The x-intercepts of a parabola can also be used to solve a \textit{quadratic inequality in one variable}, such as \(x^2 - x - 6 < 0\). To solve this inequality, first examine the graph of \(y = f(x) = x^2 - x - 6\). This is a parabola with x-intercepts at \(-2\) and \(3\), as can be seen by writing the equation in the factored form \(y = (x + 2)(x - 3)\). Note that \(y = x^2 - x - 6\) is below the x-axis between the x-intercepts, and above it outside the x-intercepts. That is,

\[
\begin{align*}
x^2 - x - 6 &< 0 \quad \text{for } -2 < x < 3 \\
x^2 - x - 6 &> 0 \quad \text{for } x < -2 \text{ or } x > 3
\end{align*}
\]

![Graph of a parabola]

**EXERCISES 3.3**

\textbf{Solve for } x \textbf{ by factoring.}

1. \(x^2 - 5x + 6 = 0\)
2. \(x^2 - 4x + 4 = 0\)
3. \(x^2 - 10x = 0\)
4. \(2x = x\)
5. \(10x^2 - 13x - 3 = 0\)
6. \(4x^2 - 15x = -9\)
7. \(4x^2 = 32x - 64\)
8. \((x + 1)(x + 2) = 30\)
9. \(2x(x + 6) = 22x\)

\textbf{Solve for } x \textbf{ by completing the square:}

10. \(x^2 - 2x - 15 = 0\)
11. \(x^2 - 4x + 1 = 0\)
12. \(2x^2 - 2x = 15\)

\textbf{Use the quadratic formula to solve for } x. \textbf{ When the roots are irrational numbers, give their radical forms and also use a calculator to find approximations to two decimal places.}

13. \(x^2 - 3x - 10 = 0\)
14. \(2x^2 + 3x - 2 = 0\)
15. \(x^2 - 2x - 4 = 0\)
16. \(2x^2 - 3x - 1 = 0\)
17. \(3x^2 + 7x + 2 = 0\)
18. \(x^2 + 4x + 1 = 0\)
19. \(x^2 - 6x + 6 = 0\)
20. \(x^2 - 2x + 2 = 0\)
21. \(-x^2 + 6x - 14 = 0\)
22. \(2 - 4x - x^2 = 0\)
23. \(3x + 1 = 2x^2\)
24. \(6x^2 + 2x = -3\)
25. \(4 + 3x + x^2 = 0\)
26. \(2 - 5x + 2x^2 = 0\)
27. \(5x^2 = 8x - 8\)