# Polynomial Factorizations with Full Steps (82–100)

## 82) w² − 64

• Difference of squares: w² − 8².

➤ Final factorization: (w − 8)(w + 8)

## 83) y² − 12y + 36

• Perfect square trinomial: y² − 2·6·y + 6².

➤ Final factorization: (y − 6)²

## 84) x² − 8x − 48

• AC = 1·(−48) = −48; numbers with product −48 and sum −8 → −12 and +4.

• Split and factor.

➤ Final factorization: (x − 12)(x + 4)

## 85) a³ − 7a² + 12a

• GCF a: a(a² − 7a + 12).

• Factor quadratic: product 12, sum −7 → −3 and −4.

➤ Final factorization: a(a − 3)(a − 4)

## 86) 25a² + 8b²

• Sum of squares with no cross term; not factorable over the rationals.

➤ Final factorization: Irreducible over ℚ

## 87) (x − 3)(x + 7) + (x − 3)(x − 4)

• Factor the common binomial (x − 3).

• Add the remaining binomials inside.

➤ Final factorization: (x − 3)(2x + 3)

## 88) 6x² + 12x + 6

• GCF 6: 6(x² + 2x + 1).

• Perfect square inside.

➤ Final factorization: 6(x + 1)²

## 89) y² − 11y + 18

• AC = 1·18 = 18; sum −11 → −9 and −2.

➤ Final factorization: (y − 9)(y − 2)

## 90) 40 + 3b − b²

• Reorder: −(b² − 3b − 40).

• Factor inside: numbers multiply −40, sum −3 → −8 and +5.

• Reapply the leading minus.

➤ Final factorization: −(b − 8)(b + 5) (equivalently (8 − b)(b + 5))

## 91) 3x⁵ − 12x²

• GCF 3x²: 3x²(x³ − 4).

• x³ − 4 is not a rational cube; leave as is over ℚ.

➤ Final factorization: 3x²(x³ − 4)

## 92) 250x³ + 2

• GCF 2: 2(125x³ + 1).

• Sum of cubes: (5x)³ + 1³.

➤ Final factorization: 2(5x + 1)(25x² − 5x + 1)

## 93) 7xy⁴ − 7xz⁴

• GCF 7x: 7x(y⁴ − z⁴).

• Use difference of squares twice.

➤ Final factorization: 7x(y − z)(y + z)(y² + z²)

## 94) 2y⁴ + 5y³ − 12y²

• GCF y²: y²(2y² + 5y − 12).

• Factor quadratic with AC = 2·(−12) = −24; sum 5 → 8 and −3.

➤ Final factorization: y²(2y − 3)(y + 4)

## 95) 24x² − 7x − 5

• AC = 24·(−5) = −120; sum −7 → −12 and +5.

• Split: 24x² − 12x + 5x − 5 = 12x(2x − 1) + 5(2x − 1).

➤ Final factorization: (12x + 5)(2x − 1)

## 96) y² + 14y − 32

• AC = 1·(−32) = −32; sum 14 → 16 and −2.

➤ Final factorization: (y + 16)(y − 2)

## 97) 0.04w² + 0.28w + 0.49

• Recognize perfect square: (0.2w)² + 2·(0.2w)·0.7 + 0.7².

➤ Final factorization: (0.2w + 0.7)²

## 98) 4x³ + 40x² + 64x

• GCF 4x: 4x(x² + 10x + 16).

• Quadratic factors: 16 → 2 and 8.

➤ Final factorization: 4x(x + 2)(x + 8)

## 99) 64y³ + 27

• Sum of cubes: (4y)³ + 3³.

➤ Final factorization: (4y + 3)(16y² − 12y + 9)

## 100) 1/81 − x²

• Difference of squares: (1/9)² − x².

➤ Final factorization: (1/9 − x)(1/9 + x)