MATHS

BOOKS - NTA MOCK TESTS

NTA TPC JEE MAIN TEST 62

Mathematics

1. The value of $\left|3+\frac{9}{z}\right|^2+|3-z|^2$ if |z| = 3 is:

A. 18

B. 1

C. 3

D. 36

Answer: D

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2. In a $\triangle ABC$, if $\begin{vmatrix} 1 & a & b \\ 1 & c & a \\ 1 & b & c \end{vmatrix} = 0$, then $\sin^2 A + \sin^2 B + \sin^2 C =$

A. $\frac{9}{4}$

B. $\frac{4}{9}$

C. 1

D. $3\sqrt{3}$

Answer: A

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3. A bag contains 20 white balls and 20 red balls. (Assume that balls of same colour are distinguishable). Pair of balls are drawn at random without replacement until the bag is empty. The probability that each pair consists of one white and one real red ball is:

A. $\frac{2^{20} \times (20!)^2}{40!}$

B. $\frac{2^{20} \times 20!}{40!}$

C. $\frac{2^{20} \times 20!}{(40!)^2}$

D. $\frac{2^{10} \times 20!}{40!}$

Answer: A

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4. Let P(x) is polynomial of degree 4 such that P(l) = 4, P(2) = 7, P(3) = 10, P(4) = 1. If leading coefficient of P(x) is unity then P(6) is equal to:

A. 8

B. 139

C. 19

D. None of these

Answer: C

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5. Let A and B be two sets containing four and two elements respectively, then the number of non-empty relations from A

to B is:

A. 255

B. 256

C. 257

D. 247

Answer: A

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6. If two distinct chords drawn from the point $\left(2\sqrt{2}\sin\theta, \frac{1}{\sqrt{2}}\right)$ to the circle. $x^2 + y^2 = 2\sqrt{2}\sin\theta x + \frac{1}{\sqrt{2}}y$ (θ is a parameter) are bisected by x -axis, then the exhaustive set in which θ lies is

A. $\left(n\pi + \frac{\pi}{4}, n\pi + \frac{3\pi}{4}\right), n \in I$

B. $\left(n\pi + \frac{\pi}{6}, n\pi + \frac{5\pi}{6}\right), n \in I$

C. $\left(2n\pi + \frac{\pi}{4}, 2n\pi + \frac{3\pi}{4}\right), n \in I$

D. $(2n\pi, (2n+1)\pi), n \in I$

Answer: A

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7. Tangent at any point P on the hyperbola $\frac{x^2}{9} - \frac{y^2}{4} = 1$ intersects the asymptotes at points A and B, if C is the centre of the hyperbola, then area of $\triangle ABC$ is:

A. 4 sq. Units

B. 6 sq. Units

C. 8 sq. Units

D. None of these

Answer: B

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8. Consider the parabola $x^2 + 4x - 2y + 6 = 0$. If its chord AB : 2m x - 2 y + (4 m + 3) = 0 intersect its axis at K and directrix at M, then AM, KM and BM are in:

A. A.P

B. G.P

C. H.P

D. None of these

Answer: C

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9. The angle between the two lines:

$\frac{x+1}{2} = \frac{y+3}{2} = \frac{z-4}{-1}$ & $\frac{x-4}{1} = \frac{y+4}{2} = \frac{z+1}{2}$ is:

A. $\cos^{-1}\left(\frac{4}{9}\right)$

B. $\cos^{-1}\left(\frac{3}{9}\right)$

C. $\cos^{-1}\left(\frac{2}{9}\right)$

D. $\cos^{-1}\left(\frac{1}{9}\right)$

Answer: A

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10. If $\vec{a} = \hat{i} - 2\hat{j} + 3\hat{k}$ and $\vec{b} = -3\hat{i} + \hat{j} - \hat{k}$ and $\vec{r} \times \vec{a} = \vec{b} \times \vec{a}, \vec{r} \times \vec{b} = \vec{a} = \vec{b}$ then a unit vector in the direction of $\vec{r}$ is:

A. $\frac{1}{3}\left(-2\hat{i} + \hat{j} - \hat{k}\right)$

B. $\frac{1}{3}\left(-2\hat{i} - \hat{j} + 2\hat{k}\right)$

C. $\frac{1}{3}\left(-2\hat{i} - \hat{j} - 2\hat{k}\right)$

D. none of these

Answer: B

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11. $(\lim)_{x \to 0} \frac{\tan x\sqrt{\tan x} - \sin x\sqrt{\sin x}}{x^3\sqrt{x}}$ equals:

A. $\frac{1}{4}$

B. $\frac{3}{4}$

C. $\frac{1}{2}$

D. 1

Answer: B

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12. The range of $\frac{1}{3\sin\theta + 4\cos\theta + 2}$ is:

A. $\left[-\frac{1}{3}, \frac{1}{7}\right]$

B. $\left[\frac{1}{3}, \frac{1}{7}\right]$

C. $\left(-\infty, -\frac{1}{3}\right] \cup \left[\frac{1}{7}, \infty\right)$

D. None of these

Answer: C

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13. The value of the definite integral $\int_{-1}^{1} \ln(1^x + 2^x + 3^x + 6^x)dx$ equals:

A. $\frac{\ln 2 + \ln 3}{2}$

B. $\frac{\ln 2 + \ln 3}{3}$

C. ln2 + ln3

D. $\frac{\ln 2 + \ln 3}{4}$

Answer: B

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14. Normal to a curve at a point P(x,y) meets the z-axis at G.. If distance of G from the origin is twice the abscissa of P, then the curve is

A. Parabola

B. Circle

C. Ellipse

D. Hyperbola

Answer: D

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15. The value of $\int \frac{x\left(x^4-1\right)}{\left(x^8+3x^4+1\right)\tan^{-1}\left(x^2+\frac{1}{x^2}\right)}$ dx is equal to

A. $\ln \tan^{-1}\left(x^2+\frac{1}{x^2}\right)+C$

B. $\frac{1}{2}\ln \tan^{-1}\left(x^2+\frac{1}{x^2}\right)+C$

C. $2\ln \tan^{-1}\left(x^2+\frac{1}{x^2}\right)+c$

D. none of these

Answer: B

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16. 110 triangles can be formed by joning 10 points as vertices in which n points are collinear. Then the value of n is:

A. 5

B. 6

C. 3

D. 4

Answer: A

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17. If $\tan(\pi\cos\theta) = \cot(\pi\sin\theta)$, then $\cos^2\left(\theta\frac{\pi}{4}\right)$ is:

A. $\frac{1}{16}$

B. $\frac{1}{8}$

C. $\frac{1}{4}$

D. $\frac{1}{2}$

Answer: B

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18. If $2x = y^{\frac{1}{3}} + y^{-\frac{1}{3}}$, then the value of $\frac{x^2-1}{y}.\frac{d^2y}{dx^2} + \frac{x}{y}.\frac{dy}{dx}$ is:

A. 9

B. 3

C. 18

D. none of these

Answer: A

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19. The angle of inclination of the top of the tower from point A on the ground is α and from point β it is β. The height of

tower is x units. If points A and B are y units apart and on the same side of tower then $\frac{y}{2x}$ is equal to ($\beta > \alpha$)

A. $\frac{\sin(\alpha - \beta)}{\cos(\alpha - \beta) - \cos(\alpha + \beta)}$

B. $\frac{\sin(\beta - \alpha)}{\cos(\alpha + \beta) - \cos(\alpha + \beta)}$

C. $\frac{\sin(\beta - \alpha)}{\cos(\alpha - \beta) + \cos(\alpha + \beta)}$

D. None of these

Answer: B

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20. Number of real roots of the equation:

$\sin^{-1}\sin x = \cos^{-1}\cos 4$ in $[0, 2\pi]$ is:

A. 0

B. 1

C. 2

D. more than 2

Answer: A

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21. If $\frac{{}^{20}C_1}{1} + \frac{{}^{20}C_3}{2} + \frac{{}^{20}C_5}{3} + \ldots . + \frac{{}^{20}C_{19}}{10} = \left(k\frac{2^{20}-1}{21}\right)$

, then the value of k is:

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22. Find the number of value(s) of θ in the interval $[0, \pi]$, such that the following linear equations has a non-trivial solution:

$$x \sin 2\theta - y \cos 2\theta - z \cos \theta = 0$$

$$\frac{x}{yz} \sin 2\theta - \frac{2 \sin 2\theta}{z} - \frac{2 \cos 2\theta}{y} = 0$$

$$x \sin 2\theta - y(\sin 2\theta + \cos 2\theta) - 2z \cos 2\theta = 0$$

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23. An aeroplane flies around a square, the sides of which measure 100 miles each. The aeroplane covers at a speed of $100mh^{-1}$ the first side, at $200mh^{-1}$ the second side, at $300mh^{-1}$ the third side and $400mh^{-1}$ the fourth side. The average speed of aeroplane around the square is (in mh^{-1})

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24. The line $3x + 2y = 24$ meets x - axis at B and the y -axis at A. The perpendicular bisector of AB meets the line through (0,

-1) parallel to x -axis at C, then the area of the triangle ABC is____

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25. If the minimum and maximum value of function: $3x^4 - 8x^3 + 12x^2 - 48x + 25$ on the interval [0, 3] is b and a, then the value of a - b is

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26. If f is a differentiable function for all real x and $f'(x) \leq 5 \forall x \in R$. If f(2)=0 and f(5) = 15 value of $\frac{f(3)}{2}$ is:

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27. Area bounded by the curves:

$y^2 = 4k_1x \,\forall k_1 \in \left[\frac{1}{8}, \frac{1}{4}\right], x^2 = 4k_2(y-2) \,\forall k_2 \in \left[-1, -\frac{1}{4}\right]$

and $x = 0$, is:

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28. If $p = \cos 55^\circ, q = \cos 65^\circ, r = \cos 175^\circ$, then the value of $\frac{1}{p} + \frac{1}{q} + \frac{r}{pq}$ is:

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29. A bouquet from 11 different flowers is to be made so that it contains not less than three flowers. The number of different ways of forming the bouquet must be:

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30. If $(\alpha, \alpha - 1)$ lies inside the ellipse $16x^2 + 9y^2 - 16x = 0$ then a lies in the interval $\left(\frac{9}{25}, k\right)$. Find the value of k.

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