

Algebraic Identities

1. Find the square of
(vi) $\left(\frac{3x}{4} - \frac{4y}{5}\right)$
2. Find the value of
(iv) $4x^2 + \frac{9}{x^2} - 12$, when $x = 2$
3. If $x + \frac{1}{x} = 3$, find the values of $x^2 + \frac{1}{x^2}$ and $x^4 + \frac{1}{x^4}$.
4. If $x + \frac{1}{x} = \sqrt{5}$, find the values of $x^2 + \frac{1}{x^2}$ and $x^4 + \frac{1}{x^4}$.
5. If $x^2 + \frac{1}{x^2} = 47$, find the value of $x + \frac{1}{x}$
6. If $x^2 + \frac{1}{x^2} = 66$, find the value of $x - \frac{1}{x}$.
7. Using the identity for the square of a binomial, evaluate the following:
(iv) $(0.98)^2$ (v) $(20.7)^2$
8. Simplify:
(i) $178 \times 178 + 2 \times 178 \times 122 + 122 \times 122$
(ii) $236 \times 236 - 2 \times 236 \times 86 + 86 \times 86$
(iii) $391 \times 391 - 291 \times 291$
iv) $0.82 \times 0.82 + 2 \times 0.82 \times 0.18 + 0.18 \times 0.18$
(v) $1.06 \times 1.06 - 2 \times 1.06 \times 0.06 + 0.06 \times 0.06$
vi) $\frac{7.83 \times 7.83 - 1.17 \times 1.17}{6.66}$
9. Expand:
(iv) $(m+5n-4p)^2$
10. Simplify:
(i) $(x+y+z)^2(x-y+z)^2 + (x+y-z)^2$
11. If $a + b + c = 9$ and $ab + bc + ac = 23$, find the value of $a^2 + b^2 + c^2$.
12. If $x + y + z = 12$ and $x^2 + y^2 + z^2 = 64$, find the value of $xy + yz + xz$.
13. If $3x + 4y = 11$ and $xy = 2$, find the value of $27x^3 + 64y^3$.
14. If $x^2 + \frac{1}{x^2} = 83$, find the value of $x^3 - \frac{1}{x^3}$.
15. Find the value of $27x^3 + 64y^3 + 36xy(3x + 4y)$, when $x = 5$ and $y = -3$.

16. Find the following products:
(vii) $\left(a + \frac{4}{3}\right)\left(a + \frac{1}{3}\right)$
17. Using the identity $(x + a)(x + b) = x^2 + (a + b)x + ab$, evaluate the following:
(iii) 98×97
18. Find the following products:
(v) $(9m + 2n)(81m^2 - 18mn + 4n^2)$
(viii) $\left(3 + \frac{5}{x}\right)\left(9 - \frac{15}{x} + \frac{25}{x^2}\right)$
19. Find the following products:
(ii) $(5 - 2x)(25 + 10x + 4x^2)$
20. Prove that:
(i) $(2x - 3y)^3 + (3y - 4z)^3 + (4z - 2x)^3 = 3(2x - 3y)(3y - 4z)(4z - 2x)$
21. Find the value of
(i) $(55)^3 - (75)^3 + (20)^3$
22. $x + y + z = 0$, prove that $x^3 + y^3 + z^3 = 3xyz$.

Answers

1. (vi) $\frac{9x^2}{16} + \frac{16y^2}{25} - \frac{6xy}{5}$
2. (iv) $\frac{25}{4}$
3. 7, 47
4. 3, 7
5. 7
6. 8
7. 0.9604, 428.49
8. (i) 90000, 22500, 68200, 1, 1, 9
9. (iv) $m^2 + 25n^2 + 16p^2 + 10mn - 40np - 8mp$
10. $3x^2 + 3y^2 + 3z^2 + 2xy - 2yz + 2xz$
11. 35
12. 40
13. 539
14. 756
15. 27
16. (vii) $a^2 + \frac{5}{3}a + \frac{4}{9}$
17. (iii) 9506
18. (v) $729m^3 + 8n^3$ (viii) $27 + \frac{125}{x^3}$
19. (ii) $125 - 8x^3$
21. (i) -247500