

## 7.4 NOTES – SUM AND DIFFERENCE OF CUBES

### OBJECTIVES:

- 1) Factor the sum and difference of cubes.

#### DIFFERENCE OF SQUARES

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

#### DIFFERENCE OF CUBES

$$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$$

$$\begin{array}{c} a a a \quad b b b \\ (a-b)(a^2 + ab + b^2) \end{array}$$

#### SUM OF CUBES

$$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$$

$$\begin{array}{c} a a a \quad b b b \\ (a+b)(a^2 - ab + b^2) \end{array}$$

Factor completely.

1)  $x^3 - 27$

$$x x x \quad 3 \quad 3 \quad 3$$

$$(x-3)(x^2 + 3x + 9)$$

2)  $2a^4 + 16a$

$$2a(a^3 + 8)$$

$$a a a \quad 2 \quad 2 \quad 2$$

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

3)  $(x+2)^2 - 9$

$$((x+2)+3)((x+2)-3)$$

$$(x+5)(x-1)$$

4)  $a^2b^4 - a^4b^2$

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

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

5)  $4x^2 - 12xy + 9y^2$

$$(2x-3)^2$$

6)  $27 - (y+2)^3$

$$3^3 - (y+2)^3$$

$$3 \quad 3 \quad 3 \quad (y+2)(y+2)(y+2)$$

$$(3 - (y+2))(9 + 3(y+2) + (y+2)^2)$$

$$(3 - y - 2)(9 + 3y + 6 + y^2 + 4y + 4)$$

$$(1-y)(y^2 + 7y + 19)$$

7)  $125x^6 + 729y^3$

$$5x^3 \quad 5x^3 \quad 5x^3 \quad 9y \quad 9y \quad 9y$$

$$(5x^3 + 9y)(25x^3 - 45x^3y + 81y^2)$$

8)  $64a^6 - b^6$

$$\text{D.O.C.} \quad 4a^2 \quad 4a^2 \quad 4a^2 \quad b^2 \quad b^2 \quad b^2$$

$$(4a^2 - b^2)(16a^4 + 4a^2b^2 + b^4)$$

$$(2a+b)(2a-b)(16a^4 + 4a^2b^2 + b^4)$$

OR

$$(8a^3 + b^3)(8a^3 - b^3) \leftarrow \text{D.O.S.}$$

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

9)  $16 - (x+4)^2$

$$(4 - (x+4))(4 + (x+4))$$

$$(4 - x - 4)(x + 8)$$

$$-x(x+8)$$

## FACTORIZING BY GROUPING TERMS.

Factor completely.

$$10) \underbrace{x^2 + 6x + 9} - y^2$$

$$(x+3)^2 - y^2$$

$$(x+3+y)(x+3-y)$$

**HINT!** Group terms of 3 and 1 **OR** group terms of 1 and 3, whichever gives you a difference of 2 squares

$$11) \underbrace{p^2 - 14p + 49} - 9k^2$$

$$(p-7)^2 - 9k^2$$

$$((p-7)+3k)((p-7)-3k)$$

$$(p-7+3k)(p-7-3k)$$

$$12) 81 - x^2 + 2xy - y^2$$

$$81 - (x^2 - 2xy + y^2)$$

$$81 - (x-y)^2$$

$$(9+(x-y))(9-(x-y))$$

$$(9+x-y)(9-x+y)$$

$$13) 7a^2x - 6a^2 - 7x + 6$$

$$a^2(7x-6) - 1(7x-6)$$

$$(a^2-1)(7x-6)$$

$$(a+1)(a-1)(7x-6)$$

$$14) 49y^2 - x^2 - 10x - 25$$

$$49y^2 - (x^2 + 10x + 25)$$

$$49y^2 - (x+5)^2$$

$$(7y+(x+5))(7y-(x+5))$$

$$(7y+x+5)(7y-x-5)$$