

Part I - GCF

1. $2z^2 + 16 = 2(z^2 + 8)$	6. $6c^4 - 9c = 3c(2c^3 - 3)$
2. $8g^2 + 20g = 4g(2g + 5)$	7. $-9a^6 - 27a^5 - 12a^3 = 3a^3(-3a^3 - 9a^2 - 4)$
3. $8r^3 - 36r - 4 = 4(2r^3 - 9r - 1)$	8. $18c^2 + 4c = 2c(9c + 2)$
4. $28s^2 + 20s = 4s(7s + 5)$	9. $-8y^6 + 4y^4 + 8 = 4(-2y^6 + y^4 + 2)$
5. $16x^3 + 4x^2 + 36x = 4x(4x^2 + x + 9)$	10. $35v^6 - 15v^3 - 15v^2 = 5v^2(7v^4 - 3v - 3)$

Part II - Difference of Two Squares

11. $x^2 - 16 = (x-4)(x+4)$	16. $x^4 - 1 = (x^2-1)(x^2+1) = (x-1)(x+1)(x^2+1)$
12. $36u^6 - 81w^2 = 9(4u^6 - 9w^2) = 9(2u^3-3w)(2u^3+3w)$	17. $100k^4 - 49 = (10k^2-7)(10k^2+7)$
13. $h^2 + 36 = \text{Not a diff of squares}$	18. $p^8 - 25 = (p^4-5)(p^4+5)$
14. $64 - 25j^{10} = (8-5j^5)(8+5j^5)$	19. $4 - 36v^{12} = 4(1-9v^{12}) = 4(1-3v^6)(1+3v^6)$
15. $9s^2 - 16t^2 = (3s-4t)(3s+4t)$	20. $144 + y^4 = \text{Not a diff. squares}$

Part III - Trinomial Squares

21. $x^2 + 8x + 16 = (x+4)(x+4)$	26. $x^2 - 4xy + 4y^2 = (x-2y)^2$
22. $x^2 - 14x + 49 = (x-7)(x-7)$	27. $2x^2 - 40x + 200 = 2(x^2 - 20x + 100) = 2(x-10)^2$
23. $9x^2 + 18xy + 9y^2 = 9(x^2 + 2xy + y^2) = 9(x+y)^2$	28. $12x^2 + 36xy + 27y^2 = 3(4x^2 + 12xy + 9y^2) = 3(2x+3y)^2$
24. $16x^2 - 56xy + 49y^2 = (4x-7y)^2$	29. $a^4 + 14a^2 + 49 = (a^2+7)^2$
25. $x^2 - 6x + 9 = (x-3)^2$	30. $4x^4 + 4x^2 + 1 = (2x^2+1)^2$

Part IV - Trinomials in the form $x^2 + bx + c$

31. $x^2 - 6x - 7 = (x-7)(x+1)$	36. $x^2 + 5x + 6 = (x+2)(x+3)$
32. $s^2 + 12s + 35 = (s+7)(s+5)$	37. $w^2 - 6w - 5 = \text{Prime}$
33. $p^2 - 9p + 20 = (p-4)(p-5)$	38. $k^2 + 3k - 4 = (k+4)(k-1)$
34. $b^2 + 5b - 36 = (b+9)(b-4)$	39. $h^2 - 9h - 36 = (h-12)(h+3)$
35. $p^2 - 8p - 9 = (p-9)(p+1)$	40. $w^2 + 2w - 15 = (w+5)(w-3)$

$$2a(a^2 - 19a + 88)$$

Part V - Trinomials in the form $ax^2 + bx + c$

$$41. 2x^2 + 9x - 5 = \frac{(x+5)(2x-1)}{x^2+9x-10}$$

$$46. 2a^3 - 38a^2 + 176a = 2a(a-11)(a-8)$$

$$42. 16m^2 - 48m + 11 = \frac{(m-\frac{44}{16})(m-\frac{4}{16})}{m^2-48+176} = (4m-11)(4m-1)$$

$$47. 2q^5 - 12q^4 - 80q^3 = 2q^3(q^2 - 6q - 40) = 2q^3(q-10)(q+4)$$

$$43. 3x^2 - 5x - 2 = \frac{(x-2)(3x+1)}{x^2-5x-6}$$

$$48. 3d^2 + 18d + 15 = 3(d+5)(d+1)$$

$$44. 20c^2 - 63c + 49 = \frac{(c-\frac{28}{20})(c-\frac{35}{20})}{c^2-63c+980} = (5c-7)(4c-7)$$

$$49. 2x^2 - x - 15 = \frac{(x-6)(x+5)}{x^2-x-30} = (x-3)(2x+5)$$

$$45. 4u^2 + 37u + 63 = \frac{(u+28)(u+9)}{u^2+37u+252} = (u+7)(4u+9)$$

$$50. 3a^2 - 4a + 1 = \frac{(a-3)(a-\frac{1}{3})}{a^2-4a+3} = (a-1)(3a-1)$$

Part VI - Grouping

$$51. 4x^5 + 6x^3 + 6x^2 + 9 = 2x^3(2x^2+3) + 3(2x^2+3)$$

$$56. 7y^2 - 14y + by - 2b = 7y(y-2) + b(y-2) = (7y+b)(y-2)$$

$$52. c^6 - c^4 - c^2 + 1 = (c^4-1)(c^2-1) = (c-1)(c+1)(c-1)(c+1)$$

$$57. 12xy + 3yz - 4x - z = 3y(4x+z) - 1(4x+z) = (3y-1)(4x+z)$$

$$53. 4y^5 + 6y^4 + 6y^3 + 9y^2 = 2y^4(2y+3) + 3y^2(2y+3) = 2y^2(2y+3)^2$$

$$58. 20a + 12 - 25ax - 15x = 4(5a+3) - 5x(5a+3) = (4-5x)(5a+3)$$

$$54. x^{13} + x^7 + 2x^6 + 2 = x^7(x^6+1) + 2(x^6+1) = (x^7+2)(x^6+1)$$

$$59. 4mna + 4mnb + 5na + 5nb = 4mn(a+b) + 5n(a+b) = (4mn+5n)(a+b)$$

$$55. 20g^3 - 4g^2 - 25g + 5 = 4g^2(5g-1) - 5(5g-1) = (4g^2-5)(5g-1)$$

$$60. t^2 - 9t + 3t - 27 = t(t-9) + 3(t-9) = (t+3)(t-9)$$

Part VII - Mixed Factoring

$$61. d^2 + d - 132 = (d+12)(d-11)$$

$$66. 3n^2 - 43n + 84 = \frac{(n-\frac{36}{3})(n-\frac{7}{3})}{n^2-43n+252} = (n-12)(3n-7)$$

$$62. p^2 - 100 = (p-10)(p+10)$$

67. $f^2 + 121 =$
fully simplified

$$63. 3v^4 + 9v^3 - 12v^2 = 3v^2(v^2+3v-4) = 3v^2(v+4)(v-1)$$

$$68. 4x^4 + 4x^2 + 1 = (2x^2+1)^2$$

$$64. 3h^2 + 44h + 121 = (h+33)(h+11) = (h+11)^3$$

$$69. 18c^3 - 21c^2 - 30c + 35 = 3c^2(6c-7) - 5(6c-7) = (3c^2-5)(6c-7)$$

$$65. 9x^{10} + 12x^5 + 4 = (x^5+\frac{6}{9})(x^5+\frac{6}{9}) = (3x^5+2)^2$$

$$70. z^2 - 6z - 72 = (z-12)(z+6)$$