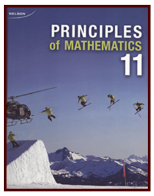
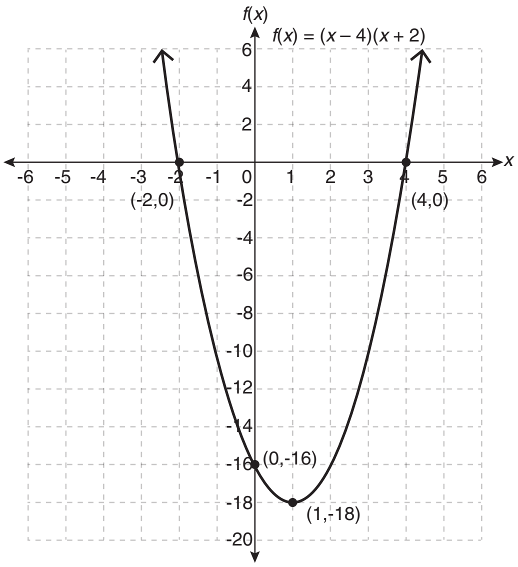
Sometimes the factored form of a quadratic function has two identical factors, such as $y = -4(x-3)(x-3)$. In this situation, the graph of the function will have only one x-intercept, at $x = 3$.



Please refer to Page 338, Example 1, of *Principles of Mathematics 11* for another example of graphing quadratic functions.

Practice Run

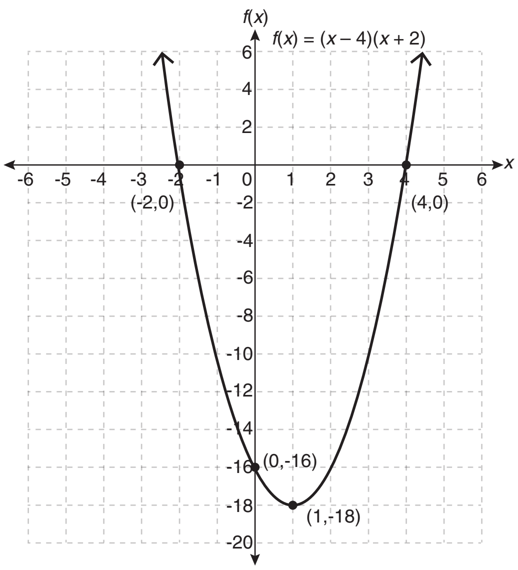
1. Using the equation of the function $f(x) = 2(x-4)(x+2)$, explain how the following information could be determined. Use the graph to verify your responses.



- the x-intercepts
- the y-intercept
- the equation of the axis of symmetry
- the coordinates of the vertex
- the maximum or minimum value of the function
- the domain and range

Compare your answers.

1. Using the equation of the function $f(x) = 2(x-4)(x+2)$, explain how the following information could be determined. Use the graph to verify your responses.



- the x-intercepts

$f(x) = 2(x-4)(x+2)$
Let $f(x) = 0$.
$0 = 2(x-4)(x+2)$
$0 = x - 4 \qquad 0 = x + 2$
$4 = x \qquad -2 = x$

- the y-intercept

$f(x) = 2(x-4)(x+2)$
Let $x = 0$.
$f(0) = 2(0-4)(0+2)$
$f(0) = 2(-4)(2)$
$f(0) = -16$

- the equation of the axis of symmetry

$\frac{4+(-2)}{2} = \frac{2}{2} = 1$, so $x = 1$

- the coordinates of the vertex

$f(1) = 2(1-4)(1+2)$
$f(1) = 2(-3)(3)$
$f(1) = -18$

- the maximum or minimum value of the function

The function has a minimum because the GCF of 2 in $f(x) = 2(x-4)(x+2)$ is positive and thus the parabola opens up. The minimum value is $y = -18$

- the domain and range

Domain: $\{x \mid x \in R\}$
Range: $\{y \mid y \geq -18, y \in R\}$