Simplify.

1. $(6 + 2b)8$ — $8(6+2b)$, $48+16b$
2. $2(6x - 3)$ — $12x-6$
3. $(-4x + 7)4$ — $4(-4x+7)$, $-16x+28$
4. $-2(y^3 + 6)$ — $-2y^3-12$
5. $-\frac{3}{2}(8x + 16y)$ — $-\frac{3}{2}(\overset{8}{8x})+-\frac{3}{2}(\overset{8}{16y})$, $-24x - 24y$
6. $4(x - 3x)5$ — $4(x-3x)5$, $20(x-3x)$, $20(-2x)$, $-40x$

Warm Up

- Review of distributive property
- remember you can rewrite if you have multiplication
- Simplify when you can before multiplying.

Determine whether the table represents a *linear* or an *exponential* function. Explain.

1.

x	2	3	4	5	6
y	−3	−2	−1	0	1

(+1 +1 +1 +1 / +1 +1 +1 +1)

Linear

Constant rate of change

2.

x	0	1	2	3	4
y	0.125	1	8	64	512

(+1 +1 +1 +1 / ×8 ×8 ×8 ×8)

Exponential

Increasing by multiples of 8

Cumulative Warm Up

Rate of Change = Slope

* Make sure to check domain (x-values) and range (y-values)

Essential Question

How can you multiply two polynomials?

- multiple ways
  - vertical
  - horizontal
  - Foil
  - area model
  - double distributive

Essential Question

What you will learn:

- Multiply binomials
- Use foil method
- multiply binomials and trinomials.

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

a. $+ \cdot + =$ ____

b. $+ \cdot - =$ ____

c. $- \cdot - =$ ____

d. $+x \cdot + =$ ____

e. $+x \cdot - =$ ____

f. $-x \cdot + =$ ____

g. $-x \cdot - =$ ____

h. $+x \cdot +x =$ ____

i. $+x \cdot -x =$ ____

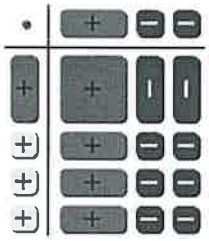
j. $-x \cdot -x =$ ____

Exploration 1

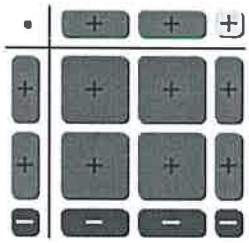
- review signed number multiplication rules

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. $(x + 3)(x - 2) =$



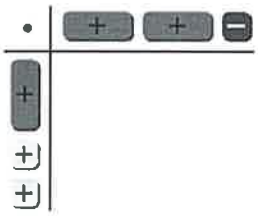
b. $(2x - 1)(2x + 1) =$



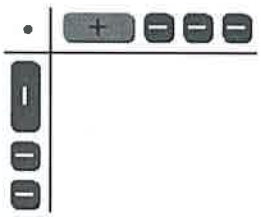
Exploration 2a-b

- area models
- can use online algebra tiles

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



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



Exploration 2c-d

- demonstrate w/ online algebra tiles

OR

- use algebra tiles in class w/ students

Find (a) $(x + 2)(x + 5)$ and (b) $(x + 3)(x - 4)$.

	x	$+2$
x	x^2	$2x$
$+5$	$5x$	10

$x^2 + 10x + 10$

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

$x^2 - x - 12$

Example 1

- Use area model to multiply

Find $(2x - 3)(x + 5)$.

	$2x$	-3
x	$2x^2$	$-3x$
$+5$	$10x$	-15

$2x^2 + 7x - 15$

Example 2

* Student practice

- discuss other methods
- Show vertical and Foil
- relationship between all methods

Use the Distributive Property to find the product.

1. $(y + 4)(y + 1)$

$y^2 + 5y + 4$

2. $(z - 2)(z + 6)$

$z^2 + 4z - 12$

Use a table to find the product.

3. $(p + 3)(p - 8)$

$p^2 - 5p - 24$

4. $(r - 5)(2r - 1)$

$2r^2 - 11r + 5$

Monitoring Progress 1-4

* Student practice *

Core Concept

FOIL Method

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

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

Outer terms, $(x + 1)(x + 2) \rightarrow x(2) = 2x$

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

Last terms, $(x + 1)(x + 2) \rightarrow 1(2) = 2$

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

Core Concept

* Foil

Find each product.

a. $(x - 3)(x - 6)$

$x^2 - 6x - 3x + 18$

$x^2 - 9x + 18$

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

$6x^2 - 10x + 3x - 5$

$6x^2 - 7x - 5$

Example 3

* watch for like terms

Use the FOIL Method to find the product.

5. $(m - 3)(m - 7)$

$m^2 - 10m + 21$

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

$x^2 - 2x - 8$

7. $\left(2u + \frac{1}{2}\right)\left(u - \frac{3}{2}\right)$

$2u^2 - \frac{5}{2}u - \frac{3}{4}$

8. $(n + 2)(n^2 + 3)$

$n^3 + 2n^2 + 3n + 6$

Monitoring Progress 5-8

* Student practice

* can also show vertical.

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

	x^2	$-3x$	-2
x	x^3	$-3x^2$	$-2x$
$+5$	$5x^2$	$-15x$	-10

$x^3 + 2x^2 - 17x - 10$

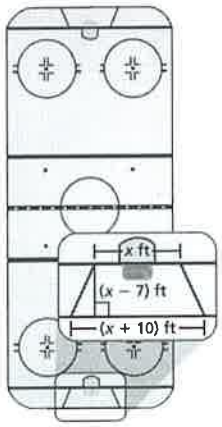
Example 4

- Use area model no matter how many terms
- Always make sure both polynomials are in standard form
- Use place holders as needed

In hockey, a goalie behind the goal line can only play a puck in the trapezoidal region.

a. Write a polynomial that represents the area of the trapezoidal region.

b. Find the area of the trapezoidal region when the shorter base is 18 feet.



Example 5

a) $\frac{1}{2}h(b_1 + b_2) = \frac{1}{2}(x-7)[x + (x+10)]$

$= \frac{1}{2}(x-7)(2x+10)$

$= \frac{1}{2}[2x^2 + 10x - 14x - 70]$

$= \frac{1}{2}(2x^2 - 4x - 70)$

$= x^2 - 2x - 35$

b) $x^2 - 2x - 35$ when $x = 18$

$(18)^2 - 2(18) - 35$

$324 - 36 - 35$

253 square feet

Find the product.

9. $(x + 1)(x^2 + 5x + 8)$ $x^3 + 6x^2 + 13x + 8$

10. $(n - 3)(n^2 - 2n + 4)$ $n^3 - 5n^2 + 10n - 12$

11. WHAT IF? In Example 5(a), how does the polynomial change when the longer base is extended by 1 foot? Explain.

It becomes $x^2 - \frac{3}{2}x - \frac{77}{2}$; the longer base becomes $(x+11)$. When substituting the new values in, the terms will change.

* Student practice

- **Point of Most Significance:** Ask students to identify, aloud or on a paper to be collected, the most significant point (or part) in the lesson that aided their learning.

Closure