



MATHS

BOOKS - FULL MARKS MATHS (TAMIL ENGLISH)

SAMPLE PAPER - 2

Part I

1. The range of the function $\frac{1}{1 - 2 \sin x}$ is

..... .

A. $(-\infty, -1) \cup \left(\frac{1}{3}, \infty\right)$

B. $(-1, -1]$

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

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

Answer:



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2. The value of $\log_{\sqrt{2}} 512$ is

A. 16

B. 18

C. 9

D. 12

Answer:



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3. If a and b are the roots of the equation $x^2 - kx + 16 = 0$ and 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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4. The value of $\log_9 27$ is

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

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

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

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

Answer:



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5. The value of

$$\frac{\sin 3\theta + \sin 5\theta + \sin 7\theta + \sin 9\theta}{\cos 3\theta + \cos 5\theta + \cos 7\theta + \cos 9\theta} = \dots\dots\dots$$

A. $\tan 3\theta$

B. $\tan 6\theta$

C. $\cot 3\theta$

D. $\cot 6\theta$

Answer:



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6. In 3 fingers the number of ways 4 rings can be worn in Ways.

A. $4^3 - 1$

B. 3^4

C. 68

D. 64

Answer:



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7. Everybody in a room shakes hands with everybody else. The total number of shake hands is 66. The number of persons in the room is

.

A. 11

B. 12

C. 10

D. 6

Answer:



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8. The H.M of two positive number whose AM and G.M. are 16, 8 respectively is

A. 10

B. 6

C. 5

D. 4

Answer:



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9. The co-efficient of the term independent of x in the expansion of $\left(2x - \frac{1}{3x}\right)^6$, $x > 0$ is

..... .

A. $\frac{-160}{27}$

B. $\frac{-160}{37}$

C. $\frac{80}{3}$

D. $\frac{-80}{9}$

Answer:



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10. The value of $\begin{vmatrix} a & 0 & 0 \\ 0 & b & 0 \\ 0 & 0 & c \end{vmatrix}^2$ is

A. abc

B. $-abc$

C. 0

D. $a^2b^2c^2$

Answer:



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11. If $\Delta = \begin{vmatrix} a & b & c \\ x & y & z \\ p & q & r \end{vmatrix}$ then $\begin{vmatrix} ka & kb & kc \\ kx & ky & kz \\ kp & kq & kr \end{vmatrix}$ is

..... .

A. Δ

B. $k\Delta$

C. $3k\Delta$

D. $k^3\Delta$

Answer:



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12. A vector makes equal angle with the positive direction of the co - ordinate axes then each angle is equal to

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

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

C. $\cos^{-1}\left(\frac{1}{\sqrt{3}}\right)$

D. $\cos^{-1}\left(\frac{2}{\sqrt{3}}\right)$

Answer:



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13. If the centroids of ΔABC and $\Delta A'B'C'$ are respectively G and G' then $\overrightarrow{AA'} + \overrightarrow{BB'} + \overrightarrow{CC'}$

..... .

A. $\overrightarrow{GG'}$

B. $3\overrightarrow{GG'}$

C. $2\overrightarrow{GG'}$

D. 0

Answer:



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14. If $f(x) = \begin{cases} kx^2 & \text{for } x \leq 2 \\ 5 & \text{for } x > 2 \end{cases}$ is continuous at $x = 2$ then the value of k is

A. $\frac{5}{4}$

B. 0

C. 1

D. $\frac{4}{5}$

Answer:



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15. If $x = \frac{1 - t^2}{1 + t^2}$ and $y = \frac{2t}{1 + t^2}$ then $\frac{dy}{dx}$ at $t = 2$



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16. $\lim_{x \rightarrow \infty} \left(\frac{x^2 + 5x + 3}{x^2 + x + 3} \right)^x$ is

A. e^4

B. e^2

C. e^3

D. 1

Answer:



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17. $\int \frac{e^x (x^2 \tan^{-1} x + \tan^{-1} x + 1)}{x^2 + 1} dx$ is

A. $e^x \tan^{-1}(x + 1) + c$

B. $\tan^{-1}(e^x) + c$

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

$$D. e^x \tan^{-1} x + c$$

Answer:



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$$18. \int \sqrt{1 - \cos 2x} dx = \dots\dots\dots$$



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$$19. \frac{e^{6 \log x} - e^{5 \log x}}{e^{4 \log x} - e^{3 \log x}} = \dots\dots\dots .$$

A. x

B. x^3

C. x^2

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

Answer:



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20. It is given that the events A and B are such that

$$P(A) = \frac{1}{4}, P(A/B) = \frac{1}{2} \text{ and } P(B/A) = \frac{1}{3}$$

then $P(B) = \dots\dots\dots$

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

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

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

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

Answer:



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1. Find x such that $-\pi \leq x \leq \pi$ and $\cos 2x = \sin x$



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2. If ${}^{(n-1)}P_3 : {}^n P_4 = 1 : 10$, find n .



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3. Find the 18th and 25th terms of the sequence defined by

$$a_n = \begin{cases} n(n+2), & \text{if } n \text{ is even natural number} \\ \frac{4n}{n^2+1}, & \text{if } n \text{ is odd natural number} \end{cases}$$



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4. Show that the lines are
 $3x + 2y + 9 = 0$ and $12x + 8y - 15 = 0$ are
parallel lines.



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5. Prove that
$$\begin{vmatrix} x + 2a & y + 2b & z + 2c \\ x & y & z \\ a & b & c \end{vmatrix} = 0$$



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6. Find the value of λ for which the vectors

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

are perpendicular.

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7. If $y = \frac{\tan x}{x}$ find $\frac{dy}{dx}$

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8. Evaluate $\int \sqrt{25x^2 - 9} dx$



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9. If A and B are two independent events such that

$P(A) = 0.4$ and $P(A \cup B) = 0.9$. Find $P(B)$.



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10. A rope of length 12 m is given. Find the largest area of the triangle formed by this rope

and find the dimensions of the triangle so formed.



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Part iii

1. Let

$$A = \{a, b, c\} \text{ and } R = \{(a, a), (b, b), (a, c)\}.$$

Write down the minimum number of ordered pairs to be included to R to make it

(i) reflexive (ii) symmetric (iii) transitive (iv) equivalence



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2. Solve: $2|x + 1| - 6 \leq 7$ and graph the solution set in a number line.



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3. If the different permutations of all letters of the word BHASKARA are listed as in a dictionary, how many strings are there in this list before the first word starting with B?



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4. Find the sum up to n terms of the series :

$$1 + \frac{6}{7} + \frac{11}{49} + \frac{16}{343} + \dots$$



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5. Area of the triangle formed by a line with the coordinate axes, is 36 square units. Find the equation of the line if the perpendicular drawn from the origin to the line makes an angle of 45° with positive the x - axis.



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6.

If

$$A^T = \begin{pmatrix} 4 & 5 \\ -1 & 0 \\ 2 & 3 \end{pmatrix} \text{ and } B = \begin{pmatrix} 2 & -1 & 1 \\ 7 & 5 & -2 \end{pmatrix}$$

verify that $(A - B)^T = A^T - B^T$



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7. For any vector \vec{a} prove that

$$|\vec{a} \times \hat{i}|^2 + |\vec{a} \times \hat{j}|^2 + |\vec{a} \times \hat{k}|^2 = 2|\vec{a}|^2.$$



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8. Given $y = \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$ find $\frac{dy}{dx}$



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9. A wound is healing in such a way that t days since Sunday the area of the wound has been decreasing at a rate of $-\frac{3}{(t+2)^2} \text{ cm}^2$ per day. If on Monday the area of the wound was 2 cm^2

What was the area of the wound on Sunday?



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10. An integer is chosen at random from the first 50 positive integers. What is probability that the integer chosen is a prime or multiple of 4?



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11. If $f: R \rightarrow R$ is defined by $f(x) = 2x - 3$ prove that f is a bijection and find its inverse.



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12. If the equations $x^2 - ax + b = 0$ and $x^2 - ex + f = 0$ have one root in common and if the second equation has equal roots then prove that $ae = 2(b + f)$.



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13. A straight line passes through a fixed point (6, 8). Find the locus of the foot of the perpendicular on it drawn from the origin is.



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14. Express the matrix $A = \begin{bmatrix} 1 & 3 & 5 \\ -6 & 8 & 3 \\ -4 & 6 & 5 \end{bmatrix}$ as the sum of a symmetric and a skew - symmetric matrices.

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15. If $y = e^{\tan^{-1} x}$, show that

$$(1 + x^2)y'' + (2x - 1)y' = 0$$

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16. Evaluate: $\int 2 \sin^{-1} x dx$



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17. A factory has two machines A and B. Machine A produces 40% of items of the output and Machine B produces 60% of the items. Further 4% of items produced by Machine A are defective and 5% produced by Machine B are defective. An item is drawn at random. If the drawn item is defective, find the probability that it was produced by Machine B.



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