



## MATHS

### BOOKS - UNITED BOOK HOUSE

### MODEL QUESTION PAPERS-SET 7

#### Exercise

1. Union, of  $\{1, 3, 5, 7, \dots\}$  and  $\{2, 4, 6, 8, \dots\}$  is

A. a)N

B. b)R

C. c)Q

D. d)Z.

**Answer:**



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2.  $Z$  is a complex number. If  $|Z| = 4$  and  $\arg(Z) = \frac{5\pi}{6}$ , then the value of  $Z$  is

A. a)  $2\sqrt{3} - 2i$

B. b)  $-2\sqrt{3} + 2i$

C. c)  $2\sqrt{3} - 2i$

D. d)  $-2\sqrt{3} - 2i$

**Answer:**



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3. In the expansion of  $\left(2P + \frac{3}{P}\right)^{10}$ , the middle term will be

A. a) 5th term

B. b) 10th term

C. c)6th term

D. d)7th term.

**Answer:**



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4. In an AP,if the  $r$ th term is  $2r-7$ , then,the 4th term will be

A. a)1

B. b)-1

C. c)2

D. d)-2

**Answer:**



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5. The straight line  $\sqrt{3}y - 3x = 3$  makes an angle with x axis is

A. a)  $30^\circ$

B. b)  $45^\circ$

C. c)  $60^\circ$

D. d)  $90^\circ$

**Answer:**



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6. The equation of diameter to the circle  $x^2 + y^2 - 6x + 2y = 15$ , which passes, through (8,-2) is

A. a)  $17x - y = 23$

B. b)  $x + 5y + 2 = 0$

C. c)  $x + 5y = 2$

D. d)  $x + y = 2$

**Answer:**



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7. IF  $x^2 + y^2 = 4$ , then the, value of  $yy' + x$  is

A. a)-1

B. b)0

C. c)1

D. d)4

**Answer:**



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8. The value of  $\lim_{x \rightarrow 0} \frac{1}{x} \sin^{-1} \left( \frac{2x}{1+x^2} \right)$  is

A. a)0

B. b)1/2

C. c)1

D. d)2

**Answer:**



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9. A and B are two independent events. if  $P(A)=3/5, P(A \cap B) = \frac{4}{9}$  the value of  $P(B)$  is

A. a)8/45

B. b)4/45

C. c)20/27

D. d)4/27

**Answer:**



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10. The mean of square of 1st n natural number is

A. a)  $\frac{(n + 1)(2n + 1)}{6}$

B. b)  $\frac{n + 1}{2}$

C. c)  $\frac{(n + 1)(n + 2)}{2}$

D. d)  $\frac{2n + 1}{2}$

**Answer:**



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11. show that  $(A - B) \cap B = \phi$



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12. A relation P defined as  $:P = \{(x, y) : 2x + 3y = 18, x, y \in N\}$  ,find the domain and Range of this relation.



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13. Find the value of:  $(8 \sin^3 10^\circ - 6 \sin 10^\circ)$



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14. If  $\frac{\sin A}{3} = \frac{\sin B}{3} = \frac{\sin C}{4}$  then show that  $\cos C = \frac{1}{9}$



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15. Value of  $i^n + i^{n+1} + i^{n+2} + i^{n+3}$  (where  $i = \sqrt{-1}$ )



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16. If, the number of diagonals of a polygon is 44. Find the number of sides of that polygon.



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17. 'Prove that the co-efficient of  $x^n$  of the expansion of  $(1+x)^{2n}$  is the double of the coefficient of  $x^n$  of the expansion of  $(1+x)^{2n-1}$ '

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18. The sum of  $P$  terms of an AP is  $P^2$ . Find the common difference.

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19. Find the co-ordinate of the point which is equidistance from  $(\alpha, 0, 0)$ ,  $(0, \beta, 0)$ ,  $(0, 0, \gamma)$  and  $(0,0,0)$ .

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20. Calcualte the angle between the straight lines  $x + \sqrt{3}y + 2 = 0$  and  $y+5=0$



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21. If  $f'(c)$  is the derivative of  $f(x)$  at  $x = c$ , then show that

$$\lim_{x \rightarrow c} \frac{xf(c) - cf(x)}{x - c} = f(c) - cf'(c)$$



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22. Evaluate :  $\lim_{x \rightarrow 3} \frac{x^2 - 9}{\sqrt{x - 2} - \sqrt{4 - x}}$



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23. 4 cards are drawn from a well - shuffled deck of 52 cards. What is the probability of obtaining 3 diamonds and one spade?



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24. If the variance of a distribution is 4 coefficient of variation is 5%, then mean of the distribution is \_\_\_

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25. If  $f(x) = \cos(\log x)$ , show that  $f(x)f(y) - \frac{1}{2}[f\left(\frac{x}{y}\right) + f(xy)] = 0$

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26. Prove that  $\frac{\cos \alpha}{\sin 3\alpha} + \frac{\cos 3\alpha}{\sin 9\alpha} + \frac{\cos 9\alpha}{\sin 27\alpha} = \frac{1}{2}[\cot \alpha - \cot 27\alpha]$

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27. Solve :  $\sec \theta - 1 = (\sqrt{2} - 1)\tan \theta$

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28. By mathematical induction show that  $3^n > n^3$  when  $n \geq 4$ .  $N$  is an integer.

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29. Find the co-efficient of  $\frac{1}{x}$  of the expansion of  $(1+x)^n \left(1 + \frac{1}{x}\right)^n$  where  $n$  is a positive integer.

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30. Find the sum up to  $n$  terms :  $n.1+(n-1).2+(n-2).3+(n-3).4+\dots$

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31. If  $\frac{n_{p_r-1}}{a} = \frac{n_{p_r}}{b} = \frac{n_{p_r+1}}{c}$ , then show that  $b^2 = a(b+c)$

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32. Show that the four lines  $2x+y+1=0$ ,  $2x+y+7=0$ ,  $x+2y-1=0$  and  $x+2y+5=0$  form a rhombus.

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33. Find the equation-of the bisector of the obtused angle between the straight lines  $x-2y+4=0$  and  $4x-3y+2=0$ .

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34. The co-ordinate of centre and the diameter of a circle are  $(3, 7)$  and  $10$  unit. Calculate the length -of intercept of the. circle by  $y$  axis.

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35. Find the ratio in which the  $YZ$ . plane divides the line segment joining the' points  $(-2, 4, 5)$  and  $(3, 5, -4)$ .



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36. Evaluate :  $\lim_{x \rightarrow 0} \frac{\sqrt{\cos x} - \sqrt[3]{\cos x}}{\sin^2 x}$

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37. Find, from 1st principles, the derivatives of  $\tan \sqrt{x}$  with respect to  $x$ .

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38. Using contrapositive method show that the following statement is true. If  $x$  is a real number such that  $x^3 = -4x$  then  $x = 0$ .

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39. Find the validity of the following biconditional Statement. A triangle is equilateral if and only if the angles of the triangle are equal





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40. For any three events  $A, B, C$  show that
- $$P(A \cup B \cup C) = P(A) + P(B) + P(C) - P(A \cap B) - P(B \cap C) - P(A \cap C) + P(A \cap B \cap C)$$



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41. The mean and SD of the scoring marks of 100 students are 40 and 5.1 resp. on checking it was discovered that the score which should correctly read as 40 had been wrongly taken as 50. Find the correct values of mean and SD



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42. if  $\tan\left(\frac{\beta}{2}\right) = 4 \tan\left(\frac{\alpha}{2}\right)$ , show that  $\tan\left(\frac{\beta - \alpha}{2}\right) = \frac{3 \sin \alpha}{5 - 3 \cos \alpha}$



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43. If  $x \cos(\theta + 120^\circ) = y \cos(\theta + 240^\circ)$ , show that

$$x - y = -(x + y)\sqrt{3} \tan \theta$$

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44. If one root is the square of another of an equation

$$ax^2 + 2ibx + ic = 0, \text{ then show that } i = \frac{6abc - ac^2}{8b^3 - a^2c}$$

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45. If the sum of 1st M terms of an AP is m. and the sum of 1st N terms is

$$n, \text{ show that- the 1st term of this AP is } \frac{mN(N - 1) - nM(M - 1)}{MN(N - M)}$$

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46. Exhibit graphically the solution region of the following system of

$$\text{inequations : } 2x + y \geq 4, x + y \leq 3, 2x - 3y \leq 6, x > 0, y > 0$$





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47. How many numbers can be formed with the digits 1, 2, 3, 4, 3, 2, 1 so that the odd digits are placed at the odd place of the respective numbers



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48. Find the equation of an ellipse having eccentricity  $\frac{2}{3}$  and the coordinates of centre and vertex are  $(-2,2)$  and  $(-2,4)$ .



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49. The axis of a parabola is along x axis and vertex is  $(0,0)$ . If it passes through  $(2, 3)$ , then find the equation of the parabola.



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50.  $e_1$  and  $e_2$  are respectively the eccentricities of a hyperbola and its conjugate. Prove that  $\frac{1}{e_1^2} + \frac{1}{e_2^2} = 1$



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