MATHS

BOOKS - MODERN PUBLICATION MATHS (KANNADA ENGLISH)

MOCK TEST PAPER -III

Select The Correct Answer

1. Let A and B be two sets containing four and two elements respectively tehn the number of subsets of the set $A \times B$ each having at least three elements is

A. 219

B. 256

C. 275

D. 510

Answer: A

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2. Let S be the set of all real numbers. A relation R has been defined on S by a Rb $\Rightarrow |a-b| \leq 1$, then R is

A. relexive an transitive but not symmetric

B. an equivalence relation

C. symmetric and transitive but not reflexive

D. reflexive and symmetric but not transitiv

Answer: D

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3. Suppose $f(x) = (x+1)^2$ for $x \geq -1$. If $g(x)$ is a function whose graph is the reflection of the graph of $f(x)$ in the line $y = x$, then $g(x) =$

A. $-\sqrt{x} - 1$

B. $\sqrt{x} - 1$

C. $\frac{1}{(x-1)^2} > -1$

D. $\sqrt{x} + 1$

Answer: B

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4. A real valued functio f(x) satisfies the functional equation

f(x-y)=f(y)-f(a-x)f(a+y)

where a is given constant and f(0) =1 f(2a-x) is equal to

A. f(x)

B. $-f(x)$

C. f(-x)

D. f(a)+f(a-x)

Answer: B

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5. If (x) $\begin{cases} x & x \in Q \\ 0 & x \neq Q \end{cases}$ and g(x)=$\begin{cases} x & x \in Q \\ 0 & x \in Q \end{cases}$ then (f-g) will be

A. one one onto

B. one-one into

C. many one onto

D. many one into

Answer: A

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6. If x and y are two non exptys sets where $f: X \to Y$ is function defined such that $f(C) = \{f(x): x \in C\}$ and f (d)= (x:f(x) in D}f or $D \supseteq Y$ for any $A \supseteq X$ and B supeY` then

A. $f\left(f^{-1}(B)\right)$=B only if B =f(x)

B. $f\left(f^{-1}(B)\right)$=B only if B $\subset f(X)$

C. $f\left(f^{-1}\right)(B))$= only if $B \subseteq f(x)$

D. $f\left(f^{-1}(B)\right)$ never equals B

Answer: B

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7. The largest interval lying in $\left[\frac{-\pi}{2}, \frac{\pi}{2}\right]$ for which the function

f(x)=$\left[4^{-x^2+\cos^{-1}\left(\frac{x}{2}-1\right)+\log(\cos x)}\right.$ is defined is :

A. $-\frac{\pi}{2}, \frac{\pi}{2}$

B. $-\frac{\pi}{4}, \frac{\pi}{2}$

C. $0, \frac{\pi}{2}$

D. $[0, \pi]$

Answer: C

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8. Prove that the funciton $f: R \to R$ defined by f(x)=4x+3 is invertible and find the inverse of f.

A. $g(y) = \frac{y-3}{4}$

B. $g(y) = \frac{3y+4}{3}$

C. $g(y) = 4 + \frac{y+3}{4}$

D. $g(y) = \frac{y+3}{4}$

Answer: A

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9. If z is a complex number such that |z| $>$ 2 then the minimum value of $\left|z+\frac{1}{2}\right|$

A. lies in the interval $(1, 2)$

B. is strictly greater than $\frac{5}{2}$

C. is strictly greater than $\frac{3}{2}$ but less than $\frac{5}{2}$

D. is equal to $\frac{5}{2}$

Answer: A

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10. A complex number z is said to be unimodular if |z| =1 suppose z_1 and z_2 are complex numebers such that $\frac{z_1-2z_2}{2-z_1z_2}$ is unimodular and z_2 is not unimodular then the point z_1 lies on a

A. straight line parallel to x axis

B. straight line paralle to y axis

C. circle of radius 2

D. circle of radius $\sqrt{2}$

Answer: C

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11. Let a,b,c be the sides of a triangle no two of them are equal and $\lambda \in R$ if the roots of the equation $x^2 + 2(a+b+c) + 3\lambda$(ab+bc+ca=0) are real then

A. $\lambda < \frac{4}{3}$

B. $\lambda > \frac{5}{3}$

C. $\lambda \in \left(\frac{1}{3}, \frac{5}{3}\right)$

D. $\lambda \in \left(\frac{4}{3}, \frac{5}{3}\right)$

Answer: A

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12. Let α, β be the roots of the equation $x^2 - px + r = 0$ and $\frac{\alpha}{2}, 2\beta$ be the roots of the equation $x^2 - qx + r = 0$ then the value of r is

A. $\frac{2}{9}(p-q)(2q-p)$

B. $\frac{2}{9}(q-p)(2p-q)$

C. $\frac{2}{9}(q-2p)(2q-p)$

D. $\frac{2}{9}(2p-q)(2q-p)$

Answer: D

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13. If the roots of the equation $bx^2 + cx + a = 0$ be imaginary then fro all real value4s of x the expression $3b^2x^2 + 6bcx + 2c^2$ is

A. greater than 4ab

B. less than 4ab

C. greater than -4ab

D. less than -ab

Answer: C

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14. The sum of coefficients of integral powers of x in the binominal expansion of $\left(1-2\sqrt{x}^{50}\right)$ is

A. $\frac{1}{2}\left(3^{50}+1\right)$

B. $\frac{1}{2}\left(3^{50}\right)$

C. $\frac{1}{2}\left(3^{50-1}\right.$

D. $\frac{1}{2}\left(2^{50}+1\right)$

Answer: A

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15. If

$(10)^9+2(11)^1+(10)^8+3(11)^2(10)^7+\ldots+10(11)^9=k(10)^9$

then k is equal to

A. $\frac{441}{100}$

B. 100

C. 110

D. $\frac{121}{10}$

Answer: B

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16. A straight line passes through the points (5, 0) and (0, 3). The length of perpendicular from the point (4, 4) on the line is

A. $\frac{\sqrt{17}}{2}$

B. $\frac{\sqrt{17}}{2}$

C. $\frac{15}{\sqrt{34}}$

D. $\frac{17}{2}$

Answer: B

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17. The equation of a hyperbola whose asymtotes are 3x $\pm$ 5y=0 and vertices are $(\pm 5, 0)$ is

A. $3x^2 - 5y^2 = 0$

B. $5x^2 - 3y^2 = 25$

C. $25x^2 - 9y^2 = 225$

D. $9x^2 - 25y^2 = 225$

Answer: D

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18. All the students of a class performed poolrly in mathematics which of the following statistical measures will not change evern after the grace marks were given

A. median

B. mode

C. variance

D. mean

Answer: C

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19. Let $f_k(x) = \frac{1}{k}\left(\sin^k x + \cos^k x\right)$ where $x \in R$ and $k \geq 1$ then $f_4(x) - f_6(x)$ equals

A. $\frac{1}{3}$

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

C. $\frac{1}{12}$

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

Answer: C

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20. Let p be the proposition. Mathematics is interesting and let q be the proposition mathematics is difficult, then the symbol $p \cap q$ means

A. mathematics is intersecting implies that mathematics is difficult

B. mathematics is intersecting implies and is implied by mathematics is difficult

C. mathematics is intersecting and mathematics is difficult

D. mathematics is intersecting or mathematics is difficult

Answer: C

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21. Value of $\frac{\tan^{-1}1}{3}+\frac{\tan^{-1}1}{5}+\frac{\tan^{-1}1}{7}+\frac{\tan^{-1}1}{8}$ is

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

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

C. $\pi)$

D. none of these

Answer: A

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22. If $\frac{\tan^{-1}\left(\sqrt{1+x^2}-1\right)}{x}=4$ then x equals

A. tan 2

B. tan 4

C. tan 6

D. tan 8

Answer: D

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23. The integral solution of $\tan^{-1} x + \frac{\tan^{-1}(1)}{y} = \tan^{-1} 3$ is

A. (1,4)

B. (2,1)

C. (3,13)

D. none of these

Answer: D

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24. If $\sin^{-1} x + \cos^{-1}(1-x) = \sin^{-1}(-x)$ then x satisfies

A. $2x^2 + 3x + 1 = 0$

B. $2x^2 - 3x = 0$

C. $2x^2 + x - 1 = 0$

D. $2x^2 + x + 1 = -0$

Answer: B

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25. The number of values of k for which the system of equations :

$(k+1)x + 8y = 4k$

$kx + (k+3)y = 3k - 1$

has no solution is:

A. 1

B. 2

C. 3

D. infinite

Answer: C

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26. If $\alpha, \beta \neq 0$ and $f(n) = \alpha^n + \beta^n$ and

$$\begin{vmatrix} 3 & 1+f(1) & 1+f(2) \\ 1+f(1) & 1+f(2) & 1+f(3) \\ 1+f(2) & 1+f(3) & 1+f(4) \end{vmatrix}$$

$= k(1-\alpha)^2(1-\beta)^2(\alpha-\beta)^2$ then k is equal to

A. $\frac{1}{\alpha\beta}$

B. 1

C. -1

D. $\alpha\beta$

Answer: B

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27. The set of all values of λ for which the system of linear equation |(2x_(1)-2x_(2)+x_(3),=lambdax_(1)), (2x_(1)-3x_(2)+2x_(3),=lambdax_(2)),(-x(1)+2x_(2),=lambdax_(3))|` has a non trivial solution

A. is an empty set

B. is a singleton

C. contains two elements

D. contains more than two elements

Answer: C

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28. The inverse of the matrix $A = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 4 \end{bmatrix}$ is

A. $\begin{bmatrix} 2 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 4 \end{bmatrix}$

B. $\begin{bmatrix} \frac{1}{2} & 0 & 0 \\ 0 & \frac{1}{3} & 0 \\ 0 & 0 & \frac{1}{4} \end{bmatrix}$

C. $\frac{1}{24}\begin{bmatrix} 2 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 4 \end{bmatrix}$

D. $\frac{1}{24}\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

Answer: B

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29. If A= $\begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$ then A^n is

A. $\begin{bmatrix} 1 & 2^n \\ 0 & 1 \end{bmatrix}$

B. $\begin{bmatrix} 1 & n^2 \\ 0 & 1 \end{bmatrix}$

C. $\begin{bmatrix} 1 & 2n \\ 0 & 1 \end{bmatrix}$

D. $\begin{bmatrix} 1 & n^2 \\ 1 & 1 \end{bmatrix}$

Answer: C

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30. If $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ then A^2 is equal to _____

A. $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$

B. $\begin{bmatrix} 1 & 0 \\ 1 & 0 \end{bmatrix}$

C. $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

D. $\begin{bmatrix} 0 & 1 \\ 0 & 1 \end{bmatrix}$

Answer: A

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31. The function $f(x) = [x]$ where $[x]$ is the greatest integer function is continous at

A. 4

B. -2

C. 1

D. 1.5

Answer: D

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32. $f(x) = \begin{cases} 3x - 8 & \text{if} x \leq 5 \\ 2k & \text{if} x > 5 \end{cases}$

A. $\frac{2}{7}$

B. $\frac{3}{7}$

C. $\frac{4}{7}$

D. $\frac{7}{2}$

Answer: D

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33. If x+y=$\tan^{-1} y$ and $\frac{d^2y}{dx^2} = f(y)\frac{dy}{dx}$ then f(y)=

A. $-\frac{2}{y^3}$

B. $\frac{2}{y^3}$

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

D. $-\frac{1}{y}$

Answer: B

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34. Let $f(x) = \cos^{-1}\left[\frac{1}{\sqrt{13}}(2\cos x - 3\sin x)\right]$. Then f(0.5) =

A. 0.5

B. 1

C. 0

D. -1

Answer: B

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35. If $y = (1+x)\left(1+x^2\right)\left(1+x^4\right)$, then $\frac{dy}{dx}$ at $x = 1$ is

A. 28

B. 0

C. 20

D. 1

Answer: A

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36. If $y = \left(\tan^{-1} x\right)^2$ then show that $\left(x^2+1\right)^2 \frac{d^2y}{dx^2} + 2x\left(x^2+1\right)\frac{dy}{dx} = 2$

A. 0

B. 1

C. 4

D. 2

Answer: D

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37. If the function $f(x)$ defined by

$f(x) = \frac{x^{100}}{100} + \frac{x^{99}}{99} + \ldots . + \frac{x^2}{2} + x + 1$, then $f'(0) =$

A. 100

B. -1

C. $100f(0)$

D. 1

Answer: D

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38. The maximum area of rectangle that can be inscribed in a circle of radius 2 units is

A. 8π sq units

B. 4 sq units

C. 5 sq units

D. 8 sq units

Answer: B

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39. A stone is dropped into a quiet lake and waves in circles at the speed of 5 cm/s. At the instant when the radius of the circular wave is 8 cm, how fast is the enclosed area increasing?

A. $8xc\frac{m^2}{s}$

B. $80\pi c\frac{m^2}{s}$

C. $6\pi c\frac{m^2}{s}$

D. $\frac{8}{3}c\frac{m^2}{s}$

Answer: B

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40. A gardener is digging a plot of land. As he gets tired, he works more slowly, After 't' minutes he is digging at a rate of $\frac{2}{\sqrt{t}}$ square metres per minute. How long will it take him to dig an area of 40 square metres ?

A. 10 minutes

B. 40 minutes

C. 100 minutes

D. 30 minutes

Answer: C

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41. If f(x)=x^3 and g(x)=$x^3 - 4x$ in $-2 < x < 2$ then consider the statements

(a) f(x) and g(x) satisfy mean value theorem

(b) f(x) and g(x) both satisfy rolle 's theorm

(c) only g(x) satisfies rolle 's theorem

OF THE STATEMENTS

A. a alone is correct

B. a and c are correct

C. a and b are correct

D. none is correct

Answer: B

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42. $\int \frac{1}{x^2(x^4+1)^{3/4}} dx$ is equal to _____.

A. $\frac{-(+x^4)^{1/4}}{x} + C$

B. $\frac{-(+x^4)^{1/4}}{x^2} + C$

C. $\frac{-(+x^4)^{1/4}}{2x} + C$

D. $\frac{-(+x^4)^{3/4}}{x} + C$

Answer: A

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43. $\in \frac{\sin^2 x}{1+\cos x}$ dx=

A. x+ sin x+C

B. x-sin x+C

C. sin x+C

D. cos x +C

Answer: B

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44. $\int e^x \frac{1+\sin x}{1+\cos x}$ dx is equal to

A. $e^x \frac{\tan(x)}{2} + c$

B. $\frac{\tan(x)}{2} + C$

C. $e^x + C$

D. $e^x \sin x + C$

Answer: A

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45. The value of $\int_{-1}^{2} \frac{|x|}{x} dx$ is

A. 0

B. 1

C. 2

D. 3

Answer: B

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46. $\int_0^{\frac{\pi}{2}} \frac{\cos^4 x}{\cos^4 x + \sin^4 x}\, dx =$

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

B. $\frac{\pi}{2}$

C. $\frac{\pi}{8}$

D. (π)

Answer: A

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47. The area bounded by the curve $y = \sin\left(\frac{x}{3}\right)$, x-axis and lines x=0 and $x = 3\pi$ is

A. 9

B. 0

C. 6

D. 3

Answer: C

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48. The particular solution of $\frac{y}{x}\frac{dy}{dx} = \frac{1+y^2}{1+x^2}$ when x=1 y=2 is

A. $5(1+y^2)=2(1+x^2)$

B. $2(1+y^2)=5(1+x^2)$

C. $5(1+y^2)=(1+x^2)$

D. $(1+y^2)=2(1+x^2)$

Answer: B

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49. The solution of the differential equation $\frac{dy}{dx}=(x+y)^2$ is

A. $\frac{1}{x+y}=c$

B. $\sin^{-1}(x+y)=x+c$

C. $\tan^{-1}(x+y)=c$

D. $\tan^{-1}(x+y) = x + c$

Answer: D

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50. The angle between the lines whose direction cosines satisfy the equation $l + m + n = 0$ and $l^2 = m^2 + n^2$ is

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

B. $\frac{\pi}{6}$

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

D. $\frac{\pi}{3}$

Answer: D

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51. The distance of the point (1,0,2) from the point of intersection of the line $\frac{x-2}{3}=\frac{y+1}{4}=\frac{z-2}{12}$ and the plane x-y+z=16 is

A. $2\sqrt{14}$

B. 8

C. $3\sqrt{21}$

D. 13

Answer: D

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52. The equatin of the plane containing the line 2x-5y+z=3,x+y+4z=5 and parallel to the plane x +3y+6z=1 is

A. 2x+6y+12z=13

B. x+3y+6z=-7

C. x+3y+6z=7

D. 2x+6y-12z=-13

Answer: C

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53. Let $\overrightarrow{P}R = 3\hat{i} + \hat{j} - 2\hat{k}$ and $\overrightarrow{S}Q = \hat{i} - 3\hat{j} - 4\hat{k}$ determine diagonals of a parallelogram PQRS and $\overrightarrow{P}T = \hat{i} + 2\hat{j} + 3\hat{k}$ be another vector the volume of the

paralleopiped determined by the vectors $\overrightarrow{PT}, \overrightarrow{PQ}$ and $\overrightarrow{PS}$ is

A. 5

B. 20

C. 10

D. 30

Answer: C

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54. If $\left[\bar{a} \times \bar{b}\bar{b} \times \bar{c}\bar{c} \times \bar{a}\right] = \lambda\left[\bar{a}\bar{b}\bar{c}\right]^2$ then λ is equal to

A. 3

B. 0

C. 1

D. 2

Answer: C

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55. Let $\vec{a}$, $\vec{b}$ and $\vec{c}$ be three non zero vectors such that no two of them are collinear and $\left(\vec{a} \times \vec{b}\right) \times \vec{c} = \frac{1}{3}\left|\vec{b}\right|\left|\vec{c}\right|\vec{a}$ if θ the angle between the vectors $\vec{b}$ and $\vec{c}$ then a value of sin θ is

A. $\frac{2\sqrt{2}}{3}$

B. $-\frac{\sqrt{2}}{3}$

C. $\frac{2}{3}$

D. $\frac{-2\sqrt{3}}{3}$

Answer: A

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56. 6 boys and 6 girls sit in a row at random the probability that all the girls sit together is

A. $\frac{1}{432}$

B. $\frac{12}{431}$

C. $\frac{1}{132}$

D. none of these

Answer: C

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57. An urn contains 9 balls , 2 of which are white, 3 blue and 4 black. 3 balls are drawn at random from the urn. The chance that 2 balls will be of the same colour and the third of a different colour is:

A. $\frac{45}{84}$

B. $\frac{55}{84}$

C. $\frac{35}{84}$

D. $\frac{25}{84}$

Answer: B

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58. Three dice are rolled once the chance of getting a score of 5 is

A. $\frac{5}{216}$

B. $\frac{1}{6}$

C. $\frac{1}{36}$

D. $\frac{1}{7^2}$

Answer: C

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59. A bag contaings 3 white 4 black 2 red balls if 2 balls are drawn at random then the probability that both the balls are white is

A. $\frac{1}{18}$

B. $\frac{1}{36}$

C. $\frac{1}{12}$

D. $\frac{1}{24}$

Answer: C

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60. An urn contains nine balls of which three are red four are blue and two are green three balls are drawn at random the probability that the three balls different colours is

A. $\frac{1}{3}$

B. $\frac{2}{7}$

C. $\frac{1}{21}$

D. $\frac{2}{23}$

Answer: B

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