**MATHCOUNTS®**

**Difference of Squares**

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**Warm-Up!**

*Try these problems before watching the lesson.*

1. What is the value of $5^2 - 4^2$?

2. What is the value of $12^2 - 8^2$?

3. What is the value of $23^2 - 13^2$?

4. If a square of side length 4 units is placed on top of a square of side length 6 units, what is the area of the non-overlapping region?

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**The Problems**

*Take a look at the following problems and follow along as they are explained in the video.*

5. What is the value of $4^2 - 3^2$?

6. What is the value of $212^2 - 211^2$?
Use the skills you practiced in the warm-up and strategies from the video to solve the following problems.

7. What is the value of $2115^2 - 2114^2$?

8. If $x \circ y$ is defined as $x^2 - y^2$, what is the value of $65 \circ (8 \circ 3)$?

9. What is the value of $(12^2 - 11^2)^2$?

10. What is the value of $4^4 - 3^4$?

11. What is the value of $25^2 - (25 - 5)(25 + 5)$?

12. What is the value of the expression $\frac{20^2 - 1}{19}$?
Optional Extension

To extend your understanding and have a little fun with math, try the following activities.

**Option 1**
See if you can apply the difference of squares formula to find a quicker solution (*hint: you don’t have to solve for the unknown*) to the following algebra problems:

If $2x + 3 = 1000$, what is the value of $4x^2 - 9$?

If $a - 2 = 6$, then what is the value of $a^4 - 4a^2$?

If $x - y = 2$ and $x^2 - y^2 = (55)(59) - (53)(57)$, what is the value of $x + y$?

**Option 2**
Similar to difference of squares, there is an identity formula for a difference of cubes.

$$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$$

Using a geometric representation of difference of cubes, similar to the approach used to derive the difference of squares formula in the video, prove the difference of cubes formula to be true.