

Looking for Shortcuts: Part 1

Consider: Say we want to expand and simplify the expression $(x + 2)(x - 2)$.

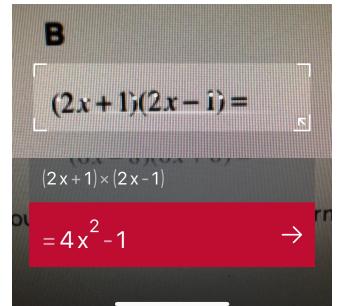
Using the distributive property, from last class, we could figure out the answer this way:

$$\begin{aligned}(x + 2)(x - 2) \\ = x^2 + 2x - 2x - 4 \\ = x^2 - 4\end{aligned}$$

Hmm.
That looks like a lot of work.
Could there be a better (faster) way?

Let's find a better way. We can use [Photomath](#), to save time when investigating.

1. Using Photomath, expand the expressions below.
How to do this is shown at right.



A

$$\begin{aligned}(x + 1)(x - 1) &= x^2 - 1 \\ (x + 2)(x - 2) &= x^2 - 4 \\ (x + 3)(x - 3) &= x^2 - 9 \\ (x + 4)(x - 4) &= x^2 - 16 \\ (x + 5)(x - 5) &= x^2 - 25\end{aligned}$$

B

$$\begin{aligned}(2x + 1)(2x - 1) &= 4x^2 - 1 \\ (2x + 2)(2x - 2) &= 4x^2 - 4 \\ (3x - 4)(3x + 4) &= 9x^2 - 16 \\ (3x - 5)(3x + 5) &= 9x^2 - 25 \\ (6x - 8)(6x + 8) &= 36x^2 - 64\end{aligned}$$

REFLECT: Describe any patterns you see. Note the *signs* of terms in your answers!

To get answer:

- multiply first terms in brackets
- multiply second terms in brackets

PREDICT: Don't use the Photomath software.

What will $(5x + 3)(5x - 3)$ be? $25x^2 - 9$

How about $(6x - 2)(6x + 2)$ be? $36x^2 - 4$

MAKE RULES: If $(a + b)(a - b)$ then the answer is...

$$a^2 - b^2$$

If $(a - b)(a + b)$ then the answer is...

$$a^2 - b^2$$

This is a shortcut for the product of a sum and difference