

CLASS: X
SUBJECT: MATHEMATICS

TOPIC: REAL NUMBERS

1. If $7 \times 5 \times 3 \times 2 + 3$ is composite number? Justify your answer
2. Show that any positive odd integer is of the form $4q + 1$ or $4q + 3$ where q is a positive integer
3. Prove that $\sqrt{2} + \sqrt{5}$ is irrational
4. Prove that $5 - 2\sqrt{3}$ is an irrational number
5. Prove that $\sqrt{2}$ is irrational
6. Use Euclid's Division Algorithms to find the H.C.F of
a) 135 and 225 (45)
b) 4052 and 12576 (4)
c) 270, 405 and 315 (45)
7. Find the HCF and LCM of 26 and 91 and verify that $\text{LCM} \times \text{HCF} = \text{Product of two numbers}$ (13,182)
8. Explain why $\frac{29}{2^3 \times 5^3}$ is a terminating decimal expansion
9. $\frac{163}{150}$ will have a terminating decimal expansion. State true or false .Justify your answer.
10. Find HCF of 96 and 404 by prime factorization method. Hence, find their LCM. (4, 9696)
11. Using prime factorization method find the HCF and LCM of 72, 126 and 168 (6, 504)
12. If $\text{HCF}(6, a) = 2$ and $\text{LCM}(6, a) = 60$ then find a (20)
13. given that $\text{LCM}(77, 99) = 693$, find the HCF (77, 99) (11)
14. Find the greatest number which exactly divides 280 and 1245 leaving remainder 4 and 3 (138)
15. The LCM of two numbers is 64699, their HCF is 97 and one of the numbers is 2231. Find the other (2813)
16. Two numbers are in the ratio 15: 11. If their HCF is 13 and LCM is 2145 then find the numbers (195,143)
17. Express 0.363636..... in the form a/b (4/11)
18. Write the HCF of smallest composite number and smallest prime number
19. Write whether $\frac{2\sqrt{45} + 3\sqrt{20}}{2\sqrt{5}}$ on simplification give a rational or an irrational number
20. State whether 10.064 is rational or not. If rational, express in p/q form
21. Write a rational number between $\sqrt{2}$ and $\sqrt{3}$
22. State the fundamental theorem of arithmetic

1. Show that $x^2 - 3$ is a factor of $2x^4 + 3x^3 - 2x^2 - 9x - 12$
2. Divide: $4x^3 + 2x^2 + 5x - 6$ by $2x^2 + 3x + 1$ (2x-2, 9x-4)
3. Find other zeroes of the polynomial $p(x) = 2x^4 + 7x^3 - 19x^2 - 14x + 30$ if two of its zeroes are $\sqrt{2}$ and $-\sqrt{2}$ (3/2, -5)
4. Find all the zeroes of the polynomial $3x^4 + 6x^3 - 2x^2 - 10x - 5$, if two of its zeroes are $\sqrt{5}/3$ and $-\sqrt{5}/3$ (-1, -1)
5. Find all the zeroes of $2x^4 - 3x^3 - 3x^2 + 6x - 2$, if it is known that two of its zeroes are $\sqrt{2}$ and $-\sqrt{2}$ (1, 1/2)
6. Find all the zeroes of $2x^4 - 9x^3 + 5x^2 + 3x - 1$, if two of its zeroes are $2 + \sqrt{3}$ and $2 - \sqrt{3}$ (1, -1/2)
7. Find all the zeroes of polynomial $4x^4 - 20x^3 + 23x^2 + 5x - 6$ if two of its zeroes are 2 and 3 (1/2, -1/2)
8. If the polynomial $f(x) = x^4 - 6x^3 + 16x^2 - 25x + 10$, is divided by another polynomial $x^2 - 2x + k$ the remainder
Comes out to be $x + a$, find k and a (k = 5, a = -5)
9. On dividing $x^3 - 3x^2 + x + 2$ by a polynomial $g(x)$, the quotient and remainder were $x - 2$ and $-2x + 4$, respectively
Find $g(x)$ ($x^2 - x + 1$)
10. If the polynomial $6x^4 + 8x^3 - 5x^2 + ax + b$ is exactly divisible by the polynomial $2x^2 - 5$, then find the values of
 a and b (-20, -25)
11. Find the values of m and n so that $x^4 + mx^3 + nx^2 - 3x + n$ is divisible by $x^2 - 1$ (m = 3, n = -3)
12. What must be subtracted from $2x^4 - 11x^3 + 29x^2 - 40x + 29$, so that the resulting polynomial is exactly divisible
By $x^2 - 3x + 4$ (-2x + 5)
13. Find the polynomial, whose zeroes are $2 + \sqrt{3}$ and $2 - \sqrt{3}$ ($x^2 - 4x + 1$)
14. Form a quadratic polynomial, one of whose zero is $2 + \sqrt{5}$ and the sum of zeroes is 4 ($x^2 - 4x - 1$)
15. If α and β are zeroes of the polynomial $x^2 - 2x - 15$, then form a quadratic polynomial whose zeroes are 2α and 2β
16. Write a quadratic polynomial, the sum and product of whose zeroes are 3 and -2 ($x^2 - 3x - 2$)
17. Find the zeroes of the polynomial and verify the relationship between the zeroes and the coefficient
a) $4x^2 - 4x + 1$ b) $x^2 - 3$ c) $\sqrt{3}x^2 - 8x + 4\sqrt{3}$
18. If α and β are the zeroes of the polynomial $2y^2 + 7y + 5$, write the value of $\alpha + \beta + \alpha\beta$ (-1)
19. If one root of the polynomial $5x^3 + 13x + k$ is reciprocal of the other, then find the value of k ?
20. If one zero of the polynomial $(a^2 + 9)x^2 + 13x + 6a$ is reciprocal of the other. Find the value of a (3)
21. If the zeroes of the polynomial $x^3 - 3x^2 + x + 1$ are $a - b$, a , $a + b$, find a and b (1, $\pm\sqrt{2}$)
22. If α and β are the zeroes of the polynomial $f(x) = 6x^2 + x - 2$, find the value of $\frac{1}{\alpha} + \frac{1}{\beta} - \frac{\alpha\beta}{\alpha\beta}$ (5/6)
23. If α and β are the zeroes of the quadratic polynomial $2x^2 + 3x - 5$, find the value of $\frac{1}{\alpha} + \frac{1}{\beta}$ (3/5)
24. If α and β are the zeroes of the polynomial $f(x) = x^2 - 5x + k$ such that $\alpha - \beta = 1$, find k (6)
25. If α, β are the zeroes of a polynomial, such that $\alpha + \beta = 6$ and $\alpha\beta = 4$, then write the polynomial
26. If the product of zeroes of the polynomial $ax^2 - 6x - 6$ is 4, find the value of a (-3/2)
27. If α, β are the zeroes of quadratic polynomial $2x^2 + 5x + k$, find the value of k such that $(\alpha + \beta)^2 - \alpha\beta = 24$ (-71/2)
28. If α and β are zeroes of $x^2 + 5x + 5$, find the value of $\alpha^{-1} + \beta^{-1}$ (-1)
29. α, β are the zeroes of the quadratic polynomial $x^2 - (k+6)x + 2(2k-1)$. Find the value of k if $\alpha + \beta = \frac{1}{2}\alpha\beta$ (7)
30. If α, β are the zeroes of the quadratic polynomial $x^2 - 7x + 10$, find the value of $\alpha^3 + \beta^3$ (133)
31. Find the sum and the product of the zeroes of cubic polynomial $2x^3 - 5x^2 - 14x + 8$ (5/2, -7, -4)
32. Find the sum and product of the zeroes of quadratic polynomial $x^2 - 3$
33. If 1 is a zero of polynomial $ax^2 - 3(a-1)x - 1$, then find the value of a (1)
34. If α, β are zeroes of quadratic polynomial $x^2 - (k+6)x + 2(2k-1)$. Find k if $\alpha + \beta = 1/2\alpha\beta$
35. Divide $(6 + 19x + x^2 - 6x^3)$ by $(2 + 5x - 3x^2)$ and verify the division algorithm

CLASS: X

TOPIC: TRIGONOMETRY

1. If $\cot\theta = 15/8$, evaluate $\frac{(2 + 2\sin\theta)(1 - \sin\theta)}{(1 + \cos\theta)(2 - 2\cos\theta)}$ (225/64)
2. If $7\sin^2\theta + 3\cos^2\theta = 4$, show that $\tan\theta = 1/\sqrt{3}$
3. Evaluate: $\tan^2 60^\circ - 2\cos^2 60^\circ - \frac{3}{4}\sin^2 45^\circ - 4\sin^2 30^\circ$ (9/8)
4. Evaluate: $\frac{\sec^2 54^\circ - \cot^2 36^\circ}{\operatorname{Cosec}^2 57^\circ - \tan^2 33^\circ} + 2\sin^2 38^\circ \sec^2 52^\circ - \sin^2 45^\circ$ (5/2)
5. Evaluate: $\sqrt{2}\tan^2 45^\circ + \cos^2 30^\circ - \sin^2 60^\circ$ ($\sqrt{2}$)
6. If $\sec^2\theta (1+\sin\theta)(1-\sin\theta) = k$, find the value of k ($k = 1$)
7. Evaluate: $(\sin 90^\circ + \cos 45^\circ + \cos 60^\circ)(\cos 0^\circ - \sin 45^\circ + \sin 30^\circ)$ (7/4)
8. Find the value of:

$$\frac{2\sin 68^\circ}{\cos 22^\circ} - \frac{2\cot 15^\circ}{5\tan 75^\circ} - \frac{3\tan 45^\circ \tan 20^\circ \tan 40^\circ \tan 50^\circ \tan 70^\circ}{5}$$
 (1)
9. If $\sin(A+B) = 1$, $\cos(A-B) = 1$, find A and B ($45^\circ, 45^\circ$)
10. If $\cos(40^\circ + x) = \sin 30^\circ$, find the value of x (20°)
11. If $\sin 2x = \sin 60^\circ \cos 30^\circ - \cos 60^\circ \sin 30^\circ$, find x (15°)
12. Find the value of θ in $2\cos 3\theta = 1$ (20°)
13. $\sin 4A = \cos(A - 20^\circ)$, where $4A$ is an acute angle, find the value of A (22°)
14. Find the acute angles A and B, $A > B$, if $\sin(A+2B) = \sqrt{3}/2$ and $\cos(A+4B) = 0$ ($30^\circ, 15^\circ$)
15. Evaluate: $\sec(90 - \theta)\operatorname{cosec}\theta - \tan(90 - \theta)\cot\theta + \frac{\cos^2 35^\circ + \cos^2 55^\circ}{\tan 5^\circ \tan 15^\circ \tan 45^\circ \tan 75^\circ \tan 85^\circ}$ (2)
16. If $\sin A - \cos B = 0$, prove that $A + B = 90^\circ$
17. If $\frac{\sin\theta + \cos\theta}{\sin\theta - \cos\theta} = \frac{5}{3}$, evaluate $\frac{7\tan\theta + 2}{2\tan\theta + 7}$ (2)
18. What is the maximum value of $1/\sec\theta$
19. If A, B and C are interior angles of triangle ABC, show that $\cos \left\{ \frac{B+C}{2} \right\} = \sin \frac{A}{2}$
20. If $x = a \sin\theta$, $y = b \tan\theta$. Prove that $\frac{a^2}{x^2} - \frac{b^2}{y^2} = 1$
21. Prove that: $\frac{1}{1 + \sin\theta} + \frac{1}{1 - \sin\theta} = 2\sec^2\theta$
22. Prove that: $\frac{\sin\theta}{1 + \cos\theta} + \frac{1 + \cos\theta}{\sin\theta} = 2\operatorname{cosec}\theta$
23. Prove: $\sqrt{\frac{1 + \sin A}{1 - \sin A}} = \frac{\cos A}{1 - \sin A}$
24. Prove that $\sin(90 - \theta) \cos(90 - \theta) = \frac{\tan\theta}{1 + \tan^2\theta}$