

I. Factoring by taking out the GCF:

Example: $10y^2 - 5y$

GCF=5y $5y(2y-1)$

Practice Problems:

1. $3ab^3 + 9a^2b^2$

2. $5xy^2 + 20xy - 15x^3y^4$

3. $3x^4 - 12x^3$

4. $4a^2+2a$

5. $3y^2-3y- 9$

6. $4x^2-12x$

7. $8xy+10xz-14x$

8. $4x^2 - 4$

9. $3x^2 - 6x + 12$

II. Factoring Quadratic Trinomials (leading coefficient of 1)

Example: $x^2 - 10x + 16$ ← The factors that multiple to equal +16 and
 $(x-8)(x-2)$ add together to equal -10 are -8 and -2.

Practice Problems:

1. $x^2 - 4x - 21$

2. $x^2 + 2x - 35$

3. $x^2 - 9x + 18$

4. $x^2 - 49$

5. $x^2 + 2x + 1$

6. $x^2 - x - 30$

7. $x^2 + 12x + 20$

8. $x^2 - 36$

9. $x^2 - 5x + 6$

10. $-x^2 + 10x - 21$

11. $x^2 + 4x + 4$

12. $x^2 - 9x + 20$

III. Factoring Quadratic Trinomials (leading coefficient not 1)

Example: $3x^2 - 4x - 15$ ← Guess and check! Write out factors of last term and first term, then substitute.
 $(3x+5)(x-3)$

Practice Problems:

1. $3a^2 - 12a - 24$

2. $2t^2 + 8t - 24$

3. $2x^2 - 5x - 12$

4. $3x^2 - 13x - 10$

5. $25x^2 - 4$

6. $3x^2 + 8x - 3$

7. $2x^2 - x - 21$

8. $6x^2 + 13x - 5$

9. $8x^2 - 6x - 5$

10. $16a^2 - 8a + 1$

11. $5x^2 - 11x + 2$

12. $3y^2 - 5y - 8$

IV. Factoring by Grouping

Example: $x^3 + x^2 - 4x - 4$

1. Group Terms

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

*Always put a + in between ()'s

2. Factor GCF of each ()

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

*If you take out a neg. change +/-

3. Factor out ()

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

4. Factor if possible.

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

Practice Problems:

1. $x^3 - x^2 - 9x + 9$

2. $x^3 - x + 5x^2 - 5$

3. $x^3 - 3x^2 - 16x + 48$

4. $x^4 + 2x^3 + x + 2$

5. $x^3 + 3x^2 + 10x + 30$

6. $2x^3 - 5x^2 + 18x - 45$

7. $3x^3 - 6x^2 + x - 2$

8. $3x^3 - 2x^2 - 9x + 6$

9. $4x^4 - 3x^3 - 16x + 12$

V. Factoring polynomials of higher degrees.

Example: $36x^4 - 9x^2$

1. Factor GCF, if possible. $9x^2 (4x^2 - 1)$

2. Factor if possible. $9x^2 (2x + 1) (2x - 1)$

Example: $x^4 + 6x^2 + 9$

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

Practice Problems:

1. $25x^4 - 9$

2. $x^5 - x^3 - 6x$

3. $x^4 - 16x^2 + 64$

4. $49x^4 - 4x^2$

5. $3x^9 - 6x^7 - 9$

6. $x^6 - 16x^2$