



MATHS

BOOKS - S CHAND MATHS (ENGLISH)

MOCK TEST PAPER-2021

Section A

1. If function f defined on th set of integers $f(x) =$

$$\begin{cases} 1 + x & 1 \leq x < 2 \\ 2x - 1 & 2 \leq x < 4 \\ 3x - 10 & 4 \leq x < 6 \end{cases}$$

A. \mathbb{Z}

B. I^+

C. {1,2,3,4,5}

D. {3,6,9,12,18}

Answer: D



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2. If A,B,C,D are angles of a quadrilateral, then $\sin A + \sin(B + C + D) =$ (i) 0 (ii) 1 (iii) 2 (iv) None of these

A. 0

B. 1

C. 2

D. None of these

Answer: A



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3. $\sin 105^\circ + \cos 105^\circ = \cos \theta$, then $\theta =$

A. 0°

B. 90°

C. 45°

D. 30°

Answer: C



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4. 15th term from end of the sequence 7,10,13,....., 130 is

A. 85

B. 9

C. 127

D. 88

Answer: D

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5. The coefficient of x in the equation $x^2 + px + q = 0$ was wrongly written as 17 in place of 13 and the roots thus found were -2 and -15. The roots of the correct equation

are

(A) 15, -2 (B) -3, -10 (C) -13, 30 (D) 4, 13

A. -3 and -15

B. -2 and -10

C. -3 and -10

D. 3 and 10

Answer: C



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6. In the binomial expansion of $(1 + x)^{10}$, the coefficients of $(2m + 1)^{th}$ and $(4m + 5)^{th}$ terms are equal. Value of m is

A. -1

B. 2

C. 3

D. None of these

Answer: D



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7. If z is a complex number and $iz^3 + z^2 - z + I = 0$, the value of $|z|$ is

A. 0

B. $\sqrt{2}$

C. 1

D. $1 + \sqrt{2}$

Answer: C



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8. Find the equation of the bisector of $\angle A$ of $\triangle ABC$ whose vertices are $A(-2, 4)$, $B(5,5)$ and $C(4,-2)$ is

A. $x + 3y - 10 = 0$

B. $x - 3y - 10 = 0$

C. $x + 3y + 10 = 0$

D. $3x + y - 10 = 0$

Answer: A



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9.

Circles

$$x^2 + y^2 - 2x = 0 \text{ and } x^2 + y^2 + 6x - 6y + 2 = 0$$

touch each other externally. Then point of contact is

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

B. $\left(\frac{3}{5}, \frac{1}{5}\right)$

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

D. $\left(\frac{1}{5}, \frac{3}{5}\right)$

Answer: D



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10. The number of proper subsets of A, where $A = \{-3, -1, 0, 4\}$ is

A. 32

B. 15

C. 31

D. None of these

Answer: C



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11. Evaluate: $\lim_{x \rightarrow 0} \frac{\tan 8x}{\sin 3x}$



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12. In how many ways can the letters of the word PERMUTATIONS be arranged such that P comes before S.



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14. If $f(x) = ax^3$, show that $xf'(x) - 3f(x) = 0$.



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15. Four persons are selected at random out of 3 men, 2 women and 4 children. The probability that there are exactly 2 children in the selection is a. $\frac{11}{21}$ b. $\frac{9}{21}$ c. $\frac{10}{21}$
d. none of these



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16. what is Subset of A



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17. Out of 500 car owners investigated, 400 owned car A and 200 owned car B, 50 owned both A and B cars. Is this data correct?



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18. Prove that:

$$\cos^2 A + \cos^2 B - 2 \cos A \cos B \cos (A + B) = \sin^2(A + B)$$



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19. Prove that $\sin 36^\circ + \cos 36^\circ = \sqrt{2} \cos 9^\circ$



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20. Prove that $\cot 2\theta + \tan \theta = \sec 2\theta$



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21. Simplify $(3 + 2i)^3$. Also find its conjugate.



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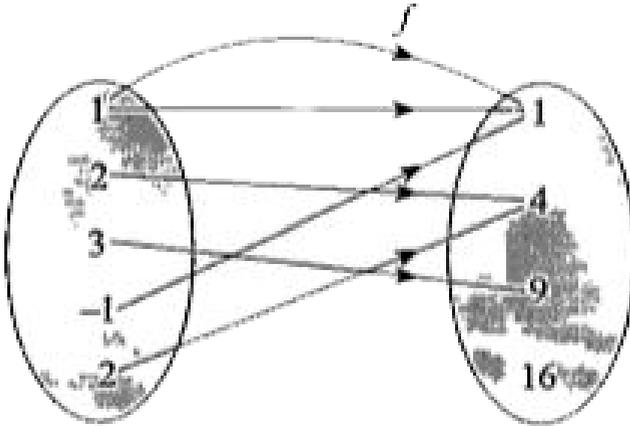
22. If the roots of the equation $2x^2 + (k + 1)x + (k^2 - 5k + 6) = 0$ are of opposite signs then show that $2 < k < 3$.



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23. Write the function given by the following diagrams in the ordered pair form. Also write the domain, co-domain

and range. Also classify the function.



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24. If $\cos x = -\frac{1}{3}$, x lies in III quadrant, then find the values of $\sin\left(\frac{x}{2}\right)$, $\cos\left(\frac{x}{2}\right)$ and $\tan\left(\frac{x}{2}\right)$.

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25. Prove that $\tan\left[7\frac{1}{2}\right]^0 = (\sqrt{3} - \sqrt{2})(\sqrt{2} - 1)$.



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26. Prove by the principle of mathematical induction that:

$n(n + 1)(2n + 1)$ is divisible by 6 for all $n \in \mathbb{N}$.



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27. Differentiate by 1^{st} , principle, $f(x) = \sec(1 - 2x)$.



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28. If $y = \frac{(\sqrt{x} + 1)(x^2 - \sqrt{x})}{x\sqrt{x} + x + \sqrt{x}}$, Prove that $\frac{dy}{dx} = 1$.



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29. If α and β are the roots of the quadratic equation $x^2 + px + q = 0$, then form the quadratic equation whose roots are $\alpha + \frac{1}{\beta}$, $\beta + \frac{1}{\alpha}$

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30. Both roots of equation $x^2 - (a + 3)x + a + 4 = 0$ are negative. Calculate the values of a .

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31. The sum of first four terms of an AP is 56. The sum of the last four terms is 112. If its first term is 11, then find the

number of terms. Also find the sum of all terms of the AP.

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32. Find the intercepts made by the line $3x + y = 12$ on the axes. Also find the equations of the straight lines which pass through origin and the trisection of the segment of the line intercepted between the axes.

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Section B

1. Equation of directrix of the parabola $3x^2 = 8y$ is

A. $3y + 2 = 0$

B. $2y - 3 = 0$

C. $3y - 2 = 0$

D. $2y + 3 = 0$

Answer: A



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2. Semi-conjugate axis of the hyperbola: $5y^2 - 9x^2 = 36$ is

A. A. 4

B. B. $\frac{12\sqrt{5}}{5}$

C. C. 2

D. D. $\frac{6\sqrt{5}}{5}$

Answer: C



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3. Find the co-ordinates of the point which divides the join of the points $(-1,2,3)$ and $(4,-2,5)$ in the ratio $1 : 2$ externally.



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4. Write the contrapositive of the following statements: If

x is real number such that $0 < x < 1$, then $x^2 < 1$.



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5. Find the eccentricity of the ellipse of minor axis $2b$, if the line segment joining the foci subtend angle 2θ at the upper vertex.



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6. Form the biconditional statement $p \Leftrightarrow q$, given,

p : The unit digits of an interger is zero.

q : It is divisible by 5.



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7. Construct the truth table for the compound proposition

$$q \Rightarrow [\sim p \vee q]$$



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8. Find the equation of the parabola having the vertex at the origin, the directrix is parallel to y - axis and passes through $(-3,6)$.



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9. Obtain the equation of the ellipse whose latus rectum is 5 and whose eccentricity is $\frac{2}{3}$, the axes of the ellipse being the axes of coordinates.

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10. Find the points on the line through $A(-5,-4,1)$ and $B(2,3,5)$ that is twice as far from A as from B.

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1. If in Delhi the commercial space rent is Rs 1000 per sq. Foot per month, while in Mumbai it is Rs 2500 per sq. foot per month, then index of rental of Mumbai compared to Delhi is

A. 2500

B. 250

C. $\frac{1}{250}$

D. None of these

Answer: B



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2. If $Q_1 = 20$, $Q_3 = 48$, then coefficient of quartile deviation is :

A. 28

B. 68

C. $\frac{7}{17}$

D. $\frac{6}{17}$

Answer: C

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3. The distribution of masses, to the nearest kg of 90 men is shown in the following table:

Mass (in kg)	50 – 58	59 – 67	68 – 76	77 – 85	86 – 94	95 – 103
Frequency	15	15	23	20	9	8

Find Modal Class.

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4. Given $\sum Iw = 1309.02$ and the index using weighted average of price relatives = 119.02. Find sum of all weights in nearest whole number.

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5. The marks of 9 students in a test were 13,17,20,3,5,3,20,15 and 18. Find quartile deviation.

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6. A shopkeeper mixes a batch of 200 apples of mean mass 150 g and standard deviation 30 g with another batch of 300 apples of mean 100 g and standard deviation 20 g. Find the standard deviation for the combined batch of 500 apples.



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Find Q_1 class.



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8. Calculate the value of Karl Person's coefficient of correlation for following:

X	15	20	25	30	40	50
Y	440	430	450	370	340	370

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9. Find Cov (x,y) for the following pair of observations, given $\bar{x} = 30$, $\bar{y} = 40$, (15,44), (20,43), (25, 45), (30, 37), (40,34), (50,37)

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10. Calculate 5 - yearly weighted moving averages for the data with weights 1,2,2,2,1

Year	1997	1998	1999	2000	2001	2002	2003	2004
Annual sales (in '0000 ₹)	3.6	4.3	4.3	3.4	4.4	5.4	3.4	2.4



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