

Q1. Factorise :

- (i) $8x^3 + 27y^3 + z^3 - 18xyz$ (ii) $a^3 - 8b^3 - 64c^3 - 24abc$ (iii) $2\sqrt{2}a^3 + 16\sqrt{2}b^3 + c^3 - 12abc$
 (iv) $x^3 - 27y^3 - 64z^3 - 36xyz$ (v) $125a^3 - 216b^3 - 64c^3 - 360abc$

- Ans. 1 (i) $(2x + 3y + z)(4x^2 + 9y^2 + z^2 - 6xy - 3yz - 2zx)$
 (ii) $(a - 2b - 4c)(a^2 + 4b^2 + 16c^2 + 2ab - 8bc + 4ac)$
 (iii) $(\sqrt{2}a + 2\sqrt{2}b + c)(2a^2 + 8b^2 + c^2 - 4ab - 2\sqrt{2}bc - \sqrt{2}ca)$
 (iv) $(x - 3y - 4z)(x^2 + 9y^2 + 16z^2 + 3xy - 12yz + 4zx)$
 (v) $(5a - 6b - 4c)(25a^2 + 36b^2 + 16c^2 + 30ab - 24bc + 20ac)$

Q2. Prove that : $a^3 + b^3 + c^3 - 3abc = \frac{1}{2}(a + b + c) \{ (a - b)^2 + (b - c)^2 + (c - a)^2 \}$

Q3. Prove that : $x^3 + y^3 + z^3 - 3xyz = \frac{1}{2}(x + y + z) \{ (x - y)^2 + (y - z)^2 + (z - x)^2 \}$

Q4. If $(a + b + c) = 0$, show that $a^3 + b^3 + c^3 = 3abc$.

Q5. If $(x + y + z) = 0$, show that $x^3 + y^3 + z^3 = 3xyz$.

Q6. Without actually calculating the cubes , find the value of each of the following :

- (i) $(-12)^3 + (7)^3 + (5)^3$ (ii) $(4)^3 + (-9)^3 + (5)^3$ (iii) $(28)^3 + (-15)^3 + (-13)^3$ (iv) $\left(\frac{1}{2}\right)^3 + \left(\frac{1}{3}\right)^3 - \left(\frac{5}{6}\right)^3$
 (v) $\left(\frac{1}{3}\right)^3 + \left(\frac{1}{4}\right)^3 - \left(\frac{7}{12}\right)^3$ (vi) $(0 \cdot 2)^3 - (0 \cdot 3)^3 + (0 \cdot 1)^3$ (vii) $(0 \cdot 7)^3 - (0 \cdot 8)^3 + (0 \cdot 1)^3$

- Ans. 6 (i) -1260 (ii) -540 (iii) 16380 (iv) $\frac{-5}{12}$ (v) $\frac{-7}{48}$ (vi) -0.018 (vii) -0.168

Q7. Factorise $(x - y)^3 + (y - z)^3 + (z - x)^3$.

Ans. $3(x - y)(y - z)(z - x)$

Q8. Factorise $(p - q)^3 + (q - r)^3 + (r - p)^3$.

Ans. $3(p - q)(q - r)(r - p)$

Q9. Factorise $(2x - y)^3 + (y - 3z)^3 + (3z - 2x)^3$.

Ans. $3(2x - y)(y - 3z)(3z - 2x)$

Q10. If a , b , c are all non-zero and $a + b + c = 0$, prove that $\frac{a^2}{bc} + \frac{b^2}{ca} + \frac{c^2}{ab} = 3$

Q11. If $a + b + c = 5$ and $ab + bc + ca = 10$ then find $a^3 + b^3 + c^3 - 3abc$

Ans. -25

Q12. If $a + b + c = 9$ and $ab + bc + ca = 23$ then find $a^3 + b^3 + c^3 - 3abc$

Ans. 108

Q13. If $a + b + c = 15$ and $a^2 + b^2 + c^2 = 83$ then find $a^3 + b^3 + c^3 - 3abc$

Ans. 180

