Factoring

1. Common Factor:

    a) $5x^3 - 25x^2 \Rightarrow 5x^2(x-5)$ b) $27xy - 81y \Rightarrow 9y(3x-9)$

2. Difference of Squares:

    a) $x^2 - 121 \Rightarrow (x+11)(x-11)$ b) $9 - x^2 \Rightarrow -1(x^2-9) \Rightarrow -1(x+3)(x-3)$

    c) $x^4 - 81 \Rightarrow (x^2+9)(x-3)(x+3)$

3. Easy Type 1

    a) $x^2 + 5x + 6 \Rightarrow (x+3)(x+2)$ b) $x^2 + 11x + 30 \Rightarrow (x+5)(x+6)$

4. Easy Type 2

    a) $x^2 - 7x + 6 \Rightarrow (x-6)(x-1)$ b) $x^2 - 8x + 15 \Rightarrow (x-3)(x-5)$

5. Easy Type 3

    a) $x^2 + 6x - 7 \Rightarrow (x+7)(x-1)$ b) $x^2 + 8x - 20 \Rightarrow (x+10(x-2)$

6. Easy Type 4

    a) $x^2 - 7x - 8 \Rightarrow (x-8)(x+1)$ b) $x^2 - 3x - 108 \Rightarrow (x-12)(x+9)$

7. Grouping

    a) $16x^3 + 20x^2 + 20x + 25 \Rightarrow (16x^3 + 20x^2) + (20x + 25) \Rightarrow 4x^2(4x+5) + 5(4x+5) \Rightarrow$

         $(4x+5)(4x^2+5)$

    b) $6a^3 - 3a^2 + 10a - 5 \Rightarrow (6a^3 - 3a^2) + (10a - 5) \Rightarrow 3a^2(2a-1) + 5(2a-1) \Rightarrow$

         $(2a-1)(3a^2+5)$

8. Hard Type 1

    a) $5x^2 + 7x + 2 \Rightarrow (5x+2)(x+1)$ b) $3x^2 + 11x + 6 \Rightarrow (3x+2)(x+3)$

9. Hard Type 2

    a) $4x^2 - 15x - 9 \Rightarrow (4x-3)(x-3)$ b) $9x^2 - 18x + 5 \Rightarrow (3x-5)(3x-1)$

10. Hard Type 3

   a) $3x^2 + 2x - 5 \Rightarrow (3x + 5)(x - 1)$ b) $7x^2 + 12x - 4 \Rightarrow (7x - 2)(x + 2)$

11. Hard Type 4

   a) $6x^2 - 13x - 5 \Rightarrow (3x + 2)(x - 5)$ b) $8x^2 - 3x - 5 \Rightarrow (8x + 5)(x - 1)$

12. Mixed

   1. $4x^3 - 36x^2 = 4x^2(x - 9)$ 2. $15x^3y^2 + 65x^2y^4 = 5x^2y^2(3x + 13y^2)$

   3. $8x^4yz^3 - 32x^3y^4z + 40x^2y^2z^3 = 8x^2yz(x^2z^2 - 4xy^3 + 5yz^2)$

   4. $3x(y - 2) + 5(y - 2) = (y - 2)(3x + 5)$ 5. $20y^4 - 405 = 5(2y^2 + 9)(2y^2 - 9)$

   6. $y^2 - 13y + 42 = (y - 7)(y - 6)$ 7. $4x^2 - 169 = (2x - 13)(2x + 13)$

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

   9. $4x^2 + 8x + 3 = (2x + 3)(2x + 1)$ 10. $x^2 + 8x - 33 = (x + 11)(x - 3)$

   11. $4x^2 + 16x + 15 = (2x + 5)(2x + 3)$ 12. $x^2 - 5x - 84 = (x - 12)(x + 7)$

   13. $6x^2 + 7x - 5 = (3x + 5)(2x - 1)$ 14. $x^2 + 11x + 30 = (x + 5)(x + 6)$

   15. $27 + 6x - x^2 = -1(x - 9)(x + 3)$ 16. $9x^2 - 20x + 4 = (9x - 2)(x - 2)$

   17. $4x^3 - 20x^2 + x - 5 = 4x^2(x - 5) + (x - 5) = (x - 5)(4x^2 + 1)$

   18. $7x^2 - 35x + 42 = 7(x^2 - 5x + 6) = 7(x - 3)(x - 2)$

   19. $x^4 - 13x^2 + 36 = (x^2 - 9)(x^2 - 4) - (x + 3)(x - 3)(x + 2)(x - 2)$

   20. $5x^2 - 11x - 12 = (5x + 4)(x - 3)$