You should be able to…

- Factor a polynomial by factoring out the greatest common factor
- Factor a polynomial that is a difference of two squares
- Factor a polynomial that has a leading coefficient of 1(x^2 + bx + c) using AM method
- Factor polynomials completely
- Factor by grouping

Factor Completely.

1. $8m^4n^5 - 12m^5n^4$

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

3. $x^2 - 49$

4. $18a^3b^5c^2 + 6a^8b^3 - 24a^5bc^3$

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

6. $8x^3 - 32x$

7. $x^2 - x - 12$

8. $-9y^2 + 25x^6$

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

10. $4x^3 - 144x$

11. $5x^3 + 30x^2 - 40x$

12. $6x^4 - 54y^8$

13. $3x^2 - 2x - 8$

14. $3x^2 + 10x - 8$

15. $3x^2 + x - 14$

16. $2x^2 - 21x - 36$

17. $-2x^2 + 3x + 9$

18. $9x^2 - 3x - 12$

19. $100x^2 - 20x - 63$

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

21. $5x^3 + 10x^2 - 20x - 40$

1. $4m^4n^4\,(2n - 3m)$

2. $(x - 3)(x - 7)$

3. $(x - 7)(x + 7)$

4. $6a^3b(3b^4c^2 + a^5b^2 - 4a^2c^3)$

5. $x(x^2 - 6x + 9)$
   $x(x - 3)(x - 3)$

6. $8x(x^2 - 4)$
   $8x(x + 2)(x - 2)$

7. $(x - 4)(x + 3)$

8. $(5x^3 + 3y)(5x^3 - 3y)$

9. Unfactorable (prime)

10. $4x(x^2 - 36)$
    $4x(x + 6)(x - 6)$

11. $5x(x^2 + 6x - 8)$

12. $6(x^4 - 9y^8)$
    $6(x^2 - 3y^4)(x^2 + 3y^4)$

13. $3x^2 - 6x + 4x - 8$
    $3x(x - 2) + 4(x - 2)$
    $(3x + 4)(x - 2)$

14. $3x^2 + 12x - 2x - 8$
    $3x(x + 4) - 2(x + 4)$
    $(3x - 2)(x + 4)$

15. $3x^2 - 6x + 7x - 14$
    $3x(x - 2) + 7(x - 2)$
    $(3x + 7)(x - 2)$

16. $2x^2 - 24x + 3x - 36$
    $2x(x - 12) + 3(x - 12)$
    $(2x + 3)(x - 12)$

17. $-2x^2 + 6x - 3x + 9$
    $-2x(x - 3) - 3(x - 3)$
    $(-2x - 3)(x - 3)$
    or $-(2x + 3)(x - 3)$

18. $3(3x^2 - x - 4)$
    $3(3x^2 + 3x - 4x - 4)$
    $3(3x(x + 1) - 4(x + 1))$
    $3(3x - 4)(x + 1)$

19. $(10x)^2 - 2(10x) - 63$
    $(10x - 9)(10x + 7)$

20. $(x^2 + 3)(x^2 - 1)$
    $(x^2 + 3)(x - 1)(x + 1)$

21. $5(x^3 + 2x^2 - 4x - 8)$
    $5(x^2(x + 2) - 4(x + 2))$
    $5(x^2 - 4)(x + 2)$
    $5(x + 2)(x - 2)(x + 2)$