

Unit 7 Lesson 10: Rewriting Quadratic Expressions in Factored Form (Part 4)

1 Which One Doesn't Belong: Quadratic Expressions (Warm up)

Student Task Statement

Which one doesn't belong?

A. $(x + 4)(x - 3)$

B. $3x^2 - 8x + 5$

C. $x^2 - 25$

D. $x^2 + 2x + 3$

2 A Little More Advanced

Student Task Statement

Each row in each table has a pair of equivalent expressions. Complete the tables. If you get stuck, try drawing a diagram.

1.

factored form	standard form
$(3x + 1)(x + 4)$	
$(3x + 2)(x + 2)$	
$(3x + 4)(x + 1)$	

2.

factored form	standard form
	$5x^2 + 21x + 4$
	$3x^2 + 15x + 12$
	$6x^2 + 19x + 10$

3 Timing A Blob of Water

Student Task Statement

An engineer is designing a fountain that shoots out drops of water. The nozzle from which the water is launched is 3 meters above the ground. It shoots out a drop of water at a vertical velocity of 9 meters per second.

Function h models the height in meters, h , of a drop of water t seconds after it is shot out from the nozzle. The function is defined by the equation $h(t) = -5t^2 + 9t + 3$.

How many seconds until the drop of water hits the ground?

1. Write an equation that we could solve to answer the question.
2. Try to solve the equation by writing the expression in factored form and using the zero product property.
3. Try to solve the equation by graphing the function using graphing technology. Explain how you found the solution.

4 Making It Simpler (Optional)

Student Task Statement

Here is a clever way to think about quadratic expressions that would make it easier to rewrite them in factored form.

$$\begin{aligned} &9x^2 + 21x + 10 \\ &(3x)^2 + 7(3x) + 10 \\ &N^2 + 7N + 10 \\ &(N + 2)(N + 5) \\ &(3x + 2)(3x + 5) \end{aligned}$$

1. Use the distributive property to expand $(3x + 2)(3x + 5)$. Show your reasoning and write the resulting expression in standard form. Is it equivalent to $9x^2 + 21x + 10$?
2. Study the method and make sense of what was done in each step. Make a note of your thinking and be prepared to explain it.
3. Try the method to write each of these expressions in factored form.

$$4x^2 + 28x + 45$$

$$25x^2 - 35x + 6$$

4. You have probably noticed that the coefficient of the squared term in all of the previous examples is a perfect square. What if that coefficient is not a perfect square?

Here is an example of an expression whose squared term has a coefficient that is not a squared term.

$$\begin{aligned} & 5x^2 + 17x + 6 \\ & \frac{1}{5} \cdot 5 \cdot (5x^2 + 17x + 6) \\ & \frac{1}{5}(25x^2 + 85x + 30) \\ & \frac{1}{5}((5x)^2 + 17(5x) + 30) \\ & \frac{1}{5}(N^2 + 17N + 30) \\ & \frac{1}{5}(N + 15)(N + 2) \\ & \frac{1}{5}(5x + 15)(5x + 2) \\ & (x + 3)(5x + 2) \end{aligned}$$

Use the distributive property to expand $(x + 3)(5x + 2)$. Show your reasoning and write the resulting expression in standard form. Is it equivalent to $5x^2 + 17x + 6$?

5. Study the method and make sense of what was done in each step and why. Make a note of your thinking and be prepared to explain it.
6. Try the method to write each of these expressions in factored form.

$$3x^2 + 16x + 5$$

$$10x^2 - 41x + 4$$