

Essential Question How can you recognize and factor special products?

Factoring Special Products

Lesson 7.9



Key Idea

$$\text{Difference of Squares: } a^2 - b^2 = (a + b)(a - b)$$

If we are subtracting two perfect squares then it will always factor to the sum and difference of the square roots.

Example 1.

$x^2 - 16$ Subtracting two perfect squares, the square roots are x and 4

$(x + 4)(x - 4)$ Our Solution

Example 2.

$9a^2 - 25b^2$ Subtracting two perfect squares, the square roots are $3a$ and $5b$

$(3a + 5b)(3a - 5b)$ Our Solution



Another factoring shortcut is the Square of a Binomial. We had a shortcut for multiplying the Square of a Binomial which can be reversed to help us factor a Perfect Square Trinomial.

Key Idea

Perfect Square Trinomial Pattern

$$a^2 + 2ab + b^2 = (a + b)^2$$

We can **factor using the square roots of the first and last terms and the sign from the middle**. This is shown in the following examples.

Example 3.

$x^2 - 6x + 9$ The square roots are x and 3 , and the sign in the middle is subtraction.

$$(x - 3)^2$$

Example 4.


$4x^2 + 20xy + 25y^2$ The square roots are $2x$ and $5y$, and the sign in the middle is addition.

$$(2x + 5y)^2$$



Real-Life Application



$$y = 81 - 16t^2$$


A bird picks up a golf ball and drops it while flying. The function represents the height y (in feet) of the golf ball t seconds after it is dropped. The ball hits the top of a 32-foot tall pine tree. After how many seconds does the ball hit the tree?



Real-Life Application



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A yellow arrow points downwards from the t^2 term, and a small grey circle is positioned to the right of the arrow.

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Substitute 32 for y and solve for t .



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A negative time does not make sense, so the golf ball hits the tree after 1.75 seconds.

