

# Products and Factoring

## Distributive Property

$$a(b+c) = ab+ac$$

$$a(b-c) = ab-ac$$

## Product of a Sum and a Difference

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

## Square of a binomial

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

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

## FOIL

**Assume that**  $a > 0$ ,  $b > 0$ ,  $c > 0$

$$(x+d)(x+e) = x^2 + bx + c$$

$$(x-d)(x-e) = x^2 - bx + c$$

$$(x+d)(x-e) = x^2 + bx - c \text{ or } (x+d)(x-e) = x^2 - bx - c$$

## Binomial-Trinomial

$$(a-b)(a^2 + 2ab + b^2) = a^3 - b^3$$

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$$(a-b)(a^2 + 2ab + b^2) = a^3 - b^3$$

# Products and Factoring

## Distributive Property (applied twice)

$$(a+b)(x+y) = a(x+y) + b(x+y) = ax + ay + bx + by$$

## Factoring

### Common Monomial Factor

$$ab + ac = a(b + c)$$

$$ab - ac = a(b - c)$$

### Difference of Two Squares

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

### Perfect Square Trinomial

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

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

### Reverse of FOIL (Assume that $a > 0$ , $b > 0$ , $c > 0$ )

$$x^2 + bx + c = (x + d)(x + e)$$

$$x^2 - bx + c = (x - d)(x - e)$$

$$x^2 + bx - c = (x + d)(x - e) \text{ or } (x - d)(x + e)$$

$$x^2 - bx - c = (x + d)(x - e) \text{ or } (x - d)(x + e)$$

### Difference of Two Cubes

$$a^3 - b^3 = (a - b)(a^2 + 2ab + b^2)$$

### Sum of Two Cubes

$$a^3 + b^3 = (a + b)(a^2 - 2ab + b^2)$$

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$$x^2 + bx - c = (x+d)(x-e) \text{ or } (x-d)(x+e)$$

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### Grouping (four or more terms)

$$\begin{aligned} ax + ay + bx + by &= a(x+y) + b(x+y) \\ &= (x+y)(a+b) \end{aligned}$$