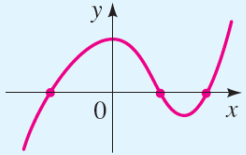
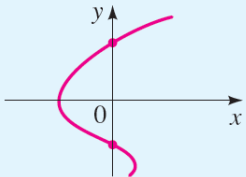


## Intercepts

The  $x$ -coordinates of the points where a graph intersects the  $x$ -axis are called the  **$x$ -intercepts** of the graph and are obtained by setting  $y = 0$  in the equation of the graph. The  $y$ -coordinates of the points where a graph intersects the  $y$ -axis are called the  **$y$ -intercepts** of the graph and are obtained by setting  $x = 0$  in the equation of the graph.

Definition of Intercepts		
Intercepts	How to find them	Where they are on the graph
<b><math>x</math>-intercepts:</b> The $x$ -coordinates of points where the graph of an equation intersects the $x$ -axis	Set $y = 0$ and solve for $x$	
<b><math>y</math>-intercepts:</b> The $y$ -coordinates of points where the graph of an equation intersects the $y$ -axis	Set $x = 0$ and solve for $y$	

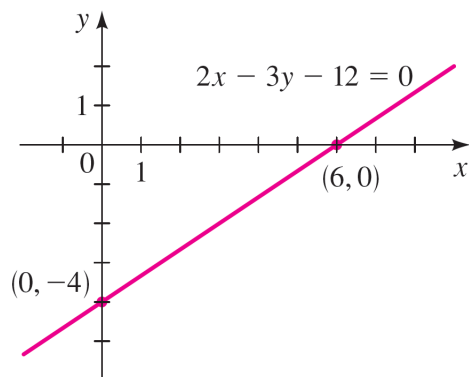
EXAMPLE: Sketch the graph of the equation  $2x - 3y - 12 = 0$ .

Solution: Since the equation is linear, its graph is a line. To draw the graph, it is enough to find any two points on the line. The intercepts are the easiest points to find.

$$x\text{-intercept: Substitute } y = 0, \text{ to get } 2x - 12 = 0 \implies 2x = 12 \implies x = \frac{12}{2} = 6$$

$$y\text{-intercept: Substitute } x = 0, \text{ to get } -3y - 12 = 0 \implies -3y = 12 \implies y = \frac{12}{-3} = -4$$

With these points we can sketch the graph in the Figure below.



EXAMPLE: Find the  $x$ - and  $y$ -intercepts of the graph of the equation  $y = x^2 - 2x - 8$ , and sketch the graph.

Solution: To find the  $x$ -intercepts, we set  $y = 0$  and solve for  $x$ . Thus

$$\begin{aligned}x^2 - 2x - 8 &= 0 \\(x + 2)(x - 4) &= 0 \\x + 2 = 0 \quad \text{or} \quad x - 4 &= 0 \\x = -2 \quad \text{or} \quad x = 4\end{aligned}$$

The  $x$ -intercepts are 2 and 4.

To find the  $y$ -intercepts, we set  $x = 0$  and find  $y$ . Thus  $y = 0^2 - 2 \cdot 0 - 8 = -8$ . The  $y$ -intercept is  $-8$ . Now make a table, using both positive and negative values for  $x$ , and plot the corresponding points. These points suggest that the entire graph looks like the Figure below.

$x$	$x^2 - 2x - 8$
-3	7
-2	0
-1	-5
0	-8
1	-9
3	-5
4	0
5	7

