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8-3 Study Guide and Intervention

Multiplying Polynomials

Multiply Binomials To multiply two binomials, you can apply the Distributive Property twice. A useful way to keep track of terms in the product is to use the FOIL method as illustrated in Example 2.

Example 1 **Find $(x + 3)(x - 4)$.**

Horizontal Method

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

$= x(x - 4) + 3(x - 4)$

$= (x)(x) + x(-4) + 3(x) + 3(-4)$

$= x^2 - 4x + 3x - 12$

$= x^2 - x - 12$

Vertical Method

$$\begin{array}{r} x + 3 \\ (\times)\quad x - 4 \\ \hline -4x - 12 \\ x^2 + 3x \\ \hline x^2 - x - 12 \end{array}$$

The product is $x^2 - x - 12$.

Example 2 **Find $(x - 2)(x + 5)$ using the FOIL method.**

$(x - 2)(x + 5)$

First Outer Inner Last

$= (x)(x) + (x)(5) + (-2)(x) + (-2)(5)$

$= x^2 + 5x + (-2x) - 10$

$= x^2 + 3x - 10$

The product is $x^2 + 3x - 10$.

Exercises

Find each product.

1. $(x + 2)(x + 3)$
$x^2 + 5x + 6$

2. $(x - 4)(x + 1)$
$x^2 - 3x - 4$

3. $(x - 6)(x - 2)$
$x^2 - 8x + 12$

4. $(p - 4)(p + 2)$
$p^2 - 2p - 8$

5. $(y + 5)(y + 2)$
$y^2 + 7y + 10$

6. $(2x - 1)(x + 5)$
$2x^2 + 9x - 5$

7. $(3n - 4)(3n - 4)$
$9n^2 - 24n + 16$

8. $(8m - 2)(8m + 2)$
$64m^2 - 4$

9. $(k + 4)(5k - 1)$
$5k^2 + 19k - 4$

10. $(3x + 1)(4x + 3)$
$12x^2 + 13x + 3$

11. $(x - 8)(-3x + 1)$
$-3x^2 + 25x - 8$

12. $(5t + 4)(2t - 6)$
$10t^2 - 22t - 24$

13. $(5m - 3n)(4m - 2n)$
$20m^2 - 22mn + 6n^2$

14. $(a - 3b)(2a - 5b)$
$2a^2 - 11ab + 15b^2$

15. $(8x - 5)(8x + 5)$
$64x^2 - 25$

16. $(2n - 4)(2n + 5)$
$4n^2 + 2n - 20$

17. $(4m - 3)(5m - 5)$
$20m^2 - 35m + 15$

18. $(7g - 4)(7g + 4)$
$49g^2 - 16$

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8-3 Study Guide and Intervention *(continued)*

Multiplying Polynomials

Multiply Polynomials The Distributive Property can be used to multiply any two polynomials.

Example **Find $(3x + 2)(2x^2 - 4x + 5)$.**

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

$= 3x(2x^2 - 4x + 5) + 2(2x^2 - 4x + 5)$ Distributive Property

$= 6x^3 - 12x^2 + 15x + 4x^2 - 8x + 10$ Distributive Property

$= 6x^3 - 8x^2 + 7x + 10$ Combine like terms.

The product is $6x^3 - 8x^2 + 7x + 10$.

Exercises

Find each product.

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

2. $(x + 3)(2x^2 + x - 3)$
$2x^3 + 7x^2 - 9$

3. $(2x - 1)(x^2 - x + 2)$
$2x^3 - 3x^2 + 5x - 2$

4. $(p - 3)(p^2 - 4p + 2)$
$p^3 - 7p^2 + 14p - 6$

5. $(3k + 2)(k^2 + k - 4)$
$3k^3 + 5k^2 - 10k - 8$

6. $(2t + 1)(10t^2 - 2t - 4)$
$20t^3 + 6t^2 - 10t - 4$

7. $(3n - 4)(n^2 + 5n - 4)$
$3n^3 + 11n^2 - 32n + 16$

8. $(8x - 2)(3x^2 + 2x - 1)$
$24x^3 + 10x^2 - 12x + 2$

9. $(2a + 4)(2a^2 - 8a + 3)$
$4a^3 - 8a^2 - 26a + 12$

10. $(3x - 4)(2x^2 + 3x + 3)$
$6x^3 + x^2 - 3x - 12$

11. $(n^2 + 2n - 1)(n^2 + n + 2)$
$n^4 + 3n^3 + 3n^2 + 3n - 2$

12. $(t^2 + 4t - 1)(2t^2 - t - 3)$
$2t^4 + 7t^3 - 9t^2 - 11t + 3$

13. $(y^2 - 5y + 3)(2y^2 + 7y - 4)$
$2y^4 - 3y^3 - 33y^2 + 41y - 12$

14. $(3b^2 - 2b + 1)(2b^2 - 3b - 4)$
$6b^4 - 13b^3 - 4b^2 + 5b - 4$