorem 13-7 *Slope-Intercept Form*

A line with the equation $y = mx + b$ has slope m and y-intercept b.

Proof:

When $x = 0$, $y = b$. So b is the y-intercept.

When $x = 1$, $y = m + b$.

Let $(x_1, y_1) = (0, b)$ and $(x_2, y_2) = (1, m + b)$.

Then the slope is $\dfrac{y_2 - y_1}{x_2 - x_1} = \dfrac{(m + b) - b}{1 - 0} = m$.