MATHS

BOOKS - UNITED BOOK HOUSE

ALGEBRA

Exercise

1. For any complex number z, show that the minimum value of | z| + | z -1 | is 1.

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2. If $a = \cos\alpha + i\sin\alpha$ and $1 + \sqrt{1 - b^2} = nb$, show that $\frac{b}{2n}(1 + na)\left(1 + \frac{n}{a}\right) = 1 + b\cos\alpha$

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3. If $x = a + bw + cw^2$,show that $x^3 - 3ax^2 + 3(a^2 - bc)x = a^3 + b^3 + c^3 - 3abc$.when w be the an imaginarry cube root of unity.

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4. If one of the root of the equation $(2 + 3i)x^2 - bx + (3 - i) = 0$ is (2 -i), find the other root and also find the value of b.

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5. If w is an imaginary cube root of unity, show that $\frac{w}{9}\left[(1-w)(1-w^2)(1-w^4)(1-w^8)\ldots..9\left(\frac{c+aw+bw^2}{aw^2+b+cw}\right)^2\right]+1=0$

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6. If p + q = m + n and $p^2 + q^2 = m^2 + n^2$, then by using mathematical induction prove that $P^r + q^r = m^r + n^r$.

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7. If a. b, c are in G.P. and $\log_c a, \log_b c, \log_a b$ are in AP show that the common difference of the AP is 1(1/2)

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8. If A and G are the A.M.and G.M. of two unequal positive numbers a and b, show that $A > G > \frac{G^2}{A}$

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9. In a G.P. 1st term and common ratio are a and r resp. and if th sum of 1st p term is S_p then show that $s_1 + s_2 + s_3 + \ldots + s_n$=[ar(r^n-1))/(r-1)^2

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10. If the sides of a triangle are three consecutive termsof a G.P. then show that '1

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11. Show that : (^(4n)C_(2n))/(^(2n)C_n) = (1.3.5...(4n-1))/{1.3.5...(2n-1)}^2

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12. For $a \leq 0$, determine all the roots of the equation $x^2 - 2a|x - a| - 3a^2 = 0$

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13. Prove that $nC_r + 3.\ nC_{r-1} + 3nC_{r-2} + nC_{r-3} = (n+3)C_r$

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14. If $\left(1 + x + x^2\right)^n = a_0 + a_1 x + a_2 x^2 + \ldots. + a_{2n} X^{2n}$,show that $a_0 + a_3 + a_6 + \ldots. = a_1 + a_4 + a_7 + \ldots = a_2 + a_5 + a_8 + \ldots = 3^{n-1}$

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15. The coefficient of the term independent of x in the expansion of $\left[\frac{(x+1)}{x^{2/3} - x^{1/3} + 1} - \frac{(x-1)}{x - x^{1/2}}\right]^{10}$ is

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16. Prove that the inequations $\frac{2x+1}{7x-1} > 5$and $\frac{x+7}{x-8} > 2$have no solutions

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17. How many five -digit numbers divisible by 3 can be formed using the digits 0, 1, 2, 3. 4 and 5 when ho digit is repeated?

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18. In how many cases there will be 3 Sundays when 20 dates are named at'random?

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