When factoring a polynomial go through this list in your mind:

1. **GCF:** Look for all factors that are common to all terms of the polynomial, pull out the greatest common factor.

2. **Difference of two squares:** If the polynomial is a binomial, look to see if it is the difference of two squares.

   - Remember you can NOT factor the sum of two squares.

3. **Trinomials:** $ax^2 + bx + c$ If the polynomial is a trinomial then look at the leading coefficient, a.

   If the leading coeffient is one ($a = 1$), use the add multiply method. Look for numbers that multiply to c while adding to b.
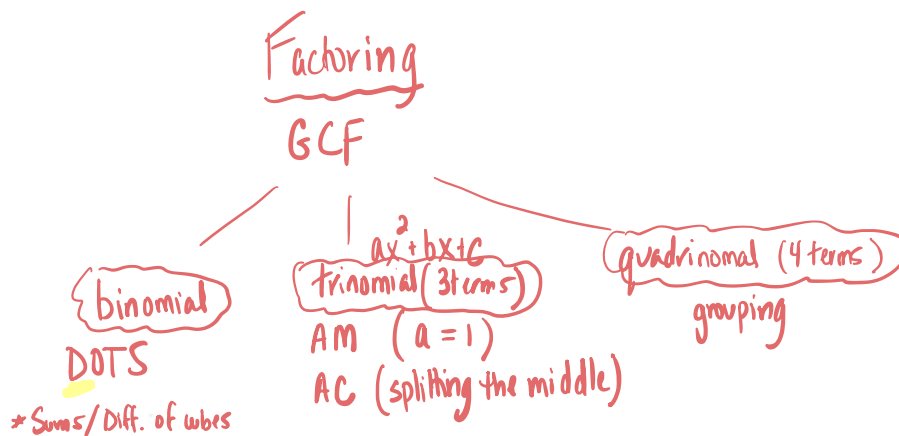
   If the leading coefficient is not equal to one ($a \neq 1$) use factoring by trial and error or the AC method.

   The AC Method
   a. Form the product ac
   b. Find a pair of numbers whose product is ac and whose sum is b
   c. Rewrite the polynomial so that the middle term (bx) is written as the sum of the two terms whose coefficients are the two numbers found in step b
   d. Factor by grouping

4. **Grouping:** If the polynomial has 4 terms, try factoring by grouping.

5. **Final check:** Always make sure that the factors you end up with are completely factored. If you have overlooked a common factor, you can catch it here.

Factoring

GCF

binomial

DOTS

* Sums/Diff. of cubes

$ax^2 + bx + c$

trinomial (3 terms)

AM ($a = 1$)

AC (splitting the middle)

quadrinomial (4 terms)

grouping

Exercises

1) $2x^2 - 18$ = $\underset{GCF}{2(x^2-9)}$ = $\underset{DOTS}{2(x+3)(x-3)}$

2) $3y^2 - 48$

3) $a^4 - 16$ = $\underset{DOTS}{(a^2-4)(a^2+4)}$ = $(a+2)(a-2)(a^2+4)$

4) $5a^2 - 30a + 45$ = $\underset{GCF}{5(a^2-6a+9)}$ = $\underset{AM}{5(a-3)(a-3)}$

5) $4a^2 + 16a + 16$

6) $-x^2 + 50x - 625$

7) $ax - bx + ay - by$

8) $2ax + 3 + x + 6a$

9) $x^3 - 3x^2 - 9x + 27$

10) $3x^2 + 5x - 2$ $\underset{ax^2+bx+c}{} \quad \underset{ac=-6}{b=5}$
$3x^2 + 6x - x - 2$
$3x(x+2) -1(x+2)$ = $(3x-1)(x+2)$

11) $12a^2b^2 - 3ab$

12) $x^2 - 4x + 2xy - 8y$
$x(x-4) + 2y(x-4)$ = $(x+2y)(x-4)$

13) $x^2 - 16y^2$

14) $x^2 - 9x + 18$

15) $3a^2 - 2ax - 3a + 2x$

16) $a^2 - 2a + ab - 2b$

17) $6x^2 + 13x + 6$

18) $x^4 - 11x^3 + 24x^2$

19) $8x^2 - 6x - 2$

20) $9x^2 - 12x + 4$

21) $a^3 - a^2b - a + b$

22) $x^2 + 6x + 5$

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

24) $n^2 + 5n + 6$

25) $n^2 - 10n + 25$

26) $m^2 + 3ms - 4s^2$

27) $y^2 + 4y - 12$

28) $y^2 - y - 30$

29) $t^2 - 14t - 72$

30) $6 - x - x^2$

31) $36 + 5x - x^2$

32) $36s^2 + 12s + 1$

33) $6s^2 + 30s - 900$

34) $2a^4 - 10a^3 - 72a^2$

35) $2x^3 - 3x^2 - 2x + 3$

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

37) $(x+2)^2 - (y-3)^2$

38) $16 - (2x-1)^2$

39) $4a^2 - 4ab - 36 + b^2$

40) $2a^3 - 16a^2 + 32a$