

# FACTORIZATION (B), ALGEBRAIC FRACTION AND FORMULA

Form 2 Regular Course

Vol 3

**Part 1 - Factorization using identities**

4. (d)  $(x^2 + 4x)^2 + 8(x^2 + 4x) + 16$

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

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

(e)  $x^4 - 16$

$$= (x^2 - 4)(x^2 + 4)$$

$$= (x - 2)(x + 2)(x^2 + 4)$$

(f)  $a^4 - b^4$

$$= (a^2 - b^2)(a^2 + b^2)$$

$$= (a - b)(a + b)(a^2 + b^2)$$

(k)  $(x^2 + 2x)^2 - 1$

$$= (x^2 + 2x + 1)(x^2 + 2x - 1)$$

$$= (x + 1)^2(x^2 + 2x - 1)$$

(l)  $(x^2 + 8x)^2 - 256$

$$= (x^2 + 8x + 16)(x^2 + 8x - 16)$$

$$= (x + 4)^2(x^2 + 8x - 16)$$

(m)  $(x^2 + 4)^2 - 4x^2$

$$= (x^2 + 2x + 4)(x^2 - 2x + 4)$$

## Part 2 - Advanced problem in factorization

$$\begin{aligned} 1. \quad (c) \quad & 6m - 2n - 9m^2 + n^2 \\ &= 2(3m - n) - (3m - n)(3m + n) \\ &= (3m - n)(2 - 3m - n) \end{aligned}$$

$$\begin{aligned} (d) \quad & a^2 - 4b^2 + a - 2b \\ &= (a - 2b)(a + 2b) + (a - 2b) \\ &= (a - 2b)(a + 2b + 1) \end{aligned}$$

$$\begin{aligned} (e) \quad & 2x - a + a^2 - 4x^2 \\ &= (2x - a) + (a - 2x)(a + 2x) \\ &= (2x - a)(1 - a - 2x) \end{aligned}$$

$$\begin{aligned} (f) \quad & 1 - 4x^2 + a + 2ax \\ &= (1 - 2x)(1 + 2x) + a(1 + 2x) \\ &= (1 + 2x)(1 - 2x + a) \end{aligned}$$

$$\begin{aligned} 2. \quad (c) \quad & a^2 - x^2 - 6x - 9 \\ &= a^2 - (x + 3)^2 \\ &= (a - x - 3)(a + x + 3) \end{aligned}$$

$$\begin{aligned} (d) \quad & 3x^2 - 12xy + 12y^2 - 48 \\ &= 3(x^2 - 4xy + 4y^2 - 16) \\ &= 3[(x - 2y)^2 - 16] \\ &= 3(x - 2y + 4)(x - 2y - 4) \end{aligned}$$

$$\begin{aligned} (e) \quad & 9x^2 - 9 + 6y - y^2 \\ &= 9x^2 - (y - 3)^2 \\ &= (3x - y + 3)(3x + y - 3) \end{aligned}$$

$$\begin{aligned} (f) \quad & x^2 + y^2 - z^2 - 2xy \\ &= (x - y)^2 - z^2 \\ &= (x - y + z)(x - y - z) \end{aligned}$$

4. (a)  $x^4 + 16x^2y^2 + 64y^4$

$$= (x^2 + 8y^2)^2$$

(b)  $x^4 + 64y^4$

$$= x^4 + 16x^2y^2 + 64y^4 - 16x^2y^2$$

$$= (x^2 + 8y^2)^2 - 16x^2y^2$$

$$= (x^2 - 4xy + 8y^2)(x^2 + 4xy + 8y^2)$$

5. (a)  $a^4 + 2a^2b^2 + b^4$

$$= (a^2 + b^2)^2$$

(b)  $a^4 + a^2b^2 + b^4$

$$= a^4 + 2a^2b^2 + b^4 - a^2b^2$$

$$= (a^2 + b^2)^2 - a^2b^2$$

$$= (a^2 - ab + b^2)(a^2 + ab + b^2)$$

7. (a)  $x^2 + 2xy + y^2$

$$= (x + y)^2$$

(b)  $x^2 + y^2 + 4xy - 1 - x^2y^2$

$$= x^2 + 2xy + y^2 + 2xy - 1 - x^2y^2$$

$$= (x + y)^2 - (xy - 1)^2$$

$$= (x + y - xy + 1)(x + y + xy - 1)$$