Simplify.

1. $(y-5)^2$ $(y-5)(y-5)$ $y^2-10y+25$
2. $(x+1)^2$ $(x+1)(x+1)$ x^2+2x+1
3. $(3x-7)^2$ $(3x-7)(3x-7)$ $9x^2-42x+49$
4. $(x-2y)^2$ $(x-2y)(x-2y)$ $x^2-4xy+4y^2$
5. $(4x-9y)^2$ $(4x-9y)(4x-9y)$ $16x^2-72x+81$
6. $(2x-7)^2$ $(2x-7)(2x-7)$ $4x^2-28x+49$

Warm Up

Review of exponents and double distributive

* don't just distribute the exponent - the exponent affects the base

Solve by substitution.

1. $2x+3y=7$, $x=2$ $(2,1)$ $2(2)+3y=7$, $4+3y=7$, $3y=3$, $y=1$
2. $y=x+2$, $x=6-y$ $y=(6-y)+2$, $2y=8$, $y=4$, $x=6-4$, $x=2$, $(2,4)$
3. $y=4+x$, $y=-3x+8$ $-3x+8=4+x$, $4=4x$, $1=x$, $y=4+1$, $y=5$, $(1,5)$
4. $x+y=2$, $x=y+2$ $(y+2)+y=2$, $2y=0$, $y=0$, $x=0+2$, $x=2$, $(2,0)$

Cumulative Warm Up

* Practice Substitution

Essential Question

How can you recognize and factor special products?

- Difference of a Squares
  - * subtraction
  - * 2 terms
  - # both terms perfect squares
- Perfect Square trinomials
  - * three terms
  - * 2 terms perfect squares
  - * ax^2+bx+c
  - * ax^2-bx+c

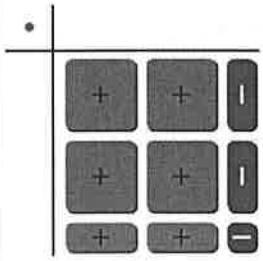
Essential Question

What you will learn:

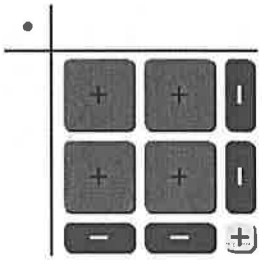
- Factor the difference of 2 squares
- Factor perfect square trinomials
- Use factoring for real life problems

Work with a partner. Use algebra tiles to write each polynomial as the product of two binomials. Check your answer by multiplying. State whether the product is a "special product" that you studied in Section 7.3.

a. $4x^2 - 1 =$



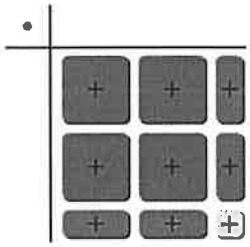
b. $4x^2 - 4x + 1 =$



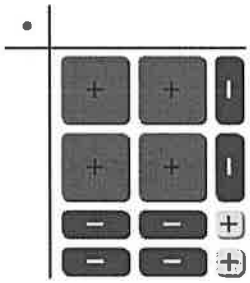
Exploration 1a-b

* skip

c. $4x^2 + 4x + 1 =$



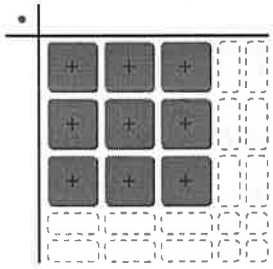
d. $4x^2 - 6x + 2 =$



Exploration 1c-d

* skip

Work with a partner. Use algebra tiles to complete the rectangular array at the left in three different ways, so that each way represents a different special product. Write each special product in standard form and in factored form.



Exploration 2

* skip

Core Concept

Difference of Two Squares Pattern

Algebra	Example
$a^2 - b^2 = (a + b)(a - b)$	$x^2 - 9 = x^2 - 3^2 = (x + 3)(x - 3)$

$x^2 + 0x - 9$

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

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

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

$-9 \cdot 1 = -9$ sum 0

$-1\ 9$ 8

$-3\ 3$ 0

$1\ -9$ -8

- ac method will work: need to use a place holder for b term → use 0x

Core Concept

Factor (a) $x^2 - 25$ and (b) $4z^2 - 1$.

-25

$-1\ 25$

$-5\ 5$

$1\ -25$

$x^2 + 0x - 25$

$(x^2 - 5x + 5x - 25)$

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

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

$4z^2 - 1$

$2z \cdot 2z$ $1 \cdot 1$

$(2z - 1)(2z + 1)$

- difference of 2 squares
- 1 factor of each square
- 1 positive binomial (+)
- 1 negative binomial (-)

Example 1

Use a special product pattern to evaluate the expression $54^2 - 48^2$.

$54^2 - 48^2$

$54 \cdot 54$ $48 \cdot 48$

$(54 + 48)(54 - 48)$

Example 2

Factor the polynomial.

1. $x^2 - 36$ 2. $100 - m^2$ 3. $9n^2 - 16$ 4. $16h^2 - 49$

Use a special product pattern to evaluate the expression.

5. $36^2 - 34^2$ 6. $47^2 - 44^2$ 7. $55^2 - 50^2$ 8. $28^2 - 24^2$

Monitoring Progress 1-8

* Student practice

Core Concept

Perfect Square Trinomial Pattern

Algebra	Example
$a^2 + 2ab + b^2 = (a + b)^2$	$x^2 + 6x + 9 = x^2 + 2(x)(3) + 3^2 = (x + 3)^2$
$a^2 - 2ab + b^2 = (a - b)^2$	$x^2 - 6x + 9 = x^2 - 2(x)(3) + 3^2 = (x - 3)^2$

Core Concept

- always has to be in the form

$ax^2 + bx + c$

or

$ax^2 - bx + c$

* c term always has to be positive

Factor each polynomial.

a. $n^2 + 8n + 16$ b. $4x^2 - 12x + 9$

$n \cdot n$ $4 \cdot 4$ $4n \cdot 2$ $8n$

$(n + 4)(n + 4)$

$2x \cdot 2x$ $3 \cdot 3$ $6x \cdot 2$ $12x$

$(2x - 3)(2x - 3)$

Example 3

* always check the b term! must be:

1 factor from first
x 1 factor from last
product
doubled = b term

Solve $x^2 + \frac{2}{3}x + \frac{1}{9} = 0$.

$9(x^2 + \frac{2}{3}x + \frac{1}{9})9$

$9x^2 + 6x + 1 = 0$

$3x \cdot 3x \quad 1 \cdot 1$

$3x \cdot 2 = 6x$

$(3x + 1)(3x + 1) = 0$

$3x + 1 = 0 \quad 3x = -1$

$x = -\frac{1}{3}$

Example 4

* Clear fractions

*Remember = means solve! We need to find a value for the variable

Factor the polynomial.

9. $m^2 - 2m + 1$ **10.** $d^2 - 10d + 25$ **11.** $9z^2 + 36z + 36$

Solve the equation.

12. $a^2 + 6a + 9 = 0$ **13.** $w^2 - \frac{7}{3}w + \frac{49}{36} = 0$ **14.** $n^2 - 81 = 0$

Monitoring Progress 9-14

* Student practice

A bird picks up a golf ball and drops it while flying. The function represents the height y (in feet) of the golf ball t seconds after it is dropped. The ball hits the top of a 32-foot-tall pine tree. After how many seconds does the ball hit the tree?

Example 5

15. WHAT IF? The golf ball does not hit the pine tree. After how many seconds does the ball hit the ground?

Monitoring Progress 15

• **Exit Ticket:** Factor each polynomial.

a. $81 - x^2$

b. $x^2 - 24x + 144$

Closure