

DOON PUBLIC SCHOOL, PASCHIM VIHAR
SUMMER VACATION HOLIDAY'S HOMEWORK
CLASS-9 MATHEMATICS
WORKSHEET

Ch1- Number System and Ch -2 Polynomials

1. If $x + y = 12$ and $xy = 32$, Find the value of $x^2 + y^2$.
2. If $3x + 2y = 12$ and $xy = 6$, find the value of $9x^2 + 4y^2$.
3. Write the following cubes in the expanded form:
 - (i) $(3a + 4b)^3$
 - (ii) $(5p - 3q)^3$
4. If $x^2 + 1/x^2 = 27$, find the values of each of the following:
 - (i) $x + \frac{1}{x}$
 - (ii) $x - \frac{1}{x}$
5. If $x - \frac{1}{x} = 4$, then evaluate $x^2 + 1/x^2$
6. If $a + b + c = 15$ and $a^2 + b^2 + c^2 = 83$, find the value of $a^3 + b^3 + c^3 - 3abc$.
7. Factorize:
 - (i) $6ab - b^2 + 12ac - 2bc$
 - (ii) $9(2a - b)^2 - 4(2a - b) - 13$
8. If $x^3 + ax^2 - bx + 10$ is divisible by $x^2 - 3x + 2$, find the values of a and b.
9. Using factor theorem, factorize each of the following polynomials:
 - (i) $x^3 - 6x^2 + 3x + 10$
 - (ii) $2y^3 - 5y^2 - 19y + 42$
10. Which one is not a polynomial
 - (a) $4x^2 + 2x - 1$
 - (b) $y + \frac{3}{y}$
 - (c) $x^3 - 1$
 - (d) $y^2 + 5y + 1$
11. Find the number of zeros of $x^2 + 4x + 2$.
12. Find the value of k, if $(x - 1)$ is a factor of $4x^3 + 3x^2 - 4x + k$.
13. Every whole number is a natural number write true or false.
14. If $x = \frac{\sqrt{3} - \sqrt{2}}{\sqrt{3} + \sqrt{2}}$ and $y = \frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} - \sqrt{2}}$, find the value of $x^2 + y^2 + xy$.
15. If $x = \frac{2 - \sqrt{5}}{2 + \sqrt{5}}$ and $y = \frac{2 + \sqrt{5}}{2 - \sqrt{5}}$, find the value of $x^2 - y^2$.

16. Determine rational numbers p and q if

$$\frac{7+\sqrt{5}}{7-\sqrt{5}} - \frac{7-\sqrt{5}}{7+\sqrt{5}} = p - 7\sqrt{5}q.$$

17. Simplify: $\frac{6}{2\sqrt{3}-\sqrt{6}} + \frac{\sqrt{6}}{\sqrt{3}+\sqrt{2}} - \frac{4\sqrt{3}}{\sqrt{6}-\sqrt{2}}$

18. Simplify: $\frac{3\sqrt{2}}{\sqrt{6}-\sqrt{3}} + \frac{2\sqrt{3}}{\sqrt{6}+2} - \frac{4\sqrt{3}}{\sqrt{6}-\sqrt{2}}$

19. Show that: $\frac{1}{3-\sqrt{8}} - \frac{1}{\sqrt{8}-\sqrt{7}} + \frac{1}{\sqrt{7}-\sqrt{6}} - \frac{1}{\sqrt{6}-\sqrt{5}} + \frac{1}{\sqrt{5}-2} = 5$

20. If: $x = \frac{\sqrt{p+q} + \sqrt{p-q}}{\sqrt{p+q} - \sqrt{p-q}}$, then find the value of $qx^2 - 2px + q$.

21. Show that: $\frac{x^{-1}+y^{-1}}{x^{-1}} + \frac{x^{-1}-y^{-1}}{x^{-1}} = \frac{x^2+y^2}{xy}$

22. If $2^a = 3^b = 6^c$ then show that $c = \frac{ab}{a+b}$.

23. If $x = 2$ and $x = 0$ are zeroes of the polynomial $2x^3 - 5x^2 + px + b$, then find the value of p and b.

24. Simplify and factorise $(a + b + c)^2 - (a - b - c)^2 + 4b^2 - 4c^2$.

25. If $a + b + c = 6$ and $ab + bc + ca = 11$, find the value of $a^3 + b^3 + c^3 - 3abc$.

26. The polynomial $bx^3 + 3x^2 - 3$ and $2x^3 - 5x + b$ when divided by $x - 4$ leave the Remainders R1 and R2 respectively. Find the value of b if $2R1 - R2 = 0$.

27. If $f(x) = x^4 - 4x^3 + 3x^2 - 2x + 1$, then find whether $f(0) \times f(-1) = f(2)$.

28. Prove that: $(x+y)^3 + (y+z)^3 + (z+x)^3 - 3(x+y)(y+z)(z+x)$.

29. Verify if $\frac{1}{2}$ and $-\frac{3}{2}$ are zeroes of the polynomial $8x^3 - 4x^2 - 18x + 9$. If yes, then factorise the polynomial.

30. Using long division method, show that the polynomial $p(x) = x^3 + 1$ is divisible by $q(x) = x + 1$. Verify your result using factor theorem.

ACTIVITIES

1. Join equivalent rational numbers given on the boundary of rectangles to obtain a star.
2. Verification of $a^3 + b^3 = (a + b)(a^2 + b^2 - ab)$
3. Construct a square root spiral .

MIND MAP

1. Coordinate Geometry.
 2. Probability
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