

Example 4

Perfect Cubes : 1, 8, 27, 64, 125

Factorise (i) $a^3 + 8b^3$ (ii) $64c^3 - 125d^3$

Sum of 2 Cubes

Difference of 2 Cubes

Difference of 2 Cubes $x^3 - y^3 = (x - y)(x^2 + xy + y^2)$ P.13

Sum of 2 Cubes $x^3 + y^3 = (x + y)(x^2 - xy + y^2)$

$$\begin{aligned} \text{(i)} \quad a^3 + 8b^3 &= (a + 2b)(a^2 - a(2b) + (2b)^2) \\ &= (a + 2b)(a^2 - 2ab + 4b^2) \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad 64c^3 - 125d^3 &= (4c - 5d)(4c^2 + (4c)(5d) + (5d)^2) \\ &= (4c - 5d)(16c^2 + 20cd + 25d^2) \end{aligned}$$

51. Using the quadratic formula, factorise each of the following: (i) $x^2 + 3\sqrt{3}x + 6$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$a = 1$$

$$b = 3\sqrt{3}$$

$$c = 6$$

$$x = \frac{-3\sqrt{3} \pm \sqrt{(3\sqrt{3})^2 - 4(1)(6)}}{2(1)}$$

$$= \frac{-3\sqrt{3} \pm \sqrt{27 - 24}}{2} = \frac{-3\sqrt{3} \pm \sqrt{3}}{2}$$

sols \Rightarrow ① $x = \frac{-2\sqrt{3}}{2} = -\sqrt{3}$

② $x = \frac{-4\sqrt{3}}{2} = -2\sqrt{3}$

factors $(x + \sqrt{3})(x + 2\sqrt{3})$

51. Using the quadratic formula, factorise each of the following: (ii) $x^2 + 2\sqrt{5}x - 15$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$a=1, b=2\sqrt{5}, c=-15$$

FACTOR

$$x = \frac{-2\sqrt{5} \pm \sqrt{(2\sqrt{5})^2 - 4(1)(-15)}}{2(1)}$$

$$= \frac{-2\sqrt{5} \pm \sqrt{80}}{2} = \frac{-2\sqrt{5} \pm 4\sqrt{5}}{2}$$

$$= \sqrt{5} \pm 2\sqrt{5}$$

$$\Rightarrow x = 3\sqrt{5} \quad \text{or} \quad x = -\sqrt{5}$$

$$(x - 3\sqrt{5})(x + \sqrt{5})$$

52. Using both the sum and the difference of two cubes, factorise the following:

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

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

Difference of 2 Cubes $x^3 - y^3 = (x-y)(x^2 + xy + y^2)$

Sum of 2 Cubes $x^3 + y^3 = (x+y)(x^2 - xy + y^2)$

52. Using both the sum and the difference of two cubes, factorise the following:

$$\begin{aligned} \text{(iii) } 8x^3 + y^3 &= (2x+y)(2x)^2 - (2x)y + y^2 \\ &= (2x+y)(4x^2 - 2xy + y^2) \end{aligned}$$

Difference of 2 Cubes $x^3 - y^3 = (x-y)(x^2 + xy + y^2)$

Sum of 2 Cubes $x^3 + y^3 = (x+y)(x^2 - xy + y^2)$

Factorise each of the expressions

53. (i) $27x^3 - y^3$ (ii) $x^3 - 64$

HW. Sec. 1.3 Q53-55