Warmup $5/(18 \cdot 9 - 17 \cdot 9)$

1. $(6s^2t^2)(3st)$
2. $4xy^2(x + y)$
3. $(x + 2)(x - 8)$
4. $(2x - 7)(x^2 + 3x - 4)$

CHECK HOMEWORK

Objective

Find special products of binomials.

How do you think this would work???

$$(x + 3)^2$$

A perfect-square trinomial is a trinomial that is the result of squaring a binomial.

Do You See a Pattern?

Multiply.

A. $(x + 3)^2 = x^2 + 6x + 9$

B. $(4s + 3t)^2 = 16s^2 + 24st + 9t^2$

Do You See a Pattern?

Multiply.

A. $(x + 6)^2 = x^2 + 12x + 36$

B. $(5a + b)^2 = 25a^2 + 10ab + b^2$

Can you apply the pattern here?

Multiply.

A. $(x - 6)^2$

$(a - b)^2 = a^2 - 2ab + b^2$

$(x - 6)^2 = x^2 - 2x(6) + (6)^2$

$= x^2 - 12x + 36$

B. $(4m - 10)^2$

$(a - b)^2 = a^2 - 2ab + b^2$

$(4m - 10)^2 = (4m)^2 - 2(4m)(10) + (10)^2$

$= 16m^2 - 80m + 100$

Can you apply the pattern here?

Multiply.

C. $(2x - 5y)^2$

$(a - b)^2 = a^2 - 2ab + b^2$

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

$= 4x^2 - 20xy + 25y^2$

D. $(7 - r^3)^2$

$(a - b)^2 = a^2 - 2ab + b^2$

$(7 - r^3)^2 = 7^2 - 2(7)(r^3) + (r^3)^2$

$= 49 - 14r^3 + r^6$

Difference of Squares:
It is the result of multiplying $(a - b)(a + b)$.

Do You See a Pattern?

Multiply.

A. $(x + 4)(x - 4) = x^2 - 16$

B. $(p^2 + 8q)(p^2 - 8q) = p^4 - 64q^2$

Special Products of Binomials

Perfect-Square Trinomials

$(a + b)^2 = (a + b)(a + b) = a^2 + 2ab + b^2$

$(a - b)^2 = (a - b)(a - b) = a^2 - 2ab + b^2$

Difference of Two Squares

$(a + b)(a - b) = a^2 - b^2$

To Multiply a Binomial by a Trinomial

- Multiply every term in the binomial by every term in the trinomial

Multiply.

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

$= x(x^2)+x(2x)+x(4)+4(x^2)+4(2x)+4(4)$

$=x^3+2x^2+4x+4x^2+8x+16$

$=x^3+6x^2+12x+16$

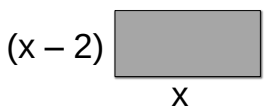
To Multiply any Polynomials

- Multiply every term of the first polynomial by every term of the second polynomial

WORD PROBLEM

The width of a rectangle is 2 meters shorter than its length.

A. Draw a picture, and write an expression for the area of the rectangle.



$A= x(x – 2)$
$A =x^2 – 2x$

B. Find the area of a rectangle when the length is 6 meters.

$A = 6^2 – 2(6)$
$A = 36 – 12$
$A = 24$

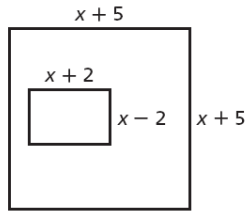
CHALLENGE

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

- Multiply the first two binomials
- $=[x^2+x(2)+2(x)+2(2)](x-2)$
- $=(x^2+4x+4)(x-2)$
- Multiply the resulting trinomial and binomial
- $=x^2(x)+(x^2)(-2)+4x(x)+4x(-2)+4(x)+4(-2)$
- $=x^3-2x^2+4x^2-8x+4x-8$
- $=x^3+2x^2-4x-8$

PROBLEM SOLVING

Write a polynomial that represents the area of the yard around the pool shown below.



Solve

Step 1 Find the total area.

$(x+5)^2 = x^2 + 2(x)(5) + 5^2$
$= x^2 + 10x + 25$

Use the rule for $(a+b)^2$: $a = x$ and $b = 5$.

Step 2 Find the area of the pool.

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

Use the rule for $(a+b)(a-b)$: $a = x$ and $b = 2$.

Solve

Step 3 Find the area of the yard around the pool.

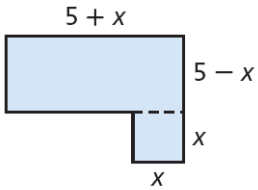
Area of yard = total area − area of pool

$a = x^2 + 10x + 25 - (x^2 - 4)$
$= x^2 + 10x + 25 - x^2 + 4$ *Identify like terms.*
$= (x^2 - x^2) + 10x + (25 + 4)$ *Group like terms together*
$= 10x + 29$

The area of the yard around the pool is $10x + 29$.

PROBLEM SOLVING

Write an expression that represents the area of the swimming pool.



3 Solve

Step 1 Find the area of the upper rectangle.

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

Use the rule for $(a+b)(a-b)$: $a = 5$ and $b = x$.

Step 2 Find the area of the lower square.

$= x \cdot x$
$= x^2$

3 Solve

Step 3 Find the area of the pool.

Area of pool = rectangle area + square area

$a = -x^2 + 25 + x^2$

$= -x^2 + 25 + x^2$ *Identify like terms.*

$= (x^2 - x^2) + 25$ *Group like terms together*

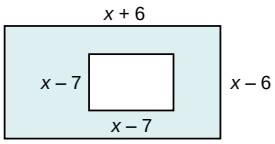
$= 25$

The area of the pool is 25.

Multiply.

1. $(x + 7)^2$ $x^2 + 14x + 49$
2. $(x - 2)^2$ $x^2 - 4x + 4$
3. $(5x + 2y)^2$ $25x^2 + 20xy + 4y^2$
4. $(2x - 9y)^2$ $4x^2 - 36xy + 81y^2$
5. $(4x + 5y)(4x - 5y)$ $16x^2 - 25y^2$
6. $(m^2 + 2n)(m^2 - 2n)$ $m^4 - 4n^2$

7. Write a polynomial that represents the shaded area of the figure below.



$14x - 85$

HOMEWORK

Worksheet