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Multiplying Polynomials
For use with Exploration 7.2

Essential Question   How can you multiply two polynomials?

1 **EXPLORATION:** Multiplying Monomials Using Algebra Tiles

Work with a partner. Write each product. Explain your reasoning.

a. [+] • [+] = _____

b. [+] • [−] = _____

c. [−] • [−] = _____

d. [+] • [+] = _____

e. [+] • [−] = _____

f. [−] • [+] = _____

g. [−] • [−] = _____

h. [+] • [+] = _____

i. [+] • [−] = _____

j. [−] • [−] = _____

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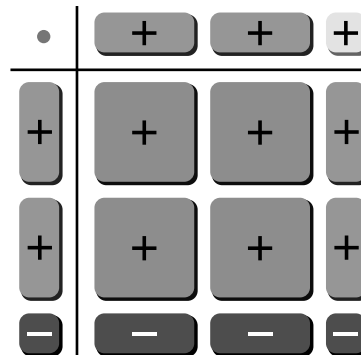**2** **EXPLORATION:** Multiplying Binomials Using Algebra Tiles

Go to *BigIdeasMath.com* for an interactive tool to investigate this exploration.

Work with a partner. Write the product of two binomials modeled by each rectangular array of algebra tiles. In parts (c) and (d), first draw the rectangular array of algebra tiles that models each product.
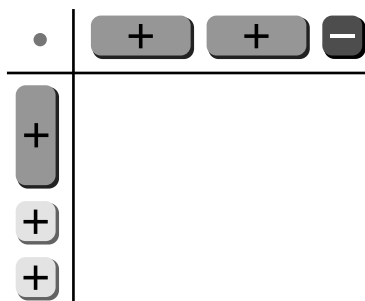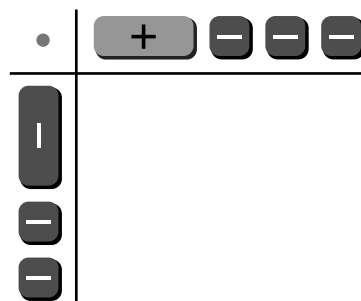
a. $(x + 3)(x - 2) =$ _____
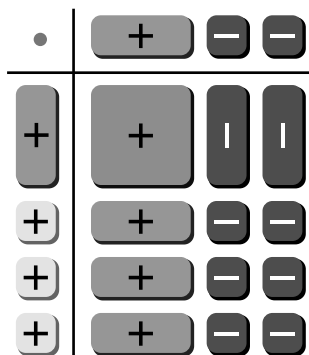
b. $(2x - 1)(2x + 1) =$ _____

c. $(x + 2)(2x - 1) =$ _____

d. $(-x - 2)(x - 3) =$ _____

Communicate Your Answer

3. How can you multiply two polynomials?

4. Give another example of multiplying two binomials using algebra tiles that is similar to those in Exploration 2.

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<table>
<tr><td>**7.2**</td><td>**Practice**
For use after Lesson 7.2</td></tr>
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Core Concepts

FOIL Method

To multiply two binomials using the FOIL Method, find the sum of the products of the

First terms, $(x + 1)(x + 2)$ ➡ $x(x) = x^2$

Outer terms, $(x + 1)(x + 2)$ ➡ $x(2) = 2x$

Inner terms, and $(x + 1)(x + 2)$ ➡ $1(x) = x$

Last terms. $(x + 1)(x + 2)$ ➡ $1(2) = 2$

$$(x + 1)(x + 2) = x^2 + 2x + x + 2 = x^2 + 3x + 2$$

Notes:

Worked-Out Examples

Example #1

Use a table to find the product.

$(c - 6)(c - 5) = [\, c + (-6)\,][\, c + (-5)\,]$

	c	-6
c	c^2	$-6c$
-5	$-5c$	30

$c^2 - 6c - 5c + 30 = c^2 - 11c + 30$

Example #2

Use the FOIL Method to find the product.

$\qquad\qquad\quad$ First $\quad$ Outer $\quad$ Inner $\quad$ Last

$(w + 5)(w^2 + 3w) = w(w^2) + w(3w) + 5(w^2) + 5(3w)$

$\qquad\qquad\qquad = w^3 + 3w^2 + 5w^2 + 15w$

$\qquad\qquad\qquad = w^3 + 8w^2 + 15w$

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Practice A

In Exercises 1–6, use the Distributive Property to find the product.

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

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

3. $(g + 2)(g + 4)$

4. $(a - 1)(2a + 5)$

5. $(3n - 4)(n + 1)$

6. $(r + 3)(3r + 2)$

In Exercises 7–12, use a table to find the product.

7. $(x - 3)(x - 2)$

8. $(y + 1)(y - 6)$

9. $(q + 3)(q + 7)$

10. $(2w - 5)(w - 3)$

11. $(6h - 2)(-3 - 2h)$

12. $(-3 + 4j)(3j + 4)$

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In Exercises 13–18, use the FOIL Method to find the product.

13. $(x + 2)(x - 3)$ **14.** $(z + 3)(z + 2)$ **15.** $(h - 2)(h + 4)$

16. $(2m - 1)(m + 2)$ **17.** $(4n - 1)(3n + 4)$ **18.** $(-q - 1)(q + 1)$

In Exercises 19–24, find the product.

19. $(x - 2)(x^2 + x - 1)$ **20.** $(2 - a)(3a^2 + 3a - 5)$ **21.** $(h + 1)(h^2 - h - 1)$

22. $(d + 3)(d^2 - 4d + 1)$ **23.** $(3n^2 + 2n - 5)(2n + 1)$ **24.** $(2p^2 + p - 3)(3p - 1)$

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Practice B

In Exercises 1–3, use the Distributive Property to find the product.

1. $(p - 5)(p - 8)$

2. $(5t + 1)(t - 2)$

3. $(4v - 3)(v + 7)$

In Exercises 4–6, use a table to find the product.

4. $(2p + 4)(5p - 1)$

5. $(-4 + 3r)(7r - 2)$

6. $(4t - 9)(-6 + 2t)$

7. Describe and correct the error in finding the product of the binomials.

$\times$ $(x - 2)(5 - x)$

	5	**− x**
x	$5x$	$-x^2$
−2	-10	$2x$

$(x - 2)(5 - x) = 4x^2 + 2x - 10$

In Exercises 8–13, use the FOIL Method to find the product.

8. $(z + 9)(z - 8)$

9. $\left(m - \frac{2}{5}\right)\left(m + \frac{4}{5}\right)$
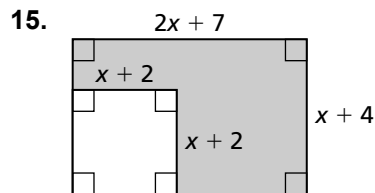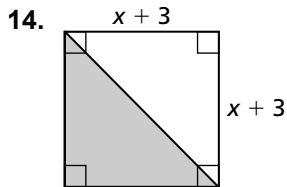
10. $(4 - x)(8 - 3x)$

11. $(9g^2 - 6)(2g^2 + 3)$

12. $(p + 4)(p^2 + 7p)$

13. $(d - 2)(d^2 - 5d)$

In Exercises 14 and 15, write a polynomial that represents the area of the shaded region.

14.

$x + 3$

$x + 3$

15.

$2x + 7$

$x + 2$

$x + 2$

$x + 4$

In Exercises 16–18, find the product.

16. $(x + 10)(3x^2 + 5x - 2)$

17. $(2t^2 - 9t - 5)(3t + 7)$

18. $(3r^2 + 3r - 8)(5 - 2r)$

19. Write two polynomials that are not monomials, whose product is a trinomial of degree 4.