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

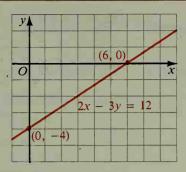
$$2x - 3(0) = 12$$
$$x = 6$$

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

$$2x - 3y = 9$$

$$12x + 3y = 12$$

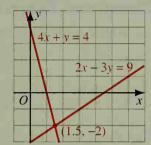
$$14x = 21$$

$$x = 1.5$$

$$4(1.5) + y = 4$$

$$y = -2$$
(First equation)
(Second equation × 3)
(Add to eliminate y.)
(Substitution)

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 $\frac{y_2 - y_1}{x_2 - x_1} = \frac{(m+b) - b}{1 - 0} = m$.