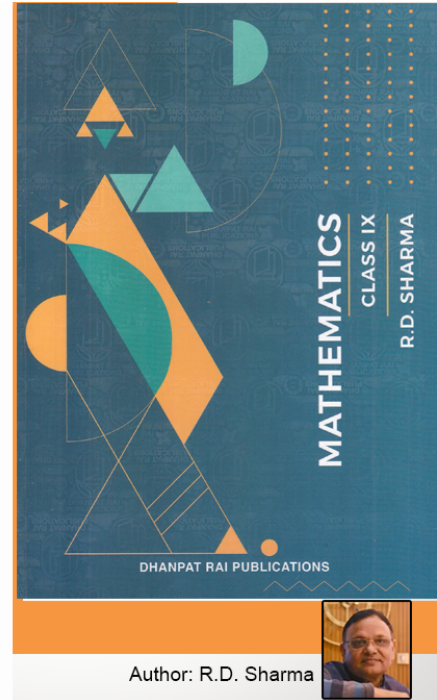


Class 9 - Chapter 4 Algebraic Identities



RD Sharma Solutions for Class 9 Maths Chapter 4–Algebraic Identities

Class 9: Maths Chapter 4 solutions. Complete Class 9 Maths Chapter 4 Notes.

RD Sharma Solutions for Class 9 Maths Chapter 4–Algebraic Identities

RD Sharma 9th Maths Chapter 4, Class 9 Maths Chapter 4 solutions

<https://www.indcareer.com/schools/rd-sharma-solutions-for-class-9-maths-chapter-4-algebraic-identities/>



Exercise 4.1 Page No: 4.6

Question 1: Evaluate each of the following using identities:

(i) $(2x - 1/x)^2$

(ii) $(2x + y)(2x - y)$

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

(iv) $(a - 0.1)(a + 0.1)$

(v) $(1.5x^2 - 0.3y^2)(1.5x^2 + 0.3y^2)$

Solution:

(i) $(2x - 1/x)^2$ [Use identity: $(a - b)^2 = a^2 + b^2 - 2ab$]

$$(2x - 1/x)^2 = (2x)^2 + (1/x)^2 - 2(2x)(1/x)$$

$$= 4x^2 + 1/x^2 - 4$$

(ii) $(2x + y)(2x - y)$ [Use identity: $(a - b)(a + b) = a^2 - b^2$]

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

$$= 4x^2 - y^2$$

(iii) $(a^2b - b^2a)^2$ [Use identity: $(a - b)^2 = a^2 + b^2 - 2ab$]

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

$$= a^4b^2 + b^4a^2 - 2a^3b^3$$

(iv) $(a - 0.1)(a + 0.1)$ [Use identity: $(a - b)(a + b) = a^2 - b^2$]

$$(a - 0.1)(a + 0.1) = (a)^2 - (0.1)^2$$

$$= (a)^2 - 0.01$$

(v) $(1.5x^2 - 0.3y^2)(1.5x^2 + 0.3y^2)$ [Use identity: $(a - b)(a + b) = a^2 - b^2$]

$$(1.5x^2 - 0.3y^2)(1.5x^2 + 0.3y^2) = (1.5x^2)^2 - (0.3y^2)^2$$

<https://www.indcareer.com/schools/rd-sharma-solutions-for-class-9-maths-chapter-4-algebraic-identities/>

$$= 2.25x^4 - 0.09y^4$$

Question 2: Evaluate each of the following using identities:

(i) $(399)^2$

(ii) $(0.98)^2$

(iii) 991×1009

(iv) 117×83

Solution:

(i)

$$\begin{aligned} 399^2 &= (400-1)^2 \\ &= (400)^2 + (1)^2 - 2 \times 400 \times 1 \end{aligned}$$

[Use identity: $(a - b)^2 = a^2 + b^2 - 2ab$]

Here, $a = 400$ and $b = 1$

$$= 160000 + 1 - 8000$$

$$= 159201$$

$$\text{So, } (399)^2 = 159201$$

(ii)

$$(0.98)^2 = (1-0.02)^2$$

[Use identity: $(a - b)^2 = a^2 + b^2 - 2ab$]

$$= (1)^2 + (0.02)^2 - 2 \times 1 \times 0.02$$

$$= 1 + 0.0004 - 0.04$$

$$= 1.0004 - 0.04$$

$$= 0.9604$$

$$\text{So, } (0.98)^2 = 0.9604$$

(iii)

$$991 \times 1009$$

$$= (1000-9)(1000+9)$$

[Use identity: $(a - b)(a + b) = a^2 - b^2$]

$$= (1000)^2 - (9)^2$$

$$= 1000000 - 81$$

$$= 999919$$

$$991 \times 1009 = 999919$$

(iv)

$$117 \times 83$$

$$= (100+17)(100-17)$$

[Use identity: $(a - b)(a + b) = a^2 - b^2$]

$$= (100)^2 - (17)^2$$

$$= 10000 - 289$$

$$= 9711$$

$$117 \times 83 = 9711$$

Question 3: Simplify each of the following:

(i) $175 \times 175 + 2 \times 175 \times 25 + 25 \times 25$

(ii) $322 \times 322 - 2 \times 322 \times 22 + 22 \times 22$

(iii) $0.76 \times 0.76 + 2 \times 0.76 \times 0.24 + 0.24 \times 0.24$

(iv)

$$\frac{7.83 \times 7.83 - 1.17 \times 1.17}{6.66}$$

Solution:

(i) $175 \times 175 + 2 \times 175 \times 25 + 25 \times 25 = (175)^2 + 2(175)(25) + (25)^2$

$$= (175 + 25)^2 \text{ [Because } a^2 + b^2 + 2ab = (a+b)^2 \text{]}$$

$$= (200)^2$$

$$= 40000$$

So, $175 \times 175 + 2 \times 175 \times 25 + 25 \times 25 = 40000$.

(ii) $322 \times 322 - 2 \times 322 \times 22 + 22 \times 22$

$$= (322)^2 - 2 \times 322 \times 22 + (22)^2$$

<https://www.indcareer.com/schools/rd-sharma-solutions-for-class-9-maths-chapter-4-algebraic-identities/>

$$= (322 - 22)^2 \text{ [Because } a^2 + b^2 - 2ab = (a-b)^2 \text{]}$$

$$= (300)^2$$

$$= 90000$$

$$\text{So, } 322 \times 322 - 2 \times 322 \times 22 + 22 \times 22 = 90000.$$

$$\text{(iii) } 0.76 \times 0.76 + 2 \times 0.76 \times 0.24 + 0.24 \times 0.24$$

$$= (0.76)^2 + 2 \times 0.76 \times 0.24 + (0.24)^2$$

$$= (0.76 + 0.24)^2 \text{ [Because } a^2 + b^2 + 2ab = (a+b)^2 \text{]}$$

$$= (1.00)^2$$

$$= 1$$

$$\text{So, } 0.76 \times 0.76 + 2 \times 0.76 \times 0.24 + 0.24 \times 0.24 = 1.$$

(iv)

$$\begin{aligned} & \frac{7.83 \times 7.83 - 1.17 \times 1.17}{6.66} \\ &= \frac{(7.83 + 1.17)(7.83 - 1.17)}{6.66} \\ &= \frac{(9.00)(6.66)}{(6.66)} = 9 \end{aligned}$$

Question 4: If $x + 1/x = 11$, find the value of $x^2 + 1/x^2$.

Solution:

<https://www.indcareer.com/schools/rd-sharma-solutions-for-class-9-maths-chapter-4-algebraic-identities/>

$$x + \frac{1}{x} = 11 \quad (\text{Given})$$

$$\text{So, } (x + \frac{1}{x})^2 = x^2 + (\frac{1}{x})^2 + 2 \times x \times \frac{1}{x}$$

$$\Rightarrow (x + \frac{1}{x})^2 = x^2 + \frac{1}{x^2} + 2$$

$$\Rightarrow (11)^2 = x^2 + \frac{1}{x^2} + 2$$

$$\Rightarrow 121 = x^2 + \frac{1}{x^2} + 2$$

$$\Rightarrow x^2 + \frac{1}{x^2} = 119$$

Question 5: If $x - 1/x = -1$, find the value of $x^2 + 1/x^2$.

Solution:

$$x - \frac{1}{x} = -1 \quad (\text{Given})$$

$$\text{So, } (x - \frac{1}{x})^2 = x^2 + (\frac{1}{x})^2 - 2 \times x \times \frac{1}{x}$$

$$\Rightarrow (x - \frac{1}{x})^2 = x^2 + \frac{1}{x^2} - 2$$

$$\Rightarrow (-1)^2 = x^2 + \frac{1}{x^2} - 2$$

$$\Rightarrow 2 + 1 = x^2 + \frac{1}{x^2}$$

$$\Rightarrow x^2 + \frac{1}{x^2} = 3$$

Exercise 4.2 Page No: 4.11

Question 1: Write the following in the expanded form:

(i) $(a + 2b + c)^2$

(ii) $(2a - 3b - c)^2$

<https://www.indcareer.com/schools/rd-sharma-solutions-for-class-9-maths-chapter-4-algebraic-identities/>

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

(iv) $(m+2n-5p)^2$

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

(vi) $(a^2+b^2+c^2)^2$

(vii) $(ab+bc+ca)^2$

(viii) $(x/y+y/z+z/x)^2$

(ix) $(a/bc + b/ac + c/ab)^2$

(x) $(x+2y+4z)^2$

(xi) $(2x-y+z)^2$

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

Solution:

Using identities:

$$(x + y + z)^2 = x^2 + y^2 + z^2 + 2xy + 2yz + 2xz$$

(i) $(a + 2b + c)^2$

$$= a^2 + (2b)^2 + c^2 + 2a(2b) + 2ac + 2(2b)c$$

$$= a^2 + 4b^2 + c^2 + 4ab + 2ac + 4bc$$

(ii) $(2a - 3b - c)^2$

$$= [(2a) + (-3b) + (-c)]^2$$

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

$$= 4a^2 + 9b^2 + c^2 - 12ab + 6bc - 4ca$$

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

$$= [(-3x)^2 + y^2 + z^2 + 2(-3x)y + 2yz + 2(-3x)z]$$

<https://www.indcareer.com/schools/rd-sharma-solutions-for-class-9-maths-chapter-4-algebraic-identities/>

$$= 9x^2 + y^2 + z^2 - 6xy + 2yz - 6xz$$

$$\text{(iv) } (m+2n-5p)^2$$

$$= m^2 + (2n)^2 + (-5p)^2 + 2m \times 2n + (2 \times 2n \times -5p) + 2m \times -5p$$

$$= m^2 + 4n^2 + 25p^2 + 4mn - 20np - 10pm$$

$$\text{(v) } (2+x-2y)^2$$

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

$$= 4 + x^2 + 4y^2 + 4x - 4xy - 8y$$

$$\text{(vi) } (a^2+b^2+c^2)^2$$

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

$$= a^4 + b^4 + c^4 + 2a^2b^2 + 2b^2c^2 + 2c^2a^2$$

$$\text{(vii) } (ab+bc+ca)^2$$

$$= (ab)^2 + (bc)^2 + (ca)^2 + 2(ab)(bc) + 2(bc)(ca) + 2(ab)(ca)$$

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

$$\text{(viii) } (x/y+y/z+z/x)^2$$

$$= \left(\frac{x}{y}\right)^2 + \left(\frac{y}{z}\right)^2 + \left(\frac{z}{x}\right)^2 + 2\frac{x}{y}\frac{y}{z} + 2\frac{y}{z}\frac{z}{x} + 2\frac{z}{x}\frac{x}{y}$$

$$= \left(\frac{x^2}{y^2}\right) + \left(\frac{y^2}{z^2}\right) + \left(\frac{z^2}{x^2}\right) + 2\frac{x}{z} + 2\frac{y}{x} + 2\frac{z}{y}$$

$$\text{(ix) } (a/bc + b/ac + c/ab)^2$$

$$= \left(\frac{a}{bc}\right)^2 + \left(\frac{b}{ca}\right)^2 + \left(\frac{c}{ab}\right)^2 + 2\left(\frac{a}{bc}\right)\left(\frac{b}{ca}\right) + 2\left(\frac{b}{ca}\right)\left(\frac{c}{ab}\right) + 2\left(\frac{a}{bc}\right)\left(\frac{c}{ab}\right)$$

$$= \left(\frac{a^2}{b^2c^2}\right) + \left(\frac{b^2}{c^2a^2}\right) + \left(\frac{c^2}{a^2b^2}\right) + \frac{2}{a^2} + \frac{2}{b^2} + \frac{2}{c^2}$$

<https://www.indcareer.com/schools/rd-sharma-solutions-for-class-9-maths-chapter-4-algebraic-identities/>

$$(x) (x+2y+4z)^2$$

$$= x^2 + (2y)^2 + (4z)^2 + (2x)(2y) + 2(2y)(4z) + 2x(4z)$$

$$= x^2 + 4y^2 + 16z^2 + 4xy + 16yz + 8xz$$

$$(xi) (2x-y+z)^2$$

$$= (2x)^2 + (-y)^2 + (z)^2 + 2(2x)(-y) + 2(-y)(z) + 2(2x)(z)$$

$$= 4x^2 + y^2 + z^2 - 4xy - 2yz + 4xz$$

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

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

$$= 4x^2 + 9y^2 + 4z^2 - 12xy + 12yz - 8xz$$

Question 2: Simplify

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

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

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

$$(iv) (2x + p - c)^2 - (2x - p + c)^2$$

$$(v) (x^2 + y^2 - z^2)^2 - (x^2 - y^2 + z^2)^2$$

Solution:

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

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

$$= 2a^2 + 2b^2 + 2c^2 + 4ca$$

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

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

$$= a^2 + b^2 + c^2 + 2ab + 2bc + 2ca - a^2 - b^2 - c^2 + 2ab + 2bc - 2ca$$

<https://www.indcareer.com/schools/rd-sharma-solutions-for-class-9-maths-chapter-4-algebraic-identities/>

$$= 4ab + 4bc$$

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

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

$$= 3a^2 + 3b^2 + 3c^2 + 2ab - 2bc + 2ca$$

$$(iv) (2x + p - c)^2 - (2x - p + c)^2$$

$$= [4x^2 + p^2 + c^2 + 4xp - 2pc - 4xc] - [4x^2 + p^2 + c^2 - 4xp - 2pc + 4xc]$$

$$= 4x^2 + p^2 + c^2 + 4xp - 2pc - 4xc - 4x^2 - p^2 - c^2 + 4xp + 2pc - 4xc$$

$$= 8xp - 8xc$$

$$= 8(xp - xc)$$

$$(v) (x^2 + y^2 - z^2)^2 - (x^2 - y^2 + z^2)^2$$

$$= (x^2 + y^2 + (-z)^2)^2 - (x^2 - y^2 + z^2)^2$$

$$= [x^4 + y^4 + z^4 + 2x^2y^2 - 2y^2z^2 - 2x^2z^2] - [x^4 + y^4 + z^4 - 2x^2y^2 - 2y^2z^2 + 2x^2z^2]$$

$$= 4x^2y^2 - 4z^2x^2$$

Question 3: If $a + b + c = 0$ and $a^2 + b^2 + c^2 = 16$, find the value of $ab + bc + ca$.

Solution:

$$a + b + c = 0 \text{ and } a^2 + b^2 + c^2 = 16 \text{ (given)}$$

$$\text{Choose } a + b + c = 0$$

Squaring both sides,

$$(a + b + c)^2 = 0$$

$$a^2 + b^2 + c^2 + 2(ab + bc + ca) = 0$$

$$16 + 2(ab + bc + ca) = 0$$

$$2(ab + bc + ca) = -16$$

<https://www.indcareer.com/schools/rd-sharma-solutions-for-class-9-maths-chapter-4-algebraic-identities/>

$$ab + bc + ca = -16/2 = -8$$

$$\text{or } ab + bc + ca = -8$$

Exercise 4.3 Page No: 4.19

Question 1: Find the cube of each of the following binomial expressions:

(i) $(1/x + y/3)$

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

(iii) $(2x + 3/x)$

(iv) $(4 - 1/3x)$

Solution:[Using identities: $(a + b)^3 = a^3 + b^3 + 3ab(a + b)$ and $(a - b)^3 = a^3 - b^3 - 3ab(a - b)$]

(i)

$$\begin{aligned} \left(\frac{1}{x} + \frac{y}{3}\right)^3 &= \left(\frac{1}{x}\right)^3 + \left(\frac{y}{3}\right)^3 + 3\left(\frac{1}{x}\right)\left(\frac{y}{3}\right)\left(\frac{1}{x} + \frac{y}{3}\right) \\ &= \frac{1}{x^3} + \frac{y^3}{27} + 3 \times \frac{1}{x} \times \frac{y}{3} \left(\frac{1}{x} + \frac{y}{3}\right) \\ &= \frac{1}{x^3} + \frac{y^3}{27} + \frac{y}{x} \left(\frac{1}{x} + \frac{y}{3}\right) \\ &= \frac{1}{x^3} + \frac{y^3}{27} + \left(\frac{y}{x} \times \frac{1}{x}\right) + \left(\frac{y}{x} \times \frac{y}{3}\right) \\ &= \frac{1}{x^3} + \frac{y^3}{27} + \frac{y}{x^2} + \frac{y^2}{3x} \end{aligned}$$

(ii)

$$\begin{aligned}\left(\frac{3}{x} - \frac{2}{x^2}\right)^3 &= \left(\frac{3}{x}\right)^3 - \left(\frac{2}{x^2}\right)^3 - 3\left(\frac{3}{x}\right)\left(\frac{2}{x^2}\right)\left(\frac{3}{x} - \frac{2}{x^2}\right) \\ &= \frac{27}{x^3} - \frac{8}{x^6} - 3 \times \frac{3}{x} \times \frac{2}{x^2} \left(\frac{3}{x} - \frac{2}{x^2}\right) \\ &= \frac{27}{x^3} - \frac{8}{x^6} - \frac{18}{x^3} \left(\frac{3}{x} - \frac{2}{x^2}\right) \\ &= \frac{27}{x^3} - \frac{8}{x^6} - \frac{54}{x^4} + \frac{36}{x^5}\end{aligned}$$

(iii)

$$\begin{aligned}\left(2x + \frac{3}{x}\right)^3 &= 8x^3 + \frac{27}{x^3} + \frac{18x}{x} \left(2x + \frac{3}{x}\right) \\ &= 8x^3 + \frac{27}{x^3} + \frac{18x}{x} \left(2x + \frac{3}{x}\right) \\ &= 8x^3 + \frac{27}{x^3} + (18 \times 2x) + \left(18 \times \frac{3}{x}\right) \\ &= 8x^3 + \frac{27}{x^3} + 36x + \frac{54}{x}\end{aligned}$$

(iv)

$$\begin{aligned}\left(4 - \frac{1}{3x}\right)^3 &= 4^3 - \left(\frac{1}{3x}\right)^3 - 3(4)\left(\frac{1}{3x}\right)\left(4 - \frac{1}{3x}\right) \\ &= 64 - \frac{1}{27x^3} - \frac{4}{x} \left(4 - \frac{1}{3x}\right) \\ &= 64 - \frac{1}{27x^3} - \frac{16}{x} + \frac{4}{3x^2}\end{aligned}$$

<https://www.indcareer.com/schools/rd-sharma-solutions-for-class-9-maths-chapter-4-algebraic-identities/>

Question 2: Simplify each of the following:

(i) $(x + 3)^3 + (x - 3)^3$

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

(iii) $(x + 2/x)^3 + (x - 2/x)^3$

(iv) $(2x - 5y)^3 - (2x + 5y)^3$

Solution:[Using identities:

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

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

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

$$(a + b)^2 = a^2 + b^2 + 2ab \text{ and}$$

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

(i) $(x + 3)^3 + (x - 3)^3$

Here $a = (x + 3)$, $b = (x - 3)$

$$= (x + 3 + x - 3)[(x + 3)^2 + (x - 3)^2 - (x + 3)(x - 3)]$$

$$= 2x[(x^2 + 9 + 6x) + (x^2 + 9 - 6x) - x^2 + 9]$$

$$= 2x[(x^2 + 9 + 6x + x^2 + 9 - 6x - x^2 + 9)]$$

$$= 2x(x^2 + 27)$$

$$= 2x^3 + 54x$$

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

Here $a = (x/2 + y/3)$ and $b = (x/2 - y/3)$

<https://www.indcareer.com/schools/rd-sharma-solutions-for-class-9-maths-chapter-4-algebraic-identities/>

$$\begin{aligned}
 &= \left[\left(\frac{x}{2} + \frac{y}{3} \right) - \left(\frac{x}{2} - \frac{y}{3} \right) \right] \left[\left(\frac{x}{2} + \frac{y}{3} \right)^2 + \left(\frac{x}{2} - \frac{y}{3} \right)^2 + \left(\frac{x}{2} + \frac{y}{3} \right) \left(\frac{x}{2} - \frac{y}{3} \right) \right] \\
 &= \frac{2y}{3} \left[\left(\frac{x^2}{4} + \frac{y^2}{9} + \frac{2xy}{6} \right) + \left(\frac{x^2}{4} + \frac{y^2}{9} - \frac{2xy}{6} \right) + \frac{x^2}{4} - \frac{y^2}{9} \right] \\
 &= \frac{2y}{3} \left[\frac{x^2}{4} + \frac{y^2}{9} + \frac{x^2}{4} + \frac{x^2}{4} \right] \\
 &= \frac{2y}{3} \left[\frac{3x^2}{4} + \frac{y^2}{9} \right] \\
 &= \frac{x^2y}{2} + \frac{2y^3}{27}
 \end{aligned}$$

(iii) $(x + 2/x)^3 + (x - 2/x)^3$

Here $a = (x + 2/x)$ and $b = (x - 2/x)$

$$\begin{aligned}
 &= \left(x + \frac{2}{x} + x - \frac{2}{x} \right) \left[\left(x + \frac{2}{x} \right)^2 + \left(x - \frac{2}{x} \right)^2 - \left(x + \frac{2}{x} \right) \left(x - \frac{2}{x} \right) \right] \\
 &= (2x) \left[\left(x^2 + \frac{4}{x^2} + \frac{4x}{x} \right) + \left(x^2 + \frac{4}{x^2} - \frac{4x}{x} \right) - \left(x^2 - \frac{4}{x^2} \right) \right] \\
 &= (2x) \left[\left(x^2 + \frac{4}{x^2} + \frac{4}{x^2} + \frac{4}{x^2} \right) \right] \\
 &= (2x) \left[\left(x^2 + \frac{12}{x^2} \right) \right] \\
 &= 2x^3 + \frac{24}{x}
 \end{aligned}$$

(iv) $(2x - 5y)^3 - (2x + 5y)^3$

Here $a = (2x - 5y)$ and $b = 2x + 5y$

<https://www.indcareer.com/schools/rd-sharma-solutions-for-class-9-maths-chapter-4-algebraic-identities/>

$$\begin{aligned} &= (2x - 5y - 2x - 5y)[(2x - 5y)^2 + (2x + 5y)^2 + ((2x - 5y)(2x + 5y))] \\ &= (-10y)[(4x^2 + 25y^2 - 20xy) + (4x^2 + 25y^2 + 20xy) + 4x^2 - 25y^2] \\ &= (-10y)[4x^2 + 4x^2 + 4x^2 + 25y^2] \\ &= (-10y)[12x^2 + 25y^2] \\ &= -120x^2y - 250y^3 \end{aligned}$$

Question 3: If $a + b = 10$ and $ab = 21$, find the value of $a^3 + b^3$.

Solution:

$$a + b = 10, ab = 21 \text{ (given)}$$

$$\text{Choose } a + b = 10$$

Cubing both sides,

$$(a + b)^3 = (10)^3$$

$$a^3 + b^3 + 3ab(a + b) = 1000$$

$$a^3 + b^3 + 3 \times 21 \times 10 = 1000 \text{ (using given values)}$$

$$a^3 + b^3 + 630 = 1000$$

$$a^3 + b^3 = 1000 - 630 = 370$$

$$\text{or } a^3 + b^3 = 370$$

Question 4: If $a - b = 4$ and $ab = 21$, find the value of $a^3 - b^3$.

Solution:

$$a - b = 4, ab = 21 \text{ (given)}$$

$$\text{Choose } a - b = 4$$

Cubing both sides,

<https://www.indcareer.com/schools/rd-sharma-solutions-for-class-9-maths-chapter-4-algebraic-identities/>

$$(a - b)^3 = (4)^3$$

$$a^3 - b^3 - 3ab(a - b) = 64$$

$$a^3 - b^3 - 3 \times 21 \times 4 = 64 \text{ (using given values)}$$

$$a^3 - b^3 - 252 = 64$$

$$a^3 - b^3 = 64 + 252$$

$$= 316$$

$$\text{Or } a^3 - b^3 = 316$$

Question 5: If $x + 1/x = 5$, find the value of $x^3 + 1/x^3$.

Solution:

$$\text{Given: } x + 1/x = 5$$

Apply Cube on $x + 1/x$

$$\left(x + \frac{1}{x}\right)^3 = x^3 + \frac{1}{x^3} + 3\left(x \times \frac{1}{x}\right)\left(x + \frac{1}{x}\right)$$

$$5^3 = x^3 + \frac{1}{x^3} + 3\left(x + \frac{1}{x}\right)$$

$$125 = x^3 + \frac{1}{x^3} + 3(5)$$

$$125 = x^3 + \frac{1}{x^3} + 15$$

$$125 - 15 = x^3 + \frac{1}{x^3}$$

$$x^3 + \frac{1}{x^3} = 110$$

Question 6: If $x - 1/x = 7$, find the value of $x^3 - 1/x^3$.

Solution:

<https://www.indcareer.com/schools/rd-sharma-solutions-for-class-9-maths-chapter-4-algebraic-identities/>

Given: $x - 1/x = 7$

Apply Cube on $x - 1/x$

$$\left(x - \frac{1}{x}\right)^3 = x^3 - \frac{1}{x^3} - 3\left(x \times \frac{1}{x}\right)\left(x - \frac{1}{x}\right)$$

$$7^3 = x^3 - \frac{1}{x^3} - 3\left(x - \frac{1}{x}\right)$$

$$343 = x^3 - \frac{1}{x^3} - (3 \times 7)$$

$$343 + 21 = x^3 - \frac{1}{x^3}$$

$$x^3 - \frac{1}{x^3} = 364$$

Question 7: If $x - 1/x = 5$, find the value of $x^3 - 1/x^3$.

Solution:

Given: $x - 1/x = 5$

Apply Cube on $x - 1/x$

$$\left(x - \frac{1}{x}\right)^3 = x^3 - \frac{1}{x^3} - 3\left(x \times \frac{1}{x}\right)\left(x - \frac{1}{x}\right)$$

$$5^3 = x^3 - \frac{1}{x^3} - 3\left(x - \frac{1}{x}\right)$$

$$125 = x^3 - \frac{1}{x^3} - (3 \times 5)$$

$$125 = x^3 - \frac{1}{x^3} - 15$$

$$125 + 15 = x^3 - \frac{1}{x^3}$$

$$x^3 - \frac{1}{x^3} = 140$$

Question 8: If $(x^2 + 1/x^2) = 51$, find the value of $x^3 - 1/x^3$.

Solution:

We know that: $(x - y)^2 = x^2 + y^2 - 2xy$

Replace y with $1/x$, we get

$$(x - 1/x)^2 = x^2 + 1/x^2 - 2$$

Since $(x^2 + 1/x^2) = 51$ (given)

$$(x - 1/x)^2 = 51 - 2 = 49$$

$$\text{or } (x - 1/x) = \pm 7$$

Now, Find $x^3 - 1/x^3$

We know that, $x^3 - y^3 = (x - y)(x^2 + y^2 + xy)$

Replace y with $1/x$, we get

$$x^3 - 1/x^3 = (x - 1/x)(x^2 + 1/x^2 + 1)$$

Use $(x - 1/x) = 7$ and $(x^2 + 1/x^2) = 51$

<https://www.indcareer.com/schools/rd-sharma-solutions-for-class-9-maths-chapter-4-algebraic-identities/>

$$x^3 - 1/x^3 = 7 \times 52 = 364$$

$$x^3 - 1/x^3 = 364$$

Question 9: If $(x^2 + 1/x^2) = 98$, find the value of $x^3 + 1/x^3$.

Solution:

We know that: $(x + y)^2 = x^2 + y^2 + 2xy$

Replace y with $1/x$, we get

$$(x + 1/x)^2 = x^2 + 1/x^2 + 2$$

Since $(x^2 + 1/x^2) = 98$ (given)

$$(x + 1/x)^2 = 98 + 2 = 100$$

$$\text{or } (x + 1/x) = \pm 10$$

Now, Find $x^3 + 1/x^3$

We know that, $x^3 + y^3 = (x + y)(x^2 + y^2 - xy)$

Replace y with $1/x$, we get

$$x^3 + 1/x^3 = (x + 1/x)(x^2 + 1/x^2 - 1)$$

Use $(x + 1/x) = 10$ and $(x^2 + 1/x^2) = 98$

$$x^3 + 1/x^3 = 10 \times 97 = 970$$

$$x^3 + 1/x^3 = 970$$

Question 10: If $2x + 3y = 13$ and $xy = 6$, find the value of $8x^3 + 27y^3$.

Solution:

Given: $2x + 3y = 13$, $xy = 6$

Cubing $2x + 3y = 13$ both sides, we get

$$(2x + 3y)^3 = (13)^3$$

<https://www.indcareer.com/schools/rd-sharma-solutions-for-class-9-maths-chapter-4-algebraic-identities/>

$$(2x)^3 + (3y)^3 + 3(2x)(3y)(2x + 3y) = 2197$$

$$8x^3 + 27y^3 + 18xy(2x + 3y) = 2197$$

$$8x^3 + 27y^3 + 18 \times 6 \times 13 = 2197$$

$$8x^3 + 27y^3 + 1404 = 2197$$

$$8x^3 + 27y^3 = 2197 - 1404 = 793$$

$$8x^3 + 27y^3 = 793$$

Question 11: If $3x - 2y = 11$ and $xy = 12$, find the value of $27x^3 - 8y^3$.

Solution:

Given: $3x - 2y = 11$ and $xy = 12$

Cubing $3x - 2y = 11$ both sides, we get

$$(3x - 2y)^3 = (11)^3$$

$$(3x)^3 - (2y)^3 - 3(3x)(2y)(3x - 2y) = 1331$$

$$27x^3 - 8y^3 - 18xy(3x - 2y) = 1331$$

$$27x^3 - 8y^3 - 18 \times 12 \times 11 = 1331$$

$$27x^3 - 8y^3 - 2376 = 1331$$

$$27x^3 - 8y^3 = 1331 + 2376 = 3707$$

$$27x^3 - 8y^3 = 3707$$

Exercise 4.4 Page No: 4.23

Question 1: Find the following products:

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

(ii) $(4x - 5y)(16x^2 + 20xy + 25y^2)$

<https://www.indcareer.com/schools/rd-sharma-solutions-for-class-9-maths-chapter-4-algebraic-identities/>

(iii) $(7p^4 + q)(49p^8 - 7p^4q + q^2)$

(iv) $(x/2 + 2y)(x^2/4 - xy + 4y^2)$

(v) $(3/x - 5/y)(9/x^2 + 25/y^2 + 15/xy)$

(vi) $(3 + 5/x)(9 - 15/x + 25/x^2)$

(vii) $(2/x + 3x)(4/x^2 + 9x^2 - 6)$

(viii) $(3/x - 2x^2)(9/x^2 + 4x^4 - 6x)$

(ix) $(1 - x)(1 + x + x^2)$

(x) $(1 + x)(1 - x + x^2)$

(xi) $(x^2 - 1)(x^4 + x^2 + 1)$

(xii) $(x^3 + 1)(x^6 - x^3 + 1)$

Solution:

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

$= (3x + 2y)[(3x)^2 - (3x)(2y) + (2y)^2]$

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

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

$= 27x^3 + 8y^3$

(ii) $(4x - 5y)(16x^2 + 20xy + 25y^2)$

$= (4x - 5y)[(4x)^2 + (4x)(5y) + (5y)^2]$

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

$= (4x)^3 - (5y)^3$

$= 64x^3 - 125y^3$

(iii) $(7p^4 + q)(49p^8 - 7p^4q + q^2)$

<https://www.indcareer.com/schools/rd-sharma-solutions-for-class-9-maths-chapter-4-algebraic-identities/>

$$= (7p^4 + q)[(7p^4)^2 - (7p^4)(q) + (q)^2]$$

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

$$= (7p^4)^3 + (q)^3$$

$$= 343 p^{12} + q^3$$

(iv) $(x/2 + 2y)(x^2/4 - xy + 4y^2)$

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

$$(x/2 + 2y)(x^2/4 - xy + 4y^2)$$

$$= \left(\frac{x}{2} + 2y\right) \left[\left(\frac{x}{2}\right)^2 - \frac{x}{2}(2y) + (2y)^2\right]$$

$$= \left(\frac{x}{2}\right)^3 + (2y)^3$$

$$= \frac{x^3}{8} + 8y^3$$

(v) $(3/x - 5/y)(9/x^2 + 25/y^2 + 15/xy)$

$$= \left(\frac{3}{x} - \frac{5}{y}\right) \left(\frac{3}{x}\right)^2 + \left(\frac{5}{y}\right)^2 + \left(\frac{3}{x}\right)\left(\frac{5}{y}\right)$$

$$= \left(\frac{3}{x}\right)^3 - \left(\frac{5}{y}\right)^3$$

$$= \left(\frac{27}{x^3}\right) - \left(\frac{125}{y^3}\right)$$

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

(vi) $(3 + 5/x)(9 - 15/x + 25/x^2)$

$$\begin{aligned} &= \left(3 + \frac{5}{x}\right) \left[\left(3^2\right) - 3\left(\frac{5}{x}\right) + \left(\frac{5}{x}\right)^2 \right] \\ &= \left(3\right)^3 + \left(\frac{5}{x}\right)^3 \\ &= 27 + \frac{125}{x^3} \end{aligned}$$

[Using: $a^3 + b^3 = (a + b)(a^2 + b^2 - ab)$]

(vii) $(2/x + 3x)(4/x^2 + 9x^2 - 6)$

$$\begin{aligned} &= \left(\frac{2}{x} + 3x\right) \left[\left(\frac{2}{x}\right)^2 + (3x)^2 - \left(\frac{2}{x}\right)(3x) \right] \\ &= \left(\frac{2}{x}\right)^3 + (3x)^3 \\ &= \frac{8}{x^3} + 27x^3 \end{aligned}$$

[Using: $a^3 + b^3 = (a + b)(a^2 + b^2 - ab)$]

(viii) $(3/x - 2x^2)(9/x^2 + 4x^4 - 6x)$

$$\begin{aligned} &= \left(\frac{3}{x} - 2x^2\right) \left[\left(\frac{3}{x}\right)^2 + (2x^2)^2 - \left(\frac{3}{x}\right)(2x^2) \right] \\ &= \left(\frac{3}{x} - 2x^2\right) \left[\left(\frac{9}{x^2}\right) + 4x^4 - \left(\frac{3}{x}\right)(2x^2) \right] \\ &= \left(\frac{3}{x}\right)^3 - (2x^2)^3 \\ &= \frac{27}{x^3} - 8x^6 \end{aligned}$$

[Using : $a^3 - b^3 = (a - b)(a^2 + b^2 + ab)$]

(ix) $(1 - x)(1 + x + x^2)$

And we know, $a^3 - b^3 = (a - b)(a^2 + b^2 + ab)$

$(1 - x)(1 + x + x^2)$ can be written as

<https://www.indcareer.com/schools/rd-sharma-solutions-for-class-9-maths-chapter-4-algebraic-identities/>

$$(1 - x)[(1^2 + (1)(x) + x^2)]$$

$$= (1)^3 - (x)^3$$

$$= 1 - x^3$$

$$(x)(1 + x)(1 - x + x^2)$$

And we know, $a^3 + b^3 = (a + b)(a^2 + b^2 - ab)$

$(1 + x)(1 - x + x^2)$ can be written as,

$$(1 + x)[(1^2 - (1)(x) + x^2)]$$

$$= (1)^3 + (x)^3$$

$$= 1 + x^3$$

(xi) $(x^2 - 1)(x^4 + x^2 + 1)$ can be written as,

$$(x^2 - 1)[(x^2)^2 - 1^2 + (x^2)(1)]$$

$$= (x^2)^3 - 1^3$$

$$= x^6 - 1[\text{using } a^3 - b^3 = (a - b)(a^2 + b^2 + ab)]$$

(xii) $(x^3 + 1)(x^6 - x^3 + 1)$ can be written as,

$$(x^3 + 1)[(x^3)^2 - (x^3)(1) + 1^2]$$

$$= (x^3)^3 + 1^3$$

$$= x^9 + 1[\text{using } a^3 + b^3 = (a + b)(a^2 + b^2 - ab)]$$

Question 2: If $x = 3$ and $y = -1$, find the values of each of the following using in identity:

(i) $(9y^2 - 4x^2)(81y^4 + 36x^2y^2 + 16x^4)$

(ii) $(3/x - x/3)(x^2/9 + 9/x^2 + 1)$

(iii) $(x/7 + y/3)(x^2/49 + y^2/9 - xy/21)$

(iv) $(x/4 - y/3)(x^2/16 + xy/12 + y^2/9)$

<https://www.indcareer.com/schools/rd-sharma-solutions-for-class-9-maths-chapter-4-algebraic-identities/>

(v) $(5/x + 5x)(25/x^2 - 25 + 25x^2)$

Solution:

(i) $(9y^2 - 4x^2)(81y^4 + 36x^2y^2 + 16x^4)$
 $= (9y^2 - 4x^2) [(9y^2)^2 + 9y^2 \times 4x^2 + (4x^2)^2]$
 $= (9y^2)^3 - (4x^2)^3$
 $= 729 y^6 - 64 x^6$

Put $x = 3$ and $y = -1$

$$= 729 - 46656$$

$$= -45927$$

(ii) Put $x = 3$ and $y = -1$

$(3/x - x/3)(x^2/9 + 9/x^2 + 1)$

$$= \left(\frac{3}{x} - \frac{x}{3}\right) \left[\left(\frac{x}{3}\right)^2 + \frac{x}{3} \times \frac{3}{x} + \left(\frac{3}{x}\right)^2\right]$$
$$= \left(\frac{3}{x}\right)^3 - \left(\frac{x}{3}\right)^3$$
$$= \left(\frac{3}{3}\right)^3 - \left(\frac{3}{3}\right)^3$$
$$= 1^3 - 1^3 = 0$$

(iii) Put $x = 3$ and $y = -1$

$(x/7 + y/3)(x^2/49 + y^2/9 - xy/21)$

<https://www.indcareer.com/schools/rd-sharma-solutions-for-class-9-maths-chapter-4-algebraic-identities/>

$$\begin{aligned} &= \left(\frac{x}{7} + \frac{y}{3}\right) \left[\left(\frac{x}{7}\right)^2 - \frac{x}{7} \times \frac{y}{3} - \left(\frac{y}{3}\right)^2\right] \\ &= \left(\frac{x}{7}\right)^3 + \left(\frac{y}{3}\right)^3 \\ &= \frac{x^3}{343} + \frac{y^3}{27} \\ &= \frac{(3)^3}{343} + \frac{(-1)^3}{27} \\ &= \frac{27}{343} - \frac{1}{27} = \frac{729 - 343}{9261} = \frac{386}{9261} \end{aligned}$$

(iv) Put $x = 3$ and $y = -1$

$$(x/4 - y/3)(x^2/16 + xy/12 + y^2/9)$$

$$\begin{aligned} &= \left(\frac{x}{4} - \frac{y}{3}\right) \left[\left(\frac{x}{4}\right)^2 + \frac{x}{4} \times \frac{y}{3} + \left(\frac{y}{3}\right)^2\right] \\ &= \left(\frac{x}{4}\right)^3 - \left(\frac{y}{3}\right)^3 = \frac{x^3}{64} - \frac{y^3}{27} \\ &= \frac{(3)^3}{64} - \frac{(-1)^3}{27} = \frac{27}{64} + \frac{1}{27} \\ &= \frac{793}{1728} \end{aligned}$$

(v) Put $x = 3$ and $y = -1$

$$(5/x + 5x)(25/x^2 - 25 + 25x^2)$$

<https://www.indcareer.com/schools/rd-sharma-solutions-for-class-9-maths-chapter-4-algebraic-identities/>

$$\begin{aligned} &= \left(\frac{5}{x} + 5x\right) \left[\left(\frac{5}{x}\right)^2 - \frac{5}{x} \times 5x + (5x)^2\right] \\ &= \left(\frac{5}{x}\right)^3 + (5x)^3 = \frac{125}{x^3} + 125x^3 \\ &= \frac{125}{(3)^3} + 125 \times (3)^3 = \frac{125}{27} + 125 \times 27 \\ &= \frac{125}{27} + 3375 \\ &= \frac{91250}{27} \end{aligned}$$

Question 3: If $a + b = 10$ and $ab = 16$, find the value of $a^2 - ab + b^2$ and $a^2 + ab + b^2$.

Solution:

$$a + b = 10, ab = 16$$

Squaring, $a + b = 10$, both sides

$$(a + b)^2 = (10)^2$$

$$a^2 + b^2 + 2ab = 100$$

$$a^2 + b^2 + 2 \times 16 = 100$$

$$a^2 + b^2 + 32 = 100$$

$$a^2 + b^2 = 100 - 32 = 68$$

$$a^2 + b^2 = 68$$

Again, $a^2 - ab + b^2 = a^2 + b^2 - ab = 68 - 16 = 52$ and

$$a^2 + ab + b^2 = a^2 + b^2 + ab = 68 + 16 = 84$$

<https://www.indcareer.com/schools/rd-sharma-solutions-for-class-9-maths-chapter-4-algebraic-identities/>

Question 4: If $a + b = 8$ and $ab = 6$, find the value of $a^3 + b^3$.

Solution:

$$a + b = 8, ab = 6$$

Cubing, $a + b = 8$, both sides, we get

$$(a + b)^3 = (8)^3$$

$$a^3 + b^3 + 3ab(a + b) = 512$$

$$a^3 + b^3 + 3 \times 6 \times 8 = 512$$

$$a^3 + b^3 + 144 = 512$$

$$a^3 + b^3 = 512 - 144 = 368$$

$$a^3 + b^3 = 368$$

Exercise 4.5 Page No: 4.28

Question 1: Find the following products:

(i) $(3x + 2y + 2z)(9x^2 + 4y^2 + 4z^2 - 6xy - 4yz - 6zx)$

(ii) $(4x - 3y + 2z)(16x^2 + 9y^2 + 4z^2 + 12xy + 6yz - 8zx)$

(iii) $(2a - 3b - 2c)(4a^2 + 9b^2 + 4c^2 + 6ab - 6bc + 4ca)$

(iv) $(3x - 4y + 5z)(9x^2 + 16y^2 + 25z^2 + 12xy - 15zx + 20yz)$

Solution:

(i) $(3x + 2y + 2z)(9x^2 + 4y^2 + 4z^2 - 6xy - 4yz - 6zx)$

$$= (3x + 2y + 2z)[(3x)^2 + (2y)^2 + (2z)^2 - 3x \times 2y - 2y \times 2z - 2z \times 3x]$$

$$= (3x)^3 + (2y)^3 + (2z)^3 - 3 \times 3x \times 2y \times 2z$$

$$= 27x^3 + 8y^3 + 8z^3 - 36xyz$$

<https://www.indcareer.com/schools/rd-sharma-solutions-for-class-9-maths-chapter-4-algebraic-identities/>

$$(ii) (4x - 3y + 2z) (16x^2 + 9y^2 + 4z^2 + 12xy + 6yz - 8zx)$$

$$= (4x - 3y + 2z) [(4x)^2 + (-3y)^2 + (2z)^2 - 4x \times (-3y) - (-3y) \times (2z) - (2z \times 4x)]$$

$$= (4x)^3 + (-3y)^3 + (2z)^3 - 3 \times 4x \times (-3y) \times (2z)$$

$$= 64x^3 - 27y^3 + 8z^3 + 72xyz$$

$$(iii) (2a - 3b - 2c) (4a^2 + 9b^2 + 4c^2 + 6ab - 6bc + 4ca)$$

$$= (2a - 3b - 2c) [(2a)^2 + (-3b)^2 + (-2c)^2 - 2a \times (-3b) - (-3b) \times (-2c) - (-2c) \times 2a]$$

$$= (2a)^3 + (-3b)^3 + (-2c)^3 - 3 \times 2a \times (-3b) \times (-2c)$$

$$= 8a^3 - 27b^3 - 8c^3 - 36abc$$

$$(iv) (3x - 4y + 5z) (9x^2 + 16y^2 + 25z^2 + 12xy - 15zx + 20yz)$$

$$= [3x + (-4y) + 5z] [(3x)^2 + (-4y)^2 + (5z)^2 - 3x \times (-4y) - (-4y) \times (5z) - 5z \times 3x]$$

$$= (3x)^3 + (-4y)^3 + (5z)^3 - 3 \times 3x \times (-4y) \times (5z)$$

$$= 27x^3 - 64y^3 + 125z^3 + 180xyz$$

Question 2: If $x + y + z = 8$ and $xy + yz + zx = 20$, find the value of $x^3 + y^3 + z^3 - 3xyz$.

Solution:

We know, $x^3 + y^3 + z^3 - 3xyz = (x + y + z) (x^2 + y^2 + z^2 - xy - yz - zx)$

Squaring, $x + y + z = 8$ both sides, we get

$$(x + y + z)^2 = (8)^2$$

$$x^2 + y^2 + z^2 + 2(xy + yz + zx) = 64$$

$$x^2 + y^2 + z^2 + 2 \times 20 = 64$$

$$x^2 + y^2 + z^2 + 40 = 64$$

$$x^2 + y^2 + z^2 = 24$$

Now,

<https://www.indcareer.com/schools/rd-sharma-solutions-for-class-9-maths-chapter-4-algebraic-identities/>

$$x^3 + y^3 + z^3 - 3xyz = (x + y + z) [x^2 + y^2 + z^2 - (xy + yz + zx)]$$

$$= 8(24 - 20)$$

$$= 8 \times 4$$

$$= 32$$

$$\Rightarrow x^3 + y^3 + z^3 - 3xyz = 32$$

Question 3: If $a + b + c = 9$ and $ab + bc + ca = 26$, find the value of $a^3 + b^3 + c^3 - 3abc$.

Solution:

$$a + b + c = 9, ab + bc + ca = 26$$

Squaring, $a + b + c = 9$ both sides, we get

$$(a + b + c)^2 = (9)^2$$

$$a^2 + b^2 + c^2 + 2(ab + bc + ca) = 81$$

$$a^2 + b^2 + c^2 + 2 \times 26 = 81$$

$$a^2 + b^2 + c^2 + 52 = 81$$

$$a^2 + b^2 + c^2 = 29$$

$$\text{Now, } a^3 + b^3 + c^3 - 3abc = (a + b + c) [(a^2 + b^2 + c^2) - (ab + bc + ca)]$$

$$= 9[29 - 26]$$

$$= 9 \times 3$$

$$= 27$$

$$\Rightarrow a^3 + b^3 + c^3 - 3abc = 27$$

Exercise VSAQs Page No: 4.28

Question 1: If $x + 1/x = 3$, then find the value of $x^2 + 1/x^2$.

<https://www.indcareer.com/schools/rd-sharma-solutions-for-class-9-maths-chapter-4-algebraic-identities/>

Solution:

$$x + 1/x = 3$$

Squaring both sides, we have

$$(x + 1/x)^2 = 3^2$$

$$x^2 + 1/x^2 + 2 = 9$$

$$x^2 + 1/x^2 = 9 - 2 = 7$$

Question 2: If $x + 1/x = 3$, then find the value of $x^6 + 1/x^6$.

Solution:

$$x + 1/x = 3$$

Squaring both sides, we have

$$(x + 1/x)^2 = 3^2$$

$$x^2 + 1/x^2 + 2 = 9$$

$$x^2 + 1/x^2 = 9 - 2 = 7$$

$$x^2 + 1/x^2 = 7 \dots (1)$$

Cubing equation (1) both sides,

$$= \left(x^2 + \frac{1}{x^2}\right)^3 = (7)^3$$

$$= x^6 + \frac{1}{x^6} + 3\left(x^2 + \frac{1}{x^2}\right) = 343$$

$$= x^6 + \frac{1}{x^6} + 3 \times 7 = 343$$

$$= x^6 + \frac{1}{x^6} = 322$$

<https://www.indcareer.com/schools/rd-sharma-solutions-for-class-9-maths-chapter-4-algebraic-identities/>

Question 3: If $a + b = 7$ and $ab = 12$, find the value of $a^2 + b^2$.

Solution:

$$a + b = 7, ab = 12$$

Squaring, $a + b = 7$, both sides,

$$(a + b)^2 = (7)^2$$

$$a^2 + b^2 + 2ab = 49$$

$$a^2 + b^2 + 2 \times 12 = 49$$

$$a^2 + b^2 + 24 = 49$$

$$a^2 + b^2 = 25$$

Question 4: If $a - b = 5$ and $ab = 12$, find the value of $a^2 + b^2$.

Solution:

$$a - b = 5, ab = 12$$

Squaring, $a - b = 5$, both sides,

$$(a - b)^2 = (5)^2$$

$$a^2 + b^2 - 2ab = 25$$

$$a^2 + b^2 - 2 \times 12 = 25$$

$$a^2 + b^2 - 24 = 25$$

$$a^2 + b^2 = 49$$



<https://www.indcareer.com/schools/rd-sharma-solutions-for-class-9-maths-chapter-4-algebraic-identities/>

Chapterwise RD Sharma Solutions for Class 9 Maths :

- Chapter 1–Number System
- Chapter 2–Exponents of Real Numbers
- Chapter 3–Rationalisation
- Chapter 4–Algebraic Identities
- Chapter 5–Factorization of Algebraic Expressions
- Chapter 6–Factorization Of Polynomials
- Chapter 7–Introduction to Euclid’s Geometry
- Chapter 8–Lines and Angles
- Chapter 9–Triangle and its Angles
- Chapter 10–Congruent Triangles
- Chapter 11–Coordinate Geometry
- Chapter 12–Heron’s Formula
- Chapter 13–Linear Equations in Two Variables
- Chapter 14–Quadrilaterals
- Chapter 15–Area of Parallelograms and Triangles
- Chapter 16–Circles
- Chapter 17–Construction
- Chapter 18–Surface Area and Volume of Cuboid and Cube
- Chapter 19–Surface Area and Volume of A Right Circular Cylinder
- Chapter 20–Surface Area and Volume of A Right Circular Cone
- Chapter 21–Surface Area And Volume Of Sphere
- Chapter 22–Tabular Representation of Statistical Data
- Chapter 23–Graphical Representation of Statistical Data
- Chapter 24–Measure of Central Tendency
- Chapter 25–Probability

<https://www.indcareer.com/schools/rd-sharma-solutions-for-class-9-maths-chapter-4-algebraic-entities/>

About RD Sharma

RD Sharma isn't the kind of author you'd bump into at lit fests. But his bestselling books have helped many CBSE students lose their dread of maths. Sunday Times profiles the tutor turned internet star

He dreams of algorithms that would give most people nightmares. And, spends every waking hour thinking of ways to explain concepts like 'series solution of linear differential equations'. Meet Dr Ravi Dutt Sharma — mathematics teacher and author of 25 reference books — whose name evokes as much awe as the subject he teaches. And though students have used his thick tomes for the last 31 years to ace the dreaded maths exam, it's only recently that a spoof video turned the tutor into a YouTube star.

R D Sharma had a good laugh but said he shared little with his on-screen persona except for the love for maths. "I like to spend all my time thinking and writing about maths problems. I find it relaxing," he says. When he is not writing books explaining mathematical concepts for classes 6 to 12 and engineering students, Sharma is busy dispensing his duty as vice-principal and head of department of science and humanities at Delhi government's Guru Nanak Dev Institute of Technology.

<https://www.indcareer.com/schools/rd-sharma-solutions-for-class-9-maths-chapter-4-algebraic-identities/>