This table summarizes the most common factoring techniques used with polynomials.

Number of Terms	Factoring Technique	General Case
Any number	Greatest Common Factor (GCF)	$a^3b^2 + 2a^2b - 4ab^2 = ab\left(a^2b + 2a - 4b\right)$
Two	Difference of Two Squares	$a^2 - b^2 = (a+b)(a-b)$
	Sum of Two Cubes	$a^3 + b^3 = (a+b)\left(a^2 - ab + b^2\right)$
	Difference of Two Cubes	$a^3 - b^3 = (a-b)\left(a^2 + ab + b^2\right)$
Three	Perfect Square Trinomials	$a^2 + 2ab + b^2 = (a+b)^2$ $a^2 - 2ab + b^2 = (a-b)^2$
	General Trinomials	$acx^2 + (ad+bc)x + bd = (ax+b)(cx+d)$
Four or More	Grouping	$ax + bx + ay + by = x(a+b) + y(a+b) = (a+b)(x+y)$

When you factor a polynomial, always look for a GCF first. Then determine whether the resulting polynomial factor can be factored further using one or more of the methods listed in the table.

Example 1:　Factor　　　$6x^2y^2 - 2xy^2 + 6x^3y$.

　　　　　GCF　　　　$2xy\left(3xy - y + 3x^2\right)$

Example 2:　Factor　　$9x^2 - 4y^2$

　　　　　Difference of Two Squares　　　$(3x + 2y)(3x - 2y)$

Example 3:   Factor $x^3 + 8$

Sum of Two Cubes $(x+2)(x^2 - 2x + 4)$

Example 4:   Factor $27x^3 - y^6$

Difference of Two Cubes $(3x - y^2)(9x^2 + 3xy^2 + y^4)$

Example 5:   Factor $x^2 + 6x + 9$

Perfect Square Trinomial $(x+3)(x+3)$ or $(x+3)^2$

Example 6:   Factor $5x^2 - 13x + 6$

General Trinomial $(5x - 3)(x - 2)$

Example 7:   Factor $3xy^2 - 48x$

GCF $3x(y^2 - 16)$

Difference of Squares $3x(y + 4)(y - 4)$

Factor Completely! ☺

1) $2xy^3 - 10x$

2) $6a^2b^2 + 18ab^3$

3) $12cd^3 - 8c^2d^2 + 10c^5d^3$

4) $3a^2bx + 15cx^2y + 25ad^3y$

5) $x^2 + 7x + 6$

6) $y^2 - 5y + 4$

7) $2a^2 + 3a + 1$

8) $2b^2 + 13b - 7$

9) $6c^2 + 13c + 6$

10) $12m^2 - m - 6$

11) $3n^2 + 21n - 24$

12) $3z^2 + 24z + 45$

13) $x^2 + 12x + 36$

14) $x^2 - 6x + 9$

15) $16a^2 - 25b^2$

16) $4m^2 - 4n^2$

17) $y^4 - z^2$

18) $3x^2 - 27y^2$

19) $z^3 + 125$

20) $z^3 + 125$

21) $p^4 - 1$

22) $x^4 - 81$

23) $x^2 + x - 42$

24) $2x^2 + 5x + 3$

25) $6x^2 + 71x - 12$

26) $6x^4 - 12x^3 + 3x^2$

27) $x^2 - 2x - 15$

28) $6x^2 + 23x + 20$

29) $24x^2 - 76x + 40$

30) $6p^2 - 13pq - 28q^2$

31) $9x^2 - 64$

32) $36 - t^{10}$

33) $a^4 - 81b^4$

34) $3a^3 + 12a^2 - 63a$

35) $x^3 - 8x^2 + 15x$

36) $18x^3 - 8x$

37) $3x^2 - 42x + 40$

38) $3p^3 - 12pq^2$

39) $2ax^3 + 16a$

40) $a^4 - 16$