



MATHS

BOOKS - FULL MARKS MATHS (TAMIL ENGLISH)

SAMPLE PAPER -8

Part I

1. Let R be the universal relation on a set X with more than one element then R is

- A. not reflexive
- B. not symmetric
- C. transitive
- D. none of the above

Answer:



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2. The value of $\log_a b \log_b c \log_c a$ is

- A. 2

B. 1

C. 3

D. 4

Answer:



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3. If $\log_{\sqrt{x}} 0.25 = 4$ then the value of x is

..... .

A. 0.5

B. 2.5

C. 1.5

D. 1.25

Answer:



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4. The product of r consecutive positive integers is divisible by

A. $r!$

B. $(r - 1)!$

C. $(r + 1)!$

D. r^r

Answer:



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5. The value of $\tan 75^\circ - \cot 75^\circ$ is

A. 1

B. $2 + \sqrt{3}$

C. $2 - \sqrt{3}$

D. $2\sqrt{3}$

Answer:



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6. If ${}^n C_{12} = {}^n C_2$ then $n = \dots\dots\dots$.

A. 12

B. 6

C. 14

D. 15

Answer:



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7. The line $(p + 2q)x + (p - 3q)y = p - q$ for different values of p and q passes through the point

A. $\left(\frac{3}{2}, \frac{5}{2}\right)$

B. $\left(\frac{2}{5}, \frac{2}{5}\right)$

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

D. $\left(\frac{2}{5}, \frac{3}{5}\right)$

Answer:



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8. The number of terms in the expansion of

$$\left[(a + b)^2\right]^{18} = \dots\dots\dots .$$

A. 19

B. 18

C. 36

D. 37

Answer:



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9. A line passes through the point $(2, 2)$ and is perpendicular to the line $3x + y = 5$ then its y- intercept is

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

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

C. 5

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

Answer:



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10. If a and b are the roots of the equation $x^2 - kx + 16 = 0$ satisfy $a^2 + b^2 = 32$, then the value of k is

A. 10

B. -8

C. -8, 8

D. 6

Answer:



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11. If A is a square matrix of order 3 then $|kA| =$

..... .

A. $k|A|$

B. $k^2|A|$

C. $k^3|A|$

D. $k|A^3|$

Answer:



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12. If ABCD is a parallelogram then

$$\vec{AB} + \vec{AD} + \vec{CB} + \vec{CD} = \dots\dots\dots .$$

A. $2(\overrightarrow{AB} + \overrightarrow{AD})$

B. $4\overrightarrow{AC}$

C. $4\overrightarrow{BD}$

D. $\overrightarrow{0}$

Answer:



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13. $\lim_{x \rightarrow 0} x \cot x = \dots\dots\dots .$

A. 0

B. 1

C. -1

D. ∞

Answer:



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14. $x = \frac{1 - t^2}{1 + t^2}$, $y = \frac{2t}{1 + t^2}$ then $\frac{dy}{dx}$ is

A. $\frac{y}{x}$

B. $\frac{-y}{x}$

C. $-\frac{x}{y}$

D. $\frac{x}{y}$

Answer:



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15. If $y = \frac{(1-x)^2}{x^2}$ then $\frac{dy}{dx}$ is

A. $\frac{2}{x^2} + \frac{2}{x^3}$

B. $-\frac{2}{x^2} + \frac{2}{x^3}$

C. $-\frac{2}{x^2} - \frac{2}{x^3}$

$$D. -\frac{2}{x^3} + \frac{2}{x^2}$$

Answer:



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16. If $y = \frac{\sin x + \cos x}{\sin x - \cos x}$ then $\frac{dy}{dx}$ at $x = \frac{\pi}{2}$ is

..... .

A. 1

B. 0

C. -2

D. 2

Answer:



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17. $\int \frac{\sin^8 x - \cos^8 x}{1 - 2 \sin^2 x \cos^2 x} dx$ is

A. $\frac{1}{2} \sin 2x + c$

B. $-\frac{1}{2} \sin 2x + c$

C. $\frac{1}{2} \cos 2x + c$

D. $-\frac{1}{2} \cos 2x + c$

Answer:



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18. An urn contains m white and n black balls. A ball is drawn at random and is put back into the urn along with k additional balls of the same colour as that of the ball drawn. A ball is again drawn at random. What is the probability that the ball drawn now is white ?

A. $\frac{5}{12}$

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

C. $\frac{7}{12}$

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

Answer:



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19. let A and B be two events such that

$$P(\overline{A \cup B}) = \frac{1}{6} \quad , \quad P(A \cap B) = 1/4 \quad \text{and}$$

$P(\overline{A}) = 1/4$ then the events A and B are

..... .

A. Equally likely but not independent

B. Independent but not equally likely

C. Independent and equally likely

D. Mutually inclusive and dependent

Answer:



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Part II

1. Let A and B are two sets such that $n(A) = 3$ and $n(B) = 2$. If $(x,1)$, $(y,2)$ and $(z,1)$ are in $A \times B$, find A and B where x,y, z are distinct elements.



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2. Solve $|5x - 12| < -2$



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3. If ${}^{10}P_{r-1} = 2 \times {}^6P_r$, find r.



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4. The number of bacteria in a certain culture doubles every hour. If there were 30 bacteria present in the culture originally, how many bacteria will be present at the end of 2^{nd} hour, 4^{th} hour and n^{th} hour?



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5. Find $|A|$, if $A = \begin{bmatrix} 0 & \sin \alpha & \cos \alpha \\ \sin \alpha & 0 & \sin \beta \\ \cos \alpha & -\sin \beta & 0 \end{bmatrix}$



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6. Find the value of λ for which the vectors

$$\vec{a} = 3\hat{i} + 2\hat{j} + 9\hat{k} \text{ and } \vec{b} = \hat{i} + \lambda\hat{j} + 3\hat{k}$$

are orthogonal.



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7. $\lim_{x \rightarrow \pi} \frac{\sin 3x}{\sin 2x}$



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8. Find the derivative of $\sin x^2$ with respect to x^2 .



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9. Evaluate: $\int \frac{x^2}{1+x^6} dx$



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1. Solve $\frac{4}{x+1} \leq 3 \leq \frac{6}{x+1}, x > 0$



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2. Prove that

$$\cos^{-1}\left(\frac{4}{5}\right) + \tan^{-1}\left(\frac{3}{5}\right) = \tan^{-1}\left(\frac{27}{11}\right)$$



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3. There are 15 candidates for an examination .

7 candidates are appearing for mathematics

examination while the remaining 8 are appearing for different subjects. In how many ways can they be seated in a row so that no two mathematics candidates are together ?



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4. Prove that if a, b, c are in H.P. if and only if

$$\frac{a}{c} = \frac{a - b}{b - c}$$



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5. If $(-4, 7)$ is one vertex of a rhombus and if the equation of one diagonal is $5x - y + 7 = 0$, then find the equation of another diagonal.



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6. verify the existence of $\lim_{x \rightarrow 1} f(x)$, where $f(x)$

$$= \begin{cases} \frac{|x-1|}{x-1} & \text{for } x \neq 1 \\ 0 & \text{, for } x = 1 \end{cases}$$



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7. If $y = \sin^{-1} x$ then find y'' .



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8. Evaluate: $\int (\cot^2 x + \tan^2 x) dx$



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9. Show that

$$\begin{vmatrix} 2bc - a^2 & c^2 & b^2 \\ c^2 & 2ca - b^2 & a^2 \\ b^2 & a^2 & 2ab - c^2 \end{vmatrix} = \begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}^2$$



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Part IV

1. The total cost of airfare on a given route is comprised of the base cost C and the fuel surcharge S in rupee. Both C and S are functions of the mileage m ,

$$C(m) = 0.4 m + 50 \text{ and } S(m) = 0.03 m .$$

Determine a function for the total cost of a ticket in terms of the mileage and find the airfare for flying 1600 miles.



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2. Prove that :

$$\sin A + \sin(120^\circ + A) + \sin(240^\circ + A) = 0$$



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3. Determine the region in the plane determined by the inequalities $y \geq 2x$ and $-2x + 3y \leq 6$.



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4. If $y = (\cos^{-1} x)^2$, prove that

$$(1 - x^2) \frac{d^2y}{dx^2} - x \frac{dy}{dx} - 2 = 0, \text{ Hence find } y_2$$

when $x=0$.



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5. Prove that ${}^nC_r + {}^nC_{r-1} = {}^{n+1}C_r$



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6. If the binomial coefficients of three consecutive terms in the expansion of $(a + x)^n$ are in the ratio 1:7:42, then find n.



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7.

$$\cos^2 \alpha + \cos^2 (\alpha + 120^\circ) + \cos^2 (\alpha - 120^\circ) = \frac{3}{2}$$



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8. A box contains two white balls, three black balls and four balls. In how many ways can three balls be drawn from the box, if at least one black ball is to be included in the draw ?



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9. Show that
$$\begin{vmatrix} a^2 + x^2 & ab & ac \\ ab & b^2 + x^2 & bc \\ ac & bc & c^2 + x^2 \end{vmatrix}$$
 is divisible by x^4



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10. If $\begin{bmatrix} 0 & p & 3 \\ 2 & q^2 & -1 \\ r & 1 & 0 \end{bmatrix}$ is skew-symmetric, find the values of p , q and r



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11. $\lim_{x \rightarrow a} \frac{\sqrt{x-b} - \sqrt{a-b}}{x^2 - a^2} (a > b)$



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12. Evaluate $\int \frac{3x + 5}{x^2 + 4x + 7} dx$





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13. A factory has two Machines - I and II. Machine - I produces 60% of items and Machine -II produces 40% of the items of the total output . Further 2% of the items produced by Machine-I are defective whereas 4% produced by Machine -II are defective . If an item is drawn at random what is the probability that it is defective ?



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