



MATHS

BOOKS - S CHAND MATHS (ENGLISH)

MODEL TEST PAPER - 10

Section A In Sub Parts I To X Choose The Correct Option And In Sub Parts Xi To Xv Answer The Questions As Instructed

1. $n(U) = 600$, $n(A) = 460$, $n(B) = 390$ and $n(A \cap B) = 325$ then $n(A \cup B)$ '

A. 75

B. 525

C. 70

D. 155

Answer: A



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2. Let A be a finite set. The number of relations on A where A has 3 elements are : (i) 9 (ii) 6 (iii) 256 (iv) 512

A. 9

B. 6

C. 256

D. 512

Answer: D



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3. If $\theta = 20^\circ$, then $8 \cos^3 \theta - 6 \cos \theta$ is

A. -1

B. 1

C. 0

D. 2

Answer: B



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4. Value of $\sec(-1680^\circ) \cdot \sin 330^\circ$

A. -1

B. 0

C. 2

D. -1

Answer: D



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5. If α and β are the roots of the equations

$x^2 - 2x - 1 = 0$, then what is the value of

$$\alpha^2\beta^{-2} + \beta^2\alpha^{-2}$$

A. -2

B. 0

C. 30

D. 34

Answer: D



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6. The number of ways of selecting 4 letters taking 2 like and 2 different from the letters of the word PROPORTION is

A. (a)30

B. (b)18

C. (c)36

D. (d)48

Answer: A



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7. The number of permutations by taking all letters and keeping the vowels of the word COMBINE in the odd places is

A. 96

B. 144

C. 512

D. 576

Answer: D



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8. Which term of the series

$8 + 1.6 + 0.32 + \dots$ is 0.00256 ?

A. (a) 7^{th}

B. (b) 6^{th}

C. (c) 5^{th}

D. (d)None of these

Answer: B



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9. The y intercept of the line through the point (1,-2) making an angle of 135° with the x - axis is

A. 1

B. -1

C. 2

D. 0

Answer: B



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10. If $f(x) = \frac{x + 2}{x - 2}$, $\forall x \neq 2$, value of $f'(-2) =$

A. 1

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

C. 0

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

Answer: D



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11.

Evaluate

:

$$(2 - \omega^{100})(2 - \omega^{101})(2 - \omega^{10}) (2 - \omega^{11})$$



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12. Find the fourth term from end in the

expansion of $\left(\frac{x^3}{2} - \frac{2}{x^2}\right)^9$



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13. Find the parametic equation of the circle :

$$x^2 + y^2 + px + qy = 0.$$



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14. The letters of the word EQUATION are arranged in a row. Find the probability that arrangements start with a vowel and end with a consonant.



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15. Evaluate : $\lim_{x \rightarrow 9} \frac{x^{\frac{3}{2}} - 27}{x - 9}$



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1. Find the domain and range of

$$f(x) = \frac{x + 2}{|x + 2|}.$$



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2. List all the proper subsets of $\{0, \{1\}, 3\}$.



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3. If $a \cos A = b \cos B$, then prove that either the triangle is isosceles or right triangle.



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4. If $\sec x = \sqrt{2}$ and x does not lie in the 1st quadrant, find the value of

$$\frac{1 + \tan x + \operatorname{cosec} x}{1 + \cot x - \operatorname{cosec} x}.$$



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5. Solve $4 \cos^2 x = 3, 0 \leq x \leq 2\pi$



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6. For the quadratic equation $(k - 1)x^2 - kx + 1 = 0$, find k so that the roots are numerically equal but opposite in sign.



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7. Find the greatest value of $3 + 5x - 2x^2$.



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8. A function f is defined on the set of real numbers as follows :

$$f(x) = \begin{cases} 1 + x & 1 \leq x < 2 \\ 2x - 1 & 2 \leq x < 4 \\ 3x - 5 & 4 \leq x < 6 \end{cases}$$

(i) Find the domain of the function.

(ii) Find the range of the function.

(iii) Find $f(4)$.

(iv) Is the function one-one ? Justify.



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9. If $\tan \frac{x-y}{2}$, $\tan z$, $\tan \frac{x+y}{2}$ are in G.P.,

then show that $\cos x = \cos y \cdot \cos 2z$.



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10. If α and β are two different values of θ lying between 0 and 2π which satisfy the equations $6 \cos \theta + 8 \sin \theta = 9$, find the value of $\sin 2(\alpha + \beta)$.



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11. Using principle of mathematical induction, prove that $5^{n+1} + 4 \cdot 6^n$ when divided by 20 leaves the remainder 9, for all $n \in \mathbb{N}$



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12. Given that $y = (3x - 1)^2 + (2x - 1)^3$, find

$\frac{dy}{dx}$ and points on the curve for which $\frac{dy}{dx} = 0$.



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13. Differentiate using 1st principle :

$$f(x) = \frac{1}{\sqrt{2x+3}}$$



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14. If $\tan \frac{x-y}{2}$, $\tan z$, $\tan \frac{x+y}{2}$ are in G.P.,

then show that $\cos x = \cos y \cdot \cos 2z$.



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15. If the A.M. and G.M. between two numbers are in the ratio $x:y$, then prove that the

numbers are in the ratio

$$\left(x + \sqrt{x^2 - y^2}\right) : \left(x - \sqrt{x^2 - y^2}\right).$$



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16.

Prove

that

$$\left(\frac{i - \sqrt{3}}{i + \sqrt{3}}\right)^{100} + \left(\frac{i + \sqrt{3}}{i - \sqrt{3}}\right)^{100} = -1$$



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17. The point $P(-1, 0)$ lies on the circle $x^2 + y^2 - 4x + 8y + k = 0$. Find the radius of the circle. Also determine the equation of the circle of equal radius which touches the given circle at P.



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18. A line is drawn through the point $A(4, -1)$ and parallel to the line $3x - 4y + 7 = 0$. Find the coordinates of two

points on this line which are at distance of 5 units from A.



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19. Lives of LG and Samsung Microwaves that are currently popular were observed to be the following in a survey :

Life of Microwaves (in Months)	Number of Microwaves	
	LG	Samsung
0 – 20	10	8
20 – 40	28	20
40 – 60	24	32
60 – 80	10	28
80 – 100	8	12

Compute coefficients of variance for the lives

of LG and Samsung Microwaves. Which model do you prefer? Justify.



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Section B In Sub Parts I And II Choose The Correct Option And In Sub Parts III To V Answer The Questions As Instructed

1. Given that the points $A(2, 3, 4)$, $B(-1, 2, -3)$ and $C(-4, 1, -10)$ are collinear. Then the ratio in which C divides AB is

A. 1 : 2

B. 2 : 1 internally

C. 1 : 2 externally

D. 2 : 1 externally

Answer: D



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2. A point $P(x,y)$ moves so that the sum of its distances from point $(4,2)$ and $(-2, 2)$ is 8. If

the locus of P is an ellipse then its length of semi-major axis is

A. 8

B. 2

C. 4

D. None of these

Answer: C



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3. Find the coordinates of vertex of the parabola $y^2 = 4(x + y)$



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



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5. The negation of $p \wedge q$ is the disjunction of ..

.....



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Section B

1. If p : 7 is not greater than 4

q : Paris is in France.

Write $\sim(p \vee q)$ in words.



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2. Write the negative of the compound proposition $p \vee (\sim p \vee q)$



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3. The foci of an ellipse coincide with foci of the hyperbola $3x^2 - y^2 = 12$. Find the equation of the ellipse, if its eccentricity is $\frac{4}{5}$.



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4. An arc is in the form of a parabola with its axis vertical. The arch is 10 m high and 5 m wide at the base. How high is it 2 m from the vertex of the parabola ?



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5. The mid point of the sides of a triangle are $(2, 3, 4)$, $(1, 5, -1)$ and $(0, 4, -2)$. Find the coordinates of the centroid of the triangle.



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Section C In Sub Parts I And II Choose The Correct Option And In Sub Parts III To V Answer The Questions As Instructed

1. Two sample of sizes 50 and 100 given. The mean of these samples respectively are 56 and 50. Then the mean of size 150 combining is

A. 55

B. 52

C. 50

D. None of these

Answer: B



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2. If semi Inter quartile range is 19.38, $Q_3 = 72.5$ then , Q_1 is

A. (a)38.75

B. (b)35.75

C. (c)33.74

D. (d)34.75

Answer: C



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3. Given $r = 0.8$, $\Sigma xy = 60$, $\sigma_y = 2.5$ and $\Sigma x^2 = 90$, find the number of items, if x and y are deviation from their respective means.



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4. Determine the mode for the following observations : 10,11,10,12,11,10,11,11,11,12,13,11,12.



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5. If weights are not given, but p_0 and q_0 respectively the price and quantity of a commodity in the base year is given, then weight is given by



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Section C

1. Compute Q_1 and Q_3 from the following data

:

x_i	18	19	20	21	22	23	24	25	26	27
f_i	15	18	25	27	40	25	19	16	8	7



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2. Find the mode for the following distribution.

Daily wages (in ₹)	Number workers
331 – 336	6
337 – 342	12
343 – 348	20
349 – 354	15
355 – 360	9
361 – 366	4



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3. The mathematical aptitude score of 10 computer programmers with their job performance is given below :

Mathematics scores	7	5	1	4	3	0	2	6	8	9
Job performance rating	8	16	8	9	5	4	3	8	17	12

Calculate the Spearman's coefficient of rank correlation and interpret the result.



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4. Heights (in cm) of a sample of 12 fathers and their oldest sons are given below :

Heights of father	165	160	170	163	173	158	178	168	173	170	175	180
Heights of son	173	168	173	165	175	168	173	165	180	170	173	178

Find Karl Pearson's correlation coefficient.



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5. The table given below shows the number of visitors (in hundreds) to a certain exhibition over a period of two weeks:

Week 1	152	148	164	168	152	170	172
Week 2	155	147	151	165	158	175	181

Calculate 6-day moving averages and illustrate these and original information on the same graph using the some scales.



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