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Study Guide and Intervention

Special Products

Squares of Sums and Differences Some pairs of binomials have products that follow specific patterns. One such pattern is called the *square of a sum*. Another is called the *square of a difference*.

Square of a sum	$(a + b)^2 = (a + b)(a + b) = a^2 + 2ab + b^2$
Square of a difference	$(a - b)^2 = (a - b)(a - b) = a^2 - 2ab + b^2$

Example 1 **Find $(3a + 4)(3a + 4)$.**

Use the square of a sum pattern, with $a = 3a$ and $b = 4$.

$$(3a + 4)(3a + 4) = (3a)^2 + 2(3a)(4) + (4)^2$$
$$= 9a^2 + 24a + 16$$

The product is $9a^2 + 24a + 16$.

Example 2 **Find $(2z - 9)(2z - 9)$.**

Use the square of a difference pattern with $a = 2z$ and $b = 9$.

$$(2z - 9)(2z - 9) = (2z)^2 - 2(2z)(9) + (9)(9)$$
$$= 4z^2 - 36z + 81$$

The product is $4z^2 - 36z + 81$.

Exercises

Find each product.

1. $(x - 6)^2$

2. $(3p + 4)^2$

3. $(4x - 5)^2$

4. $(2x - 1)^2$

5. $(2h + 3)^2$

6. $(m + 5)^2$

7. $(c + 3)^2$

8. $(3 - p)^2$

9. $(x - 5y)^2$

10. $(8y + 4)^2$

11. $(8 + x)^2$

12. $(3a - 2b)^2$

13. $(2x - 8)^2$

14. $(x^2 + 1)^2$

15. $(m^2 - 2)^2$

16. $(x^3 - 1)^2$

17. $(2h^2 - k^2)^2$

18. $\left(\frac{1}{4}x + 3\right)^2$

19. $(x - 4y^2)^2$

20. $(2p + 4q)^2$

21. $\left(\frac{2}{3}x - 2\right)^2$

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Study Guide and Intervention *(continued)*

Special Products

Product of a Sum and a Difference There is also a pattern for the product of a sum and a difference of the same two terms, $(a + b)(a - b)$. The product is called the **difference of squares.**

Product of a Sum and a Difference	$(a + b)(a - b) = a^2 - b^2$

Example **Find $(5x + 3y)(5x - 3y)$.**

$(a + b)(a - b) = a^2 - b^2$ Product of a Sum and a Difference

$(5x + 3y)(5x - 3y) = (5x)^2 - (3y)^2$ $a = 5x$ and $b = 3y$

$= 25x^2 - 9y^2$ Simplify.

The product is $25x^2 - 9y^2$.

Exercises

Find each product.

1. $(x - 4)(x + 4)$

2. $(p + 2)(p - 2)$

3. $(4x - 5)(4x + 5)$

4. $(2x - 1)(2x + 1)$

5. $(h + 7)(h - 7)$

6. $(m - 5)(m + 5)$

7. $(2c - 3)(2c + 3)$

8. $(3 - 5q)(3 + 5q)$

9. $(x - y)(x + y)$

10. $(y - 4x)(y + 4x)$

11. $(8 + 4x)(8 - 4x)$

12. $(3a - 2b)(3a + 2b)$

13. $(3y - 8)(3y + 8)$

14. $(x^2 - 1)(x^2 + 1)$

15. $(m^2 - 5)(m^2 + 5)$

16. $(x^3 - 2)(x^3 + 2)$

17. $(h^2 - k^2)(h^2 + k^2)$

18. $\left(\frac{1}{4}x + 2\right)\left(\frac{1}{4}x - 2\right)$

19. $(3x - 2y^2)(3x + 2y^2)$

20. $(2p - 5s)(2p + 5s)$

21. $\left(\frac{4}{3}x - 2y\right)\left(\frac{4}{3}x + 2y\right)$