



Octahedral classes, kharadi

2nd floor, yashwant plaza, near bank of India,

Class 09 - Mathematics

NUMBER SYSTEM

Maximum Marks: 118

Time Allowed: 2 hours

Section A

1. If $a = \frac{\sqrt{2}+1}{\sqrt{2}-1}$ and $b = \frac{\sqrt{2}-1}{\sqrt{2}+1}$, then find the value of $a^2 + b^2 - 4ab$. 4
2. Express $0.\overline{6} + 0.\overline{7} + 0.\overline{47}$ in the form $\frac{p}{q}$, where p and q are integers and $q \neq 0$. 4
3. If $x = \frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}$, and $y = \frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}$, then find the value of $x^2 + y^2$. 4
4. Simplify: $\frac{7\sqrt{3}}{\sqrt{10}+\sqrt{3}} - \frac{2\sqrt{5}}{\sqrt{6}+\sqrt{5}} - \frac{3\sqrt{2}}{\sqrt{15}+3\sqrt{2}}$. 4
5. Factorise: $x^3 + x^2 - 4x + 4$ 4
6. If the polynomials $az^3 + 4z^2 + 3z - 4$ and $z^3 - 4z + a$ leave the same remainder when divided by $z - 3$, Find the value of a. 4
7. Factorise: $3x^3 - x^2 - 3x + 1$ 4
8. Factorize: $x^3 + 13x^2 + 32x + 20$ 4
9. If $x - 3$ and $x - \frac{1}{3}$ are both factors of $px^2 + 5x + r$, then show that $p = r$ 4
10. Verify that $x^3 + y^3 + z^3 - 3xyz$ 4

$$= \frac{1}{2}(x + y + z) \left[(x - y)^2 + (y - z)^2 + (z - x)^2 \right]$$
11. The polynomial $p(x) = x^4 - 2x^3 + 3x^2 - ax + 3a - 7$ when divided by $x + 1$ leave remainder 19. Also, find the remainder when $p(x)$ is divided by $x + 2$. 4
12. Find the remainder when $x^3 - ax^2 + 6x - a$ is divided by $x - a$. 4
13. If $z^2 + \frac{1}{z^2} = 14$, find the value of $z^3 + \frac{1}{z^3}$. 4
14. If $x^2 - bx + c = (x + p)(x - q)$ then factorise $x^2 - bxy + cy^2$ 4
15. Find m and n if $x - 1$ and $x - 2$ exactly divide the polynomial 4
 $x^3 + mx^2 - nx + 10$
16. Factorise: $\frac{1}{27}(2x + 5y)^3 + \left(\frac{-5}{3}y + \frac{3}{4}z\right)^3 - \left(\frac{3}{4}z + \frac{2}{3}x\right)^3$ 4
17. Factorise: $12(y^2 + 7y^2) - 8(y^2 + 7y)(2y - 1) - 15(2y - 1)^2$ 4
18. Factorise: $x^3 - 6x^2 + 11x - 6$ 4
19. Factorize $2y^3 + y^2 - 2y - 1$ 4

20. Check whether $p(x)$ is a multiple of $g(x)$ or not: 4
- i. $p(x) = x^3 - 5x^2 + 4x - 3, g(x) = x - 2$
- ii. $p(x) = 2x^3 - 11x^2 - 4x + 5, g(x) = 2x + 1$
21. Factorise $(2x - 3y)^3 + (3y - 4z)^3 + (4z - 2x)^3$ 4
22. Find the value of $\frac{4}{(216)^{-\frac{2}{3}}} + \frac{1}{(256)^{-\frac{3}{4}}} + \frac{2}{(243)^{-\frac{1}{5}}}$ 2
- $-\left(4^{-\frac{3}{2}}\right)$ 2
23. Simplify: $(256)^{-\left(4^{-\frac{3}{2}}\right)}$.
24. Rationalize the denominators of the: 2
- $\frac{1}{\sqrt{7}-\sqrt{6}}$
25. Simplify by rationalizing denominator $\frac{7+3\sqrt{5}}{7-3\sqrt{5}}$ 2
26. Find the values of a and b in each of $\frac{5+2\sqrt{3}}{7+4\sqrt{3}} = a - 6\sqrt{3}$ 2
27. If $4^{2x-1} - 16^{x-1} = 384$, find the value of x. 2
28. Simplify the following by rationalizing the denominator : $\frac{\sqrt{5}-2}{\sqrt{5}+2} - \frac{\sqrt{5}+2}{\sqrt{5}-2}$ 2
29. Classify the following numbers as rational or irrational: 2
- 1.101001000100001...
30. Without actually calculating the cubes, find the value of: 3
- $\left(\frac{1}{2}\right)^3 + \left(\frac{1}{3}\right)^3 - \left(\frac{5}{6}\right)^3$
31. Find the integral zeroes of the polynomial $x^3 + 3x^2 - x - 3$ 3
32. Find the value of m so that $2x - 1$ be a factor of $8x^4 + 4x^3 - 16x^2 + 10x + m$. 3
33. Factorize each of the polynomial: 3
- $27 - 125a^3 - 135a + 225a^2$
34. Show that $p - 1$ is a factor of $p^{10} - 1$ and also of $p^{11} - 1$. 3
35. Factorise: $\left(2x + \frac{1}{3}\right)^2 - \left(x - \frac{1}{2}\right)^2$ 3