

JEE Main Session 2 Mathematics Exam: Model 2

1. If a die is rolled until 2 is obtained, then what is the probability that 2 is obtained on an even-numbered toss?
2. A GP has 64 terms such that $(S_n)_{\text{total}} = 7(S_n)_{\text{odd}}$. Find the common ratio r .
3. What is the rank of the word GTWENTY in the dictionary?
4. $(C_1^{11}/2) + (C_2^{11}/3) + \dots + (C_9^{11}/10) = m/n$. Find $m + n$.
5. If $4\cos\theta + 5\sin\theta = 1$, then find the number of all positive values of $\tan\theta$ where $\theta \in (-\pi/2, \pi/2)$.
6. If the given data 60, 60, 44, 58, 68, α , β , 56 has a mean of 58 and a variance of 66.2, then find $\alpha^2 + \beta^2$.
7. If $|z + 1| = \alpha z + \beta(i + 1)$ and $z = (1/2) - 2i$, then find $\alpha + \beta$.
8. In an increasing arithmetic progression a_1, a_2, \dots, a_n if $a_6 = 2$ and the product of a_1, a_5 and a_4 is greatest, then the value of d is equal to?
9. If relation $R : (a, b) R (c, d)$ is only if $ad - bc$ is divisible by 5, ($a, b, c, d \in \mathbb{Z}$) then R is:
 - i. Reflexive
 - ii. Symmetric, Reflexive but not Transitive
 - iii. Reflexive, Transitive but not Symmetric
 - iv. Equivalence Relation
10. Find the area under the curve $x^2 + y^2 = 169$ and below the line $5x - y = 13$.
11. a, b, c are non-zero vectors and b and c are non-collinear vectors. $a + 5b$ is collinear with c and $b + 6c$ is collinear with a . If $a + \alpha b + \beta c = 0$, then $\alpha + \beta = ?$
12. If the foot of the perpendicular from $(1, 2, 3)$ to the line $(x + 1)/2 = (y - 2)/5 = (z - 4)/1$ is (α, β, γ) , then find $\alpha + \beta + \gamma$.
13. In an arithmetic progression, if the sum of 20 terms is 790 and the sum of 10 terms is 145, then $S_{15} - S_5 = ?$
14. Find the value of the maximum area possible (in sq.units) of ΔABC with vertices $A(0, 0)$, $B(x, y)$ and $C(-x, y)$ such that $y = -2x^2 + 54x$.
15. What is the range of r for which circles $(x + 1)^2 + (y + 2)^2 = r^2$ and $x^2 + y^2 - 4x - 4y + 4 = 0$ coincide at two distinct points.