Example 1

Factor $x^2 - 25$.

Both x^2 and 25 are perfect squares, so $x^2 - 25$ is a difference of squares. Begin by determining the positive square root of each term.

$\sqrt{x^2} = x$ and $\sqrt{25} = 5$

The factors can be written as the sum and the difference of these two square roots.

$x^2 - 25 = (x+5)(x-5)$

These factors can be verified through multiplication.

$$\begin{aligned}(x-5)(x+5) &= x^2 + 5x - 5x - 25 \\ &= x^2 - 25\end{aligned}$$

Check Up

1. Factor each difference of squares.

   a. $q^2 - 81$

   b. $1 - p^2$

Compare your answers.

1. Factor each difference of squares.

   a. $q^2 - 81$

   $\sqrt{q^2} = q$ and $\sqrt{81} = 9$

   $q^2 - 81 = (q + 9)(q - 9)$

   b. $1 - p^2$

   $\sqrt{1} = 1$ and $\sqrt{p^2} = p$

   $1 - p^2 = (1 + p)(1 - p)$

The difference of squares strategy can also be used with more complex expressions.

Multimedia

A video demonstration of the solution for *Example 2* is provided.

Example 2

Factor $36d^2 - 100e^2$.

Both $36d^2$ and $100e^2$ are perfect squares. Look at the coefficients and variables separately to determine the positive square roots.

$$\begin{aligned}\sqrt{36d^2} &= \sqrt{36} \cdot \sqrt{d^2} \\ &= \sqrt{6^2} \cdot \sqrt{d^2} \\ &= 6d\end{aligned} \qquad \begin{aligned}\sqrt{100e^2} &= \sqrt{100} \cdot \sqrt{e^2} \\ &= \sqrt{10^2} \cdot \sqrt{e^2} \\ &= 10e\end{aligned}$$

The factors can be written as the sum and the difference of these two square roots.

$36d^2 - 100e^2 = (6d + 10e)(6d - 10e)$

These factors can be verified through multiplication.

$$\begin{aligned}(6d + 10e)(6d - 10e) &= 36d^2 - 60d + 60d - 100e^2 \\ &= 36d^2 - 100e^2\end{aligned}$$