# Polynomial Factorizations with Full Steps (41–60)

## 41) x² − 6x − 16

• AC = 1·(−16) = −16; need two numbers whose product is −16 and sum −6 → −8 and +2.

• Split and group: x² − 8x + 2x − 16 = x(x − 8) + 2(x − 8).

➤ Final factorization: (x − 8)(x + 2)

## 42) x² − 10xy + 24y²

• Treat as quadratic in x with parameter y.

• AC = 1·24y² = 24y²; sum −10y → −6y and −4y.

• Split: x² − 6xy − 4xy + 24y² = x(x − 6y) − 4y(x − 6y).

➤ Final factorization: (x − 6y)(x − 4y)

## 43) x² + 3x + 2

• AC = 1·2 = 2; sum 3 → 1 and 2.

➤ Final factorization: (x + 1)(x + 2)

## 44) x² − 3x + 2

• AC = 1·2 = 2; sum −3 → −1 and −2.

➤ Final factorization: (x − 1)(x − 2)

## 45) x² − x − 30

• AC = 1·(−30) = −30; sum −1 → −6 and +5.

• Split: x² − 6x + 5x − 30 = x(x − 6) + 5(x − 6).

➤ Final factorization: (x − 6)(x + 5)

## 46) x² + 7x − 8

• AC = 1·(−8) = −8; sum 7 → 8 and −1.

➤ Final factorization: (x + 8)(x − 1)

## 47) x² + x − 2

• AC = 1·(−2) = −2; sum 1 → 2 and −1.

➤ Final factorization: (x + 2)(x − 1)

## 48) x² − 5xy + 6y²

• Quadratic in x; AC = 1·6y² = 6y²; sum −5y → −2y and −3y.

• Split: x² − 2xy − 3xy + 6y² = x(x − 2y) − 3y(x − 2y).

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

## 49) x² + 10x + 16

• AC = 1·16 = 16; sum 10 → 8 and 2.

➤ Final factorization: (x + 8)(x + 2)

## 50) x² + x − 72

• AC = 1·(−72) = −72; sum 1 → 9 and −8.

➤ Final factorization: (x + 9)(x − 8)

## 51) x² − 8x − 9

• AC = 1·(−9) = −9; sum −8 → −9 and +1.

➤ Final factorization: (x − 9)(x + 1)

## 52) x² + 2x − 48

• AC = 1·(−48) = −48; sum 2 → 8 and −6.

➤ Final factorization: (x + 8)(x − 6)

## 53) x² − 13xy + 42y²

• Quadratic in x; AC = 1·42y² = 42y²; sum −13y → −6y and −7y.

➤ Final factorization: (x − 6y)(x − 7y)

## 54) x² + 8x + 12

• AC = 1·12 = 12; sum 8 → 6 and 2.

➤ Final factorization: (x + 6)(x + 2)

## 55) 4x³ − 8x² − 12x

• GCF 4x: 4x(x² − 2x − 3).

• Factor inside: product −3, sum −2 → −3 and +1.

➤ Final factorization: 4x(x − 3)(x + 1)

## 56) 2x³ − 2x² − 4x

• GCF 2x: 2x(x² − x − 2).

• Factor inside: product −2, sum −1 → −2 and +1.

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

## 57) 2x³ − 4x² − 6x

• GCF 2x: 2x(x² − 2x − 3).

• Factor inside: product −3, sum −2 → −3 and +1.

➤ Final factorization: 2x(x − 3)(x + 1)

## 58) 3x³ − 6x² − 9x

• GCF 3x: 3x(x² − 2x − 3).

• Factor inside: product −3, sum −2 → −3 and +1.

➤ Final factorization: 3x(x − 3)(x + 1)

## 59) 5x³y − 35x²y + 50xy

• GCF 5xy: 5xy(x² − 7x + 10).

• Factor quadratic: product 10, sum −7 → −5 and −2.

➤ Final factorization: 5xy(x − 5)(x − 2)

## 60) 3x³y + 18x²y − 21xy

• GCF 3xy: 3xy(x² + 6x − 7).

• Factor inside: product −7, sum 6 → 7 and −1.

➤ Final factorization: 3xy(x + 7)(x − 1)