**8-4 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*.

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| **Square of a Sum** | $(a + b)^{2}$ = (*a* + *b*)(*a* + *b*) = $a^{2}$+ 2*ab* + $b^{2}$ |
| **Square of a Difference** | $(a - b)^{2}$ = (*a* – *b*)(*a* – *b*) = $a^{2}$– 2*ab* + $b^{2}$ |

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

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

(3*a* + 4)(3*a* + 4) = $(3a)^{2}$ + 2(3*a*)(4) + $(4)^{2}$

 = 9*a*2 + 24*a* + 16

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

**Example 2: Find (2*z* – 9)(2*z* – 9).**

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

(2*z* – 9)(2*z* – 9) = $(2z)^{2}$– 2(2*z*)(9) + (9)(9)

 = 4$z^{2}$ – 36*z* + 81

The product is 4$z^{2}$ – 36*z* + 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.**$(a+3)^{2}$ **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.** $(2p + 4r)^{2}$ **21.** $\left(\frac{2}{3}x-2\right)^{2}$

**8-4 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 (5*x* + 3*y*)(5*x* – 3*y*).**

(*a* + *b*)(*a* – *b*) = $a^{2}$ – $b^{2}$ Product of a Sum and a Difference

(5*x* + 3*y*)(5*x* – 3*y*) = $(5x)^{2}$ – $(3y)^{2}$ *a* = 5*x* and *b* = 3*y*

 = 25$x^{2}$ – 9$y^{2}$ Simplify.

The product is 25$x^{2}$ – 9$y^{2}$.

**Exercises**

**Find each product.**

 **1.** (*x* – 4)(*x* + 4) **2.** (*p* + 2)( *p* – 2) **3.** (4*x* – 5)(4*x* + 5)

 **4.** (2*x* – 1)(2*x* + 1) **5.** (*h* + 7)(*h* – 7) **6.** (*m* – 5)(*m* + 5)

 **7.** (2*d* – 3)(2*d* + 3) **8.** (3 – 5*q*)(3 + 5*q*) **9.** (*x* – *y*)(*x* + *y*)

**10.** ( *y* – 4*x*)( *y* + 4*x*) **11.** (8 + 4*x*)(8 – 4*x*) **12.** (3*a* – 2*b*)(3*a* + 2*b*)

**13.** (3*y* – 8)(3*y* + 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.** (3*x* – 2$y^{2}$)(3*x* + 2$y^{2}$) **20.** (2*p* – 5*r*)(2*p* + 5*r*) **21.** $\left(\frac{4}{3}x-2y\right)\left(\frac{4}{3}x+2y\right)$