

Factorising the Sum and Difference of 2 Cubes

Factorise each of the expressions

54. (i) $8 + 27k^3$

(ii) $64 - 125a^3$

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

$$a^3 = 8 \Rightarrow a = 2$$

$$b^3 = 27k^3 \Rightarrow b = 3k$$

$$\begin{aligned} 8 + 27k^3 &= (2 + 3k)((2)^2 - (2)(3k) + (3k)^2) \\ &= (2 + 3k)(4 - 6k + 9k^2) \end{aligned}$$

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

$$a^3 = 64 \Rightarrow a = 4$$

$$b^3 = 125a^3 \Rightarrow b = 5a$$

$$\begin{aligned} 64 - 125a^3 &= (4 - 5a)((4)^2 + (4)(5a) + (5a)^2) \\ &= (4 - 5a)(16 + 20a + 25a^2) \end{aligned}$$

Functions

9. If $f(x) = x + 5$, find, in terms of a , $f(a^2) - 3f(a) + 2$.

$$f(a^2) = a^2 + 5$$

$$f(a) = a + 5$$

$$-3f(a) = -3(a + 5) = -3a - 15$$

$$\begin{aligned} f(a^2) - 3f(a) + 2 &= a^2 + 5 - 3a - 15 + 2 \\ &= a^2 - 3a - 8 \end{aligned}$$