

### Factor Special Products

**Goal** Factor special products

**Difference of Two Squares Pattern**  
 $a^2 - b^2 = (a+b)(a-b)$       Example:  $9x^2 - 16 = (3x)^2 - 4^2 = (3x+4)(3x-4)$

**Example 1**      Factor the polynomial

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

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

c.  $20 - 125x^2 = 5(4 - 25x^2) = 5(2+5x)(2-5x)$

**PROBLEMS**

Factor the polynomial

1.  $x^2 - 121$        $x^2 + 0x - 121$

$x^2 - 11x + 11x - 121$   
 $x(x-11) + 11(x-11)$   
 $(x-11)(x+11)$

2.  $9n^2 - 64$        $9n^2 + 0n - 64$

$9n^2 - 24n + 24n - 64$   
 $3n(3n-8) + 8(3n-8)$   
 $(3n-8)(3n+8)$

3.  $8x^2 - 2$        $8x^2 + 0x - 2$

$8x^2 + 4x - 4x - 2$   
 $4x(2x+1) - 2(2x+1)$   
 $(4x-2)(2x+1)$   
 $2(2x-1)(2x+1)$

**Perfect Square Trinomial Pattern**  
 $a^2 + 2ab + b^2 = (a+b)^2$   
 Example:  $x^2 + 6x + 9 = x^2 + 2(x)(3) + 3^2 = (x+3)^2$

**Perfect Square Trinomial Pattern**  
 $a^2 - 2ab + b^2 = (a-b)^2$   
 Example:  $x^2 - 6x + 9 = x^2 - 2(x)(3) + 3^2 = (x-3)^2$

**PROBLEMS**

Factor the polynomial

4.  $x^2 + 12x + 36$

$(x+6)^2$

5.  $n^2 + 10n + 25$

$(n+5)^2$

6.  $x^2 + 14x + 49$

$(x+7)^2$

7.  $x^2 - 12x + 36$

$(x-6)^2$

8.  $x^2 - 4x + 4$

$(x-2)^2$

9.  $x^2 - 2x + 1$

$(x-1)^2$

**Example 3** Solve a polynomial equationSolve the equation  $x^2 - 100 = 0$ 

<b>Solution</b>	$x^2 - 100 = 0$	Write the original equation
	$x^2 - 10^2 = 0$	Write left side as $a^2 - b^2$
	$(x+10)(x-10) = 0$	Difference of two squares pattern
	$(x+10)=0$	or $(x-10) = 0$
	$x = -10$ or	$x = 10$

**PROBLEMS**

10.  $x^2 - 12x + 36 = 0$

$(x-6)(x-6) = 0$

$x = 6$

11.  $x^2 - 4 = 0$

$(x-2)(x+2) = 0$

$x = 2, -2$

12.  $x^2 + 14x + 49 = 0$

$(x+7)(x+7) = 0$

$x = -7$

13.  $x^2 - 9 = 0$

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

$x = 3, -3$

14.  $x^2 + 8x + 15 = 0$

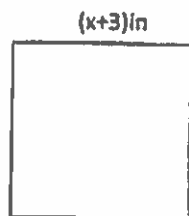
$(x+3)(x+5) = 0$

$x = -3, -5$

15.  $x^2 - 2x + 1 = 0$

$(x-1)(x-1) = 0$

$x = 1$

16. Find the value of  $x$  in the square. $(x+3)$  inArea =  $16 \text{ in}^2$ 

$(x+3)(x+3) = 16$

$x^2 + 3x + 3x + 9 = 16$

$x^2 + 6x + 9 = 16$   
 $-16 \quad -16$

$x^2 + 6x - 7 = 0$

$(x+7)(x-1) = 0$

$x = -7, 1$

$x = 1$