

Sums and Differences of Cubes:

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

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

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

2. $27x^3 + y^3$
 $(3x + y)(9x^2 - 3xy + y^2)$

3. $8x^3 - 27$
 $(2x - 3)(4x^2 + 6x + 9)$

4. $64x^3 + 1$
 $(4x + 1)(16x^2 - 4x + 1)$

Factoring Trinomials - $ax^2 + bx + c$

1. $5x^2 - 7x + 2$
 $(5x - 2)(x - 1)$

2. $3x^2 + 10x - 8$
 $(3x - 2)(x + 4)$

FOIL
 3. $2y^2 + 15y + 7$
 $(2y + 1)(y + 7)$

4. $7a^2 - 11a + 4$
 $(7a - 4)(a - 1)$

5. $5n^2 + 17n + 6$
 $(5n + 2)(n + 3)$

6. $4y^2 + 8y + 3$
 $y^2 + 8y + 12$
 $(y + 6)(y + 2)$
 $(y + \frac{3}{2})(y + \frac{1}{2})$
 $(2y + 3)(2y + 1)$

7. $6x^2 - 7x - 20$
 $(3x + 4)(2x - 5)$

8. $2n^2 - 3n - 14$
 $(2n - 7)(n + 2)$

9. $5n^2 + 2n - 7$
 $(5n + 7)(n - 1)$

Factoring by Grouping (when have 4 terms)

1. $8x^3 - 64x^2 + x - 8$
 $8x^2(x - 8) + 1(x - 8)$
 $(8x^2 + 1)(x - 8)$

2. $12x^3 + 2x^2 - 30x - 5$
 $2x^2(6x + 1) - 5(6x + 1)$
 $(2x^2 - 5)(6x + 1)$

3. $24x^3 - 64x^2 - 21x + 56$
 $8x^2(3x - 8) - 7(3x - 8)$
 $(8x^2 - 7)(3x - 8)$

4. $12x^3 - 21x^2 + 28x - 49$
 $3x^2(4x - 7) + 7(4x - 7)$
 $(3x^2 + 7)(4x - 7)$

5. $4x^3 - 12x^2 - 5x + 15$
 $4x^2(x - 3) - 5(x - 3)$
 $(4x^2 - 5)(x - 3)$

Factoring – Putting it all Together

Example:

$$5x^2 + 20x - 60 = 5(x^2 + 4x - 12) = 5(x+6)(x-2)$$

1. $2x^2 - 8$

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

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

2. $2x^2 + 8x + 6$

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

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

3. $3n^2 + 9n - 30$

$$3(n^2 + 3n - 10)$$

$$3(n+5)(n-2)$$

4. $6x^2 - 26x - 20$

$$2(3x^2 - 13x - 10)$$

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

5. $2x^2 + 12x - 80$

$$2(x^2 + 6x - 40)$$

$$2(x+10)(x-4)$$

6. $5t^2 + 15t + 10$

$$5(t^2 + 3t + 2)$$

$$5(t+2)(t+1)$$

7. $8n^2 - 18$

$$2(4n^2 - 9)$$

$$2(2n-3)(2n+3)$$

8. $14x^2 + 7x - 21$

$$7(2x^2 + x - 3)$$

$$7(2x+3)(x-1)$$

9. $4x^2 + 16x + 16$

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

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

10. $18x + 12x^2 + 2x^3$

$$2x(x^2 + 6x + 9)$$

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

11. $2x - 2xy^2$

$$2x(1 - y^2)$$

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

12. $3t^3 - 27t$

$$3t(t^2 - 9)$$

$$3t(t-3)(t+3)$$

13. $24a^2 - 30a + 9$

$$3(8a^2 - 10a + 3)$$

$$3(4a-3)(2a-1)$$

14. $10x^2 + 15x - 10$

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

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

15. $3x^2 - 42x + 147$

$$3(x^2 - 14x + 49)$$

$$3(x-7)^2$$

16. $4x^4 - 4x^2$

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

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

17. $4x^3 - 32$

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

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

18. $x^4 + 64x$

$$x(x^3 + 64)$$

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