



MATHS

BOOKS - S CHAND MATHS (ENGLISH)

MODEL TEST PAPER -12

Section A

1. Let $A = \{1, 2, 3\}$, $B = \{2, 3, 4\}$, then which of the following is a function form A to B ? (a) $\{(1,2),(1,3),(2,3),(3,3)\}$ (b) $\{(1,3),(2,4)\}$ (c) $\{(1,3),(2,2),(3,3)\}$ (d) $\{(1,2),(2,3),(3,2),(3,4)\}$

A. $\{(1,2),(1,3),(2,3),(3,3)\}$

B. $\{(1,3),(2,4)\}$

C. $\{(1,3),(2,2),(3,3)\}$

D. $\{(1,2),(2,3),(3,2),(3,4)\}$

Answer: C



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2. Value of $\tan 75^\circ + \cot 75^\circ = ?$

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

B. $\sqrt{3}$

C. 4

D. -4

Answer: C



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3. If $\tan 69^\circ + \tan 66^\circ - \tan 69^\circ \tan 66^\circ = 2k$ then $k =$ (a) $-\frac{1}{2}$ (b) $\frac{1}{2}$ (c)

-1 (d) None of these

A. $-\frac{1}{2}$

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

C. -1

D. None of these

Answer: A



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4. if second terms of a GP is 2 and the sun of its infinite terms is , then its first term is

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

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

C. 2

D. 4

Answer: D

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5. If the equations $x^2 + 2x + 3\lambda = 0$ and $2x^2 + 3x + 5\lambda = 0$ have a non-zero common roots. then $\lambda =$ (a)1 (b)-1 (c)3 (d)None of these

A. 1

B. -1

C. 3

D. None of these

Answer: B

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6. n points are given of which r points are collinear, then the number of straight lines that can be found = (a) ${}^n C_2 - {}^r C_2$ (b) ${}^n C_2 - {}^r C_2 + 1$ (c) ${}^n C_2 - {}^r C_2 - 1$ (d) None of these

A. ${}^n C_2 - {}^r C_2$

B. ${}^n C_2 - {}^r C_2 + 1$

C. ${}^n C_2 - {}^r C_2 - 1$

D. None of these

Answer: B



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7. The least value of k which makes the roots of the equation

$x^2 + 5x + k = 0$ imaginary is

A. 4

B. 5

C. 6

D. 7

Answer:

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8. Equation of the diameter of the circle $x^2 + y^2 - 2x + 4y = 0$ which passes through the origin is

A. $x + 2y = 0$

B. $x - 2y = 0$

C. $2x + y = 0$

D. $2x - y = 0$

Answer: C

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

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

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

C. 1

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

Answer: D



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10. $\lim_{x \rightarrow 0} \frac{\sin x^\circ}{x}$ is equal to

A. 1

B. π

C. $-\pi$

D. $\frac{\pi}{180}$

Answer: D



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11. If A and B are two sets, such that $n(A) = 115$, $n(B) = 326$, $n(A - B) = 47$, then write $n(A \cup B)$

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12. The word THINGS is given. Determine the number of different 6 letters words that can be formed

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13. Find the term independent of x in $\left(\frac{3x^2}{2} - \frac{1}{3x}\right)^9$

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14. Find the derivative of the function $\left(1 + \frac{1}{x}\right)\left(1 + \frac{2}{x}\right)$ with respect to x.

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15. Two cards are drawn from a well-shuffled deck of 52 cards. Find the probability that either both are red or both are kings .

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16. If $R = \{(x, y) : x, y \in W, x^2 + y^2 = 25\}$, then find the domain and range of R .

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17. For any sets A and B, prove that $[B' \cup (B' - A)]' = B$

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18. If $a = b \cos \frac{2\pi}{3} = c \cos \frac{4\pi}{3}$, then write the value of $ab + bc + ca$

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19. Show that $\sin 3A + \sin 2A - \sin A = 4 \sin A \cos \frac{A}{2} \cos \frac{3A}{2}$

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20. If $A + B + C = \pi$, then show that \sin

$$\frac{A + B + C}{2} = \sin\left(\frac{A}{2}\right) \cdot \cos \frac{B + C}{2} + \sin \frac{B + C}{2} \cdot \cos \frac{A}{2}$$

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21. In solving quadratic equation $x^2 + px + q = 0$, one student makes mistake only in the constant term obtains 4 and 3 as the roots. Another student makes a mistake only in the coefficient of x and finds -5 and -2 as the roots. Determine the correct equation

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22. If x is real and the expression $\frac{x^2 + 2x - 11}{x - 3}$ takes all values which do not lie between a and b , then find a and b

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23. Let $A = \mathbb{R} - \{-5\}$ and $B = \mathbb{R}$. Let the function $f: A \rightarrow B$ be defined as $f(x) = \frac{5x + 4}{x + 5}$, $x \in A$. Show that f is an injective function.

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24. If $\cos(\alpha + \beta) = \frac{4}{5}$, $\sin(\alpha - \beta) = \frac{5}{13}$ and α and β lie between 0 and $\frac{\pi}{4}$, find $\tan 2\alpha$.

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25. Solve $\cos \theta \cdot \cos 2\theta \cdot \cos 3\theta = \frac{1}{4}$, $0 \leq \theta \leq \pi$

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26. Use principle of mathematical induction, to prove that $(1 + x)^n > 1 + nx$, for $n \geq 2$ and $x > = -1, (\neq 0)$

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27. If $y = \log(\sqrt{\sin x - \cos x})$, that prove that $\frac{dy}{dx} = -\frac{1}{2}\tan\left(\frac{\pi}{4} + x\right)$

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28. Differentiate the function $\frac{1}{2x - 3}$ by First Principle of differentiation.

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29. Find the sum of the series $7 + 10 + 22 + 70 + \dots$ up to n terms

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30. If a_1, a_2, \dots, a_n is a sequence of non-zero number which are in A.P.,

show that

$$\frac{1}{a_1 a_n} + \frac{1}{a_2 a_{n-1}} + \dots + \frac{1}{a_n a_1} = \frac{2}{a_1 + a_n} \left[\frac{1}{a_1} + \frac{1}{a_2} + \dots + \frac{1}{a_n} \right]$$



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31. If $x = a + b, y = a\alpha + b\beta, z = a\beta + b\alpha$ where α and β are complex

cube roots of unity, show that $x^3 + y^3 + z^3 = 3(a^3 + b^3)$



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32. A line L is such that its segment between the straight lines $5x - y - 4 =$

0 and $3x + 4y - 4 = 0$ is bisected at the point $(1,5)$. Obtain the equation.



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33. Show that the line $x + y\sqrt{3} = 4$ touches the circles $x^2 + y^2 - 4x - 4\sqrt{3}y + 12 = 0$ and $x^2 + y^2 = 4$ at the same point. Also find the coordinate of the point



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34. The scores of 48 children in an intelligence test are shown in the following frequency table.

Score	71	76	79	83	86	89	92	97	101	103	107	110	114
Frequency	4	3	4	5	6	5	4	4	3	3	3	2	2

Calculate σ^2 and find the percentage of students whose score lie between $\bar{x} - \sigma$ and $\bar{x} + \sigma$



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Section B

1. The focus of the parabola $y = 2x^2 + x$ is

A. (0,0)

B. $\left(\frac{1}{2}, \frac{1}{4}\right)$

C. $\left(-\frac{1}{4}, 0\right)$

D. $\left(-\frac{1}{4}, \frac{1}{8}\right)$

Answer: C



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2. The third vertex of triangle whose centroid is origin and two vertex are (0,-2,5) and (-2,-2,-1) is

A. (2,4,-4)

B. (2,-4,-4)

C. (-2,4,-4)

D. (-2,-4,-4)

Answer: A

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3. Find the length of the major axis of the ellipse whose focus is $(1,-1)$, corresponding directrix is the line $x - y - 3 = 0$ and eccentricity is $\frac{1}{2}$

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4. If $y = mx + 1$ is tangent to the parabola $y = 2\sqrt{x}$, then find the value of m

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5. Write the negative of the following statement : "Some students are 25 (years) or older"

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6. Prove the following statement by contradiction method

p The sum of in irrational number and a rational number is irrational

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7. Using contrapositive method prove that , if n^2 is an even integer, then n is also an even integer.

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8. Show that the set of all points such that the difference of their distances from $(4,0)$ and $(-4,0)$ is always equal to 2 represent a hyperbola . Find its equation.

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9. Find the length of the segment joining the vertex of the parabola $y^2 = 4ax$ and a point on the parabola, where the line segment makes an angle θ to the x-axis



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10. Find the distance of the point P(-4,3,5) from coordinate axes.



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Section C

1. The relation between D_5 and Q_2 is :

A. (a) $D_5 > Q_2$

B. (b) $D_5 \neq Q_2$

C. (c) $D_5 = Q_2$

D. (d) $Q_2 = D_5$

Answer: C



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2. Using 2105 as base year, the index number for the price of a commodity in 2016 is 118. Then the index number for 2015 taking 2016 as base year is :

A. (a) 84.74

B. (b) 87.45

C. (c) 84.75

D. (d) 847.5

Answer: A



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3. If upper quartile and inter-quartile range of a data are 55 and 5 respectively, then find the value of lower quartile

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4. For a data containing 100 observations, the mean is 8. For 50 observations selected from these 100 observations, the mean is 10. Find the mean of the other 50 observations.

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5. Compute a price index for the following data by simple aggregate method.

Prices in 2008 (in ₹) 20 30 25 40 50

Price in 2010 (in ₹) 25 30 35 45 55

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6. Find the median of the following data if the value of $x = 4$,

$$x - 4, 2x - 6, 3x - 10, \frac{x}{2} - 1, \frac{3x}{2x - 4}, x + 3, \frac{x}{2}, 2x + 7, 3x - 2, 2x - 5$$

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7. Compute the missing frequencies in the following distribution, given

that is $\sum f_i = 100$ and the median is 32

Marks	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60
Number of students	9	?	26	30	?	10

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8. The marks in Physics and Biology of 12 students in a public examination are as follows :

Physics	69	36	39	71	67	76	40	20	85	65	55	34
Biology	33	52	71	25	79	22	83	81	24	35	46	64

Calculate the coefficient of rank correlation. What conclusion can be made from the result ?

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9. The marks of seven students in intelligence and arithmetic tests are as follows :

Candidate	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>	<i>F</i>	<i>G</i>
Intelligence test	30	52	60	62	45	32	41
Arithmetic test	41	62	70	78	53	45	57

Calculate Karl Person's coefficient of correlation and interpret it .

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10. Calculate the three -yearly moving averages and display these and the original figures on the same graph.

Year	2001	2002	2003	2004	2005	2006	2007
Values	20	40	50	70	80	100	130

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