

# L1 Factoring Polynomials

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## L1 Factoring Polynomials

Pre-Calculus 11 Enriched Quadratic Equations & Functions I

### Lesson 1 Factoring Polynomials

#### Definitions:

**Factor:** a number that divides evenly into another number  
ie. factors of 18 are 1, 2, 3, 6, 9, and 18

**Multiples** of a number are determined by multiplying the number by any whole number other than 1 (or by skip counting)  
ie. some multiples of 6 are 6, 12, 18, 24...

**Greatest Common Factor (GCF)** of two or more terms is the greatest factor the terms have in common.  
ie. the greatest common factor of 32 and 48 is 16

**Perfect Square Trinomial:**  $(a + b)^2 = (a + b)(a + b) = a^2 + 2ab + b^2$

Square the first term  $a^2$

Double the inside product  $2ab$

Square the 2<sup>nd</sup> term  $b^2$

#### Example 1: Greatest Common Factor (GCF)

Factor:

a)  $x^2 + 4x$

$$x(x + 4)$$

b)  $y^3 - 2y^2$

$$y^2(y - 2)$$

c)  $4cd^2 + 20cd$

$$4cd(d + 5)$$

d)  $6p^2 + 6p$

$$6p(p + 1)$$

**Example 2: Difference of Squares**

Factor:

a)  $x^2 - 4$

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

b)  $25a^2 - 16b^2$

$(5a+4b)(5a-4b)$

$a^2 - b^2$   
 $(a+b)(a-b)$  conjugates  
 $a^2 - \underbrace{ab+ab} - b^2$   
 $a^2 - b^2$

**Example 3: Factoring Trinomials**

$a = 1$  (Product, Sum, Factors)

Factor:

a)  $x^2 - 4x - 21$

P -21  
 S -4  
 F -7, 3  
 $(x+3)(x-7)$

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

P 4  
 S -4  
 F -2, -2  
 $(x-2)(x-2)$   
 or  
 $(x-2)^2$   
 ← perfect square trinomial

c)  $t^2 - 3t - 10$

P -10  
 S -3  
 F -5, 2  
 $(t+2)(t-5)$

d)  $x^2 + 3x - 28$

P -28  
 S 3  
 F 7, -4  
 $(x-4)(x+7)$

Try  
 $y^2 - 81$   
 $36x^2 - 4$   
 $4(9x^2 - 1)$   
 $4(3x+1)(3x-1)$

Try  
 $x^2 - 3x - 18$   
 $x^2 - 6x - 16$

**Example 4: Factoring Trinomials**

$a \neq 1$  (PSF)

Factor:

a)  $3x^2 - 10x - 8$

b)  $4x^2 + 3x - 7$

$$\begin{array}{l} P -24 \\ S -10 \\ F \frac{-12, 2}{3 \quad 1} \end{array} \quad (3x+2)(x-4)$$

$$\begin{array}{l} P -28 \\ S 3 \\ F \frac{7, -4}{1 \quad 4} \end{array} \quad (x-1)(4x+7)$$

c)  $3t^2 + 13t + 4$

d)  $2d^2 + 6d - 56$

$$\begin{array}{l} P 12 \\ S 13 \\ F \frac{12, 1}{3 \quad 1} \end{array} \quad (3t+1)(t+4)$$

$$2(d^2 + 3d - 28) \quad \begin{array}{l} \text{GCF} \\ \text{first !!} \end{array}$$

PSF

$$\begin{array}{l} P -28 \\ S 3 \\ F 7, -4 \end{array} \quad 2(d-4)(d+7)$$

Try  $3x^2 + 7x + 2$   
 $(3x+1)(x+2)$

Try pg 174  
 #4 a, b  
 7 a, c