

Mathematics

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(Chapter – 2) (Polynomials)(Exemplar Problems)

(Class – IX)

Exercise 2.4

Question 8:

If $a + b + c = 5$ and $ab + bc + ca = 10$, then prove that $a^3 + b^3 + c^3 - 3abc = -25$.

Answer 8:

Given that: $a + b + c = 5$ and $ab + bc + ca = 10$

Using the identity $(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$, we have

$$5^2 = a^2 + b^2 + c^2 + 2(ab + bc + ca)$$

$$\Rightarrow 25 = a^2 + b^2 + c^2 + 2(10)$$

$$\Rightarrow 25 = a^2 + b^2 + c^2 + 20$$

$$\Rightarrow a^2 + b^2 + c^2 = 5$$

Now, applying $a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$, we have

$$a^3 + b^3 + c^3 - 3abc = (5)(5 - 10) = -25$$

