

EXPLORING ALGEBRAIC IDENTITIES**Multiple Choice Questions**

- Q1. Which of these identities can be used to find the value of the expression 97×103 ?
(a) $(x - y)^2 = x^2 - 2xy + y^2$
(b) $(x + y)^2 = x^2 + 2xy + y^2$
(c) $(x + y + z)^2 = x^2 + y^2 + z^2 + 2xy + 2yz + 2xz$
(d) $(x - y)(x + y) = x^2 - y^2$
- Q2. One of the factors of $(25x^2 - 1) + (1 + 5x)^2$ is:
(a) $5 + x$
(b) $5 - x$
(c) $5x - 1$
(d) $10x$
- Q3. The value of $(249)^2 - (248)^2$ is:
(a) 1
(b) 477
(c) 487
(d) 497
- Q4. If $x - \frac{1}{x} = \frac{1}{2}$, then $4x^2 + \frac{4}{x^2} =$
(a) 9
(b) 16
(c) 25
(d) 64
- Q5. If $3a + 4b = 16$ and $ab = 4$, then $9a^2 + 16b^2 =$
(a) 140
(b) 150
(c) 160
(d) 170
- Q6. If $x + \frac{1}{x} = 3$, then the value of $x^2 + \frac{1}{x^2} =$
(a) 7
(b) 8
(c) 9
(d) -8

Assertion-Reason Based Questions

The following questions are Assertion and Reason based questions. Two statements are given, one labelled as Assertion (A) and the other is labelled as Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.

(a) Both A and R are true, and R is the correct explanation of A .



- (b) Both A and R are true, but R is not the correct explanation of A .
 (c) A is true, but R is false.
 (d) A is false, but R is true.

Q7. Assertion (A) : The polynomial $x^4 - 1$ can be factorised into linear and quadratic factors over real numbers.

Reason (R): $a^2 - b^2 = (a - b)(a + b)$

Short Answer Questions

Q 8. Expand using suitable identities:

- (i) $\left(3x + \frac{y}{2} + 4\right)^2$
 (ii) $\left(\frac{2}{3}x - \frac{3}{2}y\right)^2$
 (iii) $\left(\frac{2}{9}x^5 - \frac{4}{3}a^3\right)\left(\frac{2}{9}x^5 + \frac{4}{3}a^3\right)$
 (iv) $(xy + yz + zx)^2$

Q 9. Using suitable identities factorise the following:

- (i) $4x^2 + 20x + 25$
 (ii) $9x^2 - \frac{y^2}{121}$
 (iii) $\left(2x + \frac{1}{3}\right)^2 - \left(x - \frac{1}{2}\right)^2$

Q 10. Using suitable identities factorise the following:

- (i) $49a^2 + 70ab + 25b^2$
 (ii) $9y^2 - 66yz + 121z^2$
 (iii) $9y^2 - 6y + 1$

Q 11. Evaluate each of the following using suitable identities:

- (i) $(9.9)^2$
 (ii) 1002×998
 (iii) 403×397

Q 12. Using identity $a^2 = (a + b)(a - b) + b^2$, find:

- (i) $(197)^2$
 (ii) $(403)^2$

Q 13. If $x + y = 7$ and $x^2 + y^2 = 26.5$, then find the value of xy .

Q 14. If $2x + 3y = 8$ and $xy = 2$, find the value of $4x^2 + 9y^2$.



Q 15. Factorise the following:

(i) $9x^2 + 4y^2 + 16z^2 + 12xy - 16yz - 24xz$

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

(iii) $4x^2 + 25y^2 + 9z^2 - 20xy - 30yz + 12zx$

(iv) $\frac{a^2}{4} + \frac{b^2}{9} + c^2 - \frac{ab}{3} - \frac{2bc}{3} + ac$

CASE STUDY BASED QUESTIONS

Q 16. The school management decided to build a square playground with each side a metres long. Later, they planned to reduce one side by b metres and increase the other side by b metres. Based on the above information answer the following questions:

(i) Write an expression for the area of new playground in terms of a and b .

(ii) Find the area of the new playground if $a = 90$ and $b = 2$.

ANSWER KEY

1. (d) 2.(d) 3.(d) 4.(a) 5.(c) 6.(a)
7. (a)
8. (i) $9x^2 + \frac{y^2}{4} + 3xy + 24x + 4y + 16$
(ii) $\frac{4}{9}x^2 - 2xy + \frac{9}{4}y^2$
(iii) $\frac{4}{81}x^{10} - \frac{16}{9}a^6$
(iv) $x^2y^2 + y^2z^2 + z^2x^2 + 2xy^2z + 2xyz^2 + 2x^2yz$
9. (i) $(2x + 5)(2x + 5)$
(ii) $\left(3x - \frac{y}{11}\right)\left(3x + \frac{y}{11}\right)$
(iii) $\left(x + \frac{5}{6}\right)\left(3x - \frac{1}{6}\right)$
10. (i) $(7a + 5b)(7a + 5b)$
(ii) $(3y - 11z)(3y - 11z)$
(iii) $(3y - 1)(3y - 1)$
11. (i) 98.01 (ii) 999996 (iii) 159991
12. (i) 38809 (ii) 162409
13. 11.25
14. 40
15. (i) $(3x + 2y - 4z)(3x + 2y - 4z)$
(ii) $(x - 2y - 3z)(x - 2y - 3z)$
(iii) $(2x - 5y + 3z)(2x - 5y + 3z)$
(iv) $\left(\frac{a}{2} - \frac{b}{3} + c\right)\left(\frac{a}{2} - \frac{b}{3} + c\right)$
16. (i) $(a^2 - b^2)m^2$ (ii) $8096 m^2$



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