DPP
DAILY PRACTICE PROBLEMS

Class : IXTH **Subject : MATHS**
Date : **DPP No. : 3**

EXPLORING ALGEBRAIC IDENTITIES

Q 1. The factors of $4x^2 + 8x + 3$ are:
(a) $(x + 1), (x + 3)$ (b) $(2x + 1), (2x + 3)$
(c) $(2x + 2), (2x + 5)$ (d) $(2x - 1), (2x - 3)$

Q 2. If $l + m + n = 0$, then $\frac{l^2}{mn} + \frac{m^2}{nl} + \frac{n^2}{lm}$ is equal to:
(a) 1 (b) 2
(c) 3 (d) 4

Q 3. If volume of cuboid is $16x^2 - 26x + 10$, then which of the following can be a dimension of the cuboid?
(i) 2 (ii) $(8x - 5)$
(iii) $(x - 1)$ (iv) $(x + 1)$

Choose the correct option from following:
(a) Only (i) and (ii)
(b) Only (ii) and (iii)
(c) (i), (ii) and (iii)
(d) (i), (iii) and (iv)

Q4. Four terms are given as $(a + b)$, $(a - b)$, $(a^2 - ab + b^2)$ and $(a^2 + ab + b^2)$, then:
(i) Product of 4 terms is $a^6 + b^6$.
(ii) Sum of 4 terms is $2(a + a^2 + b^2)$.
(iii) Product of 4 terms is $a^6 - b^6$.
(iv) Sum of 4 terms is $(a + a^2 + b^2)$.

Choose the correct option from the following:
(a) (i) and (ii)
(b) (ii) and (iii)
(c) Only (iii)
(d) (iii) and (iv)

Q 5. If $x + y = 5$ and $xy = 6$, then:

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

(ii) $x^3 + y^3 = 35$

(iii) $x^2 + y^2 = 35$

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

Choose the correct option from the following:

(a) (i) and (ii)

(b) (iii) and (iv)

(c) (ii) and (iii)

(d) (i) and (iv)

Q 6. The product of the present ages of a father and his son is $(x^2 + 25x)$. If the son's present age is x years, find father's present age.

Q7. Using appropriate identity, find the following products:

(i) $(2p + 3q)(4p^2 - 6pq + 9q^2)$

(ii) $(3p - 4q)(9p^2 + 12pq + 16q^2)$

Q8. Simplify each of the following:

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

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

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

Q9. Two students in class of IX named Riya and Ravya were assigned a polynomial by their maths teacher. The polynomial was $x^2 - 5x + 6$.

They were asked to express this polynomial as product of factors. Both applied factorisation by splitting the middle term and got different answer.

Riya's answer : $(x - 3)(x - 2)$

Ravya's answer : $(x + 3)(x - 2)$

(i) Find out whose answer is correct and show factorisation.

(ii) Find the value of polynomial when $x = -1$.

Q10. Factorise the following using suitable identities:

(i) $8a^3 - b^3 - 12a^2b + 6ab^2$

(ii) $64a^3 - 27b^3 - 144a^2b + 108ab^2$

Q11. Find the following products using suitable identities:

(i) $\left(\frac{3}{x} - 2x^2\right)\left(\frac{9}{x^2} + 4x^4 + 6x\right)$

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

Q 12. Using suitable identities factorise: $9a^2 + 6a + 1 - 25b^2$

Q 13. If $a + b + c = 9$ and $ab + bc + ca = 26$, then find $a^2 + b^2 + c^2$.

Q 14. Write the following in the expanded form:

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

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

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

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

Q15. Factorise the following using suitable identities:

(i) $64a^3 - b^3$

(ii) $\frac{x^3}{216} - 8y^3$

(iii) $54x^6y + 2x^3y^4$

(iv) $32a^3 + 108b^3$

(v) $8x^2y^3 - x^5$

Q16. Factorise the following:

(i) $3\sqrt{3} + 64x^3 + 36x + 48\sqrt{3}x^2$

(ii) $1 - 2\sqrt{2}x^3 - 3\sqrt{2}x + 6x^2$

(iii) $\frac{x^3}{3\sqrt{3}} - \frac{y^3}{8} - \frac{x^2y}{2} + \frac{\sqrt{3}}{4}xy^2$

Q 17. Multiply the following expressions:

(i) $9x^2 + 25y^2 + 15xy - 12x + 20y + 16$ by $3x - 5y + 4$

(ii) $x^2 + 4y^2 + z^2 + 2xy + xz - 2yz$ by $(-z + x - 2y)$

(iii) $4x^2 + y^2 + 9z^2 + 2xy + 3yz - 6xz$ by $(2x - y + 3z)$

Q 18. If $a - b = 5$ and $ab = -6$, find the value of $a^3 - b^3$.

Q 19. Factorise each of the following expressions by splitting the middle term:

(i) $y^2 - \sqrt{3}y - 6$

(ii) $2y^2 + 3\sqrt{5}y + 5$

(iii) $y^2 - 2\sqrt{2}y - 30$

(iv) $y^2 + 5\sqrt{5}y + 30$

ANSWER KEY

1. (b) 2.(c) 3.(c) 4.(b) 5.(a)
6. $(x + 25)$ years
7. (i) $8p^3 + 27q^3$
   (ii) $27p^3 - 64q^3$
8. (i) $2x(x^2 + 27)$
   (ii) $\frac{2y}{3}\left(\frac{y^2}{9} + \frac{3x^2}{4}\right)$
   (iii) $-10y(12x^2 + 25y^2)$
9. (i) Riya's answer is correct.
   (ii) 12
10. (i) $(2a - b)(2a - b)(2a - b)(ii)(4a - 3b)(4a - 3b)(4a - 3b)$
11. (i) $\frac{27}{x^3} - 8x^6$
    (ii) $x^6 - 1$
12. $(3a - 5b + 1)(3a + 5b + 1)$
13. 29
14. (i) $9x^2 + y^2 + z^2 - 6xy + 2yz - 6zx$ (ii) $a^4 + b^4 + c^4 + 2a^2b^2 + 2b^2c^2 + 2c^2a^2$
    (iii) $\frac{x^2}{y^2} + \frac{y^2}{z^2} + \frac{z^2}{x^2} + 2\left(\frac{x}{z} + \frac{y}{x} + \frac{z}{y}\right)$ (iv) $\frac{a^2}{b^2c^2} + \frac{b^2}{c^2a^2} + \frac{c^2}{a^2b^2} + 2\left(\frac{1}{c^2} + \frac{1}{a^2} + \frac{1}{b^2}\right)$
15. $(i)(4a - b)(16a^2 + 4ab + b^2)$
    (ii) $\left(\frac{x}{6} - 2y\right)\left(\frac{x^2}{36} + \frac{xy}{3} + 4y^2\right)$
    (iii) $2x^3y(3x + y)(9x^2 - 3xy + y^2)$
    (iv) $4(2a + 3b)(4a^2 - 6ab + 9b^2)$
    (v) $x^2(2y - x)(4y^2 + 2xy + x^2)$
16. (i) $(\sqrt{3} + 4x)(\sqrt{3} + 4x)(\sqrt{3} + 4x)$
    (ii) $(1 - \sqrt{2}x)(1 - \sqrt{2}x)(1 - \sqrt{2}x)$
    (iii) $\left(\frac{x}{\sqrt{3}} - \frac{y}{2}\right)\left(\frac{x}{\sqrt{3}} - \frac{y}{2}\right)\left(\frac{x}{\sqrt{3}} - \frac{y}{2}\right)$
17. (i) $27x^3 - 125y^3 + 64 + 180xy$
    (ii) $x^3 - 8y^3 - z^3 - 6xyz$
    (iii) $8x^3 - y^3 + 27z^3 + 18xyz$
18. 35
19. (i) $(y - 2\sqrt{3})(y + \sqrt{3})$
    (ii) $(y + \sqrt{5})(2y + \sqrt{5})$
    (iii) $(y - 5\sqrt{2})(y + 3\sqrt{2})$
    (iv) $(y + 2\sqrt{5})(y + 3\sqrt{5})$