## Warm Up- Simplify!

- $(2x^3y^2)(3x^2y)$

- $(5x^5y)(10x^2y^2)$

- $2(x+3)$

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

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Some polynomials have special names based on their degree and the number of terms they have.

WHY???

| Degree | Name |
|--------|------|
| 0 | **Constant** |
| 1 | **Linear** |
| 2 | **Quadratic** |
| 3 | **Cubic** |
| 4 | **Quartic** |
| 5 | **Quintic** |
| 6 or more | **6th,7th,degree and so on** |

| Terms | Name |
|-------|------|
| 1 | **Monomial** |
| 2 | **Binomial** |
| 3 | **Trinomial** |
| 4 or more | **Polynomial** |

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## Quiz Thursday

- Know
  - Adding and Subtracting Polynomials
  - Multiplying Polynomials

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## What is the ***DISTRIBUTIVE PROPERTY***?

$5(x + 3)$

$= 5x + 15$

x      3

5 | 5x | 15

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## Multiply.

### $6pq(2p - q)$

$(6pq)(2p - q)$

$(6pq)2p + (6pq)(-q)$

$(6 \cdot 2)(p \cdot p)(q) + (-1)(6)(p)(q \cdot q)$

$12p^2q - 6pq^2$

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## Multiply.

### $3ab(5a^2 + b)$

$3ab(5a^2 + b)$

$(3ab)(5a^2) + (3ab)(b)$

$(3 \cdot 5)(a \cdot a^2)(b) + (3)(a)(b \cdot b)$

$15a^3b + 3ab^2$

**Multiply.**

$$4(3x^2 + 4x - 8)$$

$4(3x^2 + 4x - 8)$

$(4)3x^2 + (4)4x - (4)8$

$12x^2 + 16x - 32$

Multiply

$$6x^3(5x^2 - 3x + 2)$$

Multiply

$$4x^2y(x^3 + 2y^2 + 3xy)$$
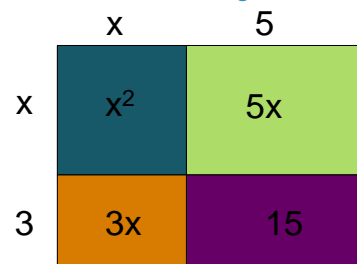
Multiply

$$(20x^2 - 5x + 10)(4xy)$$

Multiply

$$x^2(2x^4 + 3x^3y^2 + 8xy + 12y)$$
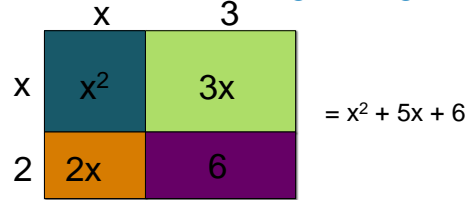
How can we find the area of the big rectangle?

| | x | 5 |
|---|---|---|
| x | $x^2$ | 5x |
| 3 | 3x | 15 |

(x+5)(x+3)= $x^2 + 8x + 15$

## To Multiply a Binomial by a Binomial

• Multiply every term of the first binomial by every term of the second binomial

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

## Find the area of the big rectangle

| | x | 3 |
|---|---|---|
| x | $x^2$ | 3x |
| 2 | 2x | 6 |

$= x^2 + 5x + 6$

Algebraically:
$(x+2)(x+3)$
$=x(x) + x(3) + 2(x) + 2(3)$
$=x^2 + 3x + 2x + 6$
$=x^2 + 5x + 6$

## Find the area of the big rectangle

| | x | 4 |
|---|---|---|
| x | $x^2$ | 4x |
| 3 | 3x | 12 |
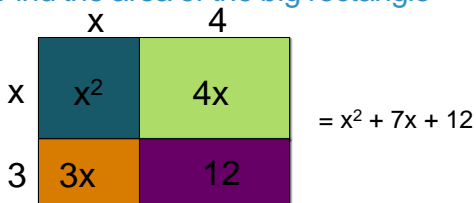
$= x^2 + 7x + 12$

Algebraically:
$(x+3)(x+4)$
$=x(x) + x(4) + 3(x) + 3(4)$
$=x^2 + 4x + 3x + 12$
$=x^2 + 7x + 12$

## Find the area of the big rectangle

| | x | 6 |
|---|---|---|
| x | $x^2$ | 6x |
| 5 | 5x | 6 |
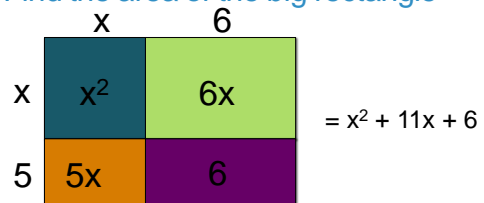
$= x^2 + 11x + 6$

Algebraically:
$(x+5)(x+6)$
$=x(x) + x(6) + 5(x) + 5(6)$
$=x^2 + 6x + 5x + 30$
$=x^2 + 11x + 30$

## Some people call multiplying Binomials "FOIL"ing

1. Multiply the First terms. $(x+3)(x+2) \longrightarrow x \cdot x = x^2$

2. Multiply the Outer terms. $(x+3)(x+2) \longrightarrow x \cdot 2 = 2x$

3. Multiply the Inner terms. $(x+3)(x+2) \longrightarrow 3 \cdot x = 3x$

4. Multiply the Last terms. $(x+3)(x+2) \longrightarrow 3 \cdot 2 = 6$

$(x+3)(x+2) = x^2 + 2x + 3x + 6 = x^2 + 5x + 6$

F O I L

## Multiply.

$(x+4)(x - 2)$
$=x(x) + x(-2) + 4(x) + 4(-2)$
$=x^2 - 2x + 4x - 8$
$=x^2 + 2x - 8$

### Multiply.

$(x+6)(x-7)$

$=x(x) + x(-7) + 6(x) + 6(-7)$

$=x^2 - 7x + 6x - 42$

$=x^2 - x - 42$

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- You do not have to multiply in the order of FOIL.
- You just have to make sure that you multiply every term in the first set of parentheses by every term in the second set of parentheses.

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### Multiply.

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

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

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

$=x^2 - 5x + 6$

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### Multiply.

$(x-5)(x-3)$

$=x(x) + x(-3) + (-5)x + (-5)(-3)$

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

$=x^2 - 8x + 15$

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### Multiply.

$(x-2)(x+8)$

$=x(x) + x(8) + (-2)x + (-2)(8)$

$=x^2 + 8x - 2x - 16$

$=x^2 + 6x - 16$

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### Multiply.

$(2x-1)(x+5)$

$=(2x)(x) + (2x)(5) + (-1)x + (-1)(5)$

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

$=2x^2 + 9x - 5$

### Multiply.

$(3x + 1)(x − 9)$

$=(3x)(x) + (3x)(-9) + (1)x + (1)(-9)$

$=3x^2 − 27x + x − 9$

$=3x^2 − 26x − 9$

### Multiply.

$(3x + 9)(2x − 1)$

### Multiply.

$(6 − 2s)(3 − s)$

### Multiply.

$(5 + 2a)(5 − 2a)$

### Homework

- Worksheet

**Helpful Hint**

In the expression $(x + 5)^2$, the base is $(x + 5)$.

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

### Multiply.

•$(x+4)^2$

$=(x+4)(x + 4)$

$=x(x) + x(4) + 4(x) + 4(4)$

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

$=x^2 + 8x + 16$

### 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.

$(x - 2)$ [rectangle] 

$A= x(x - 2)$
$A =x^2 - 2x$

x

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
- $=x^2(x)+(x^2)(-2)+4x(x)+4x(-2)+4(x)+4(-2)$
- $=x^3-2x^2+4x^2-8x+4x-8$
- $=x^3+2x^2-4x-8$