



MATHS

BOOKS - S CHAND MATHS (ENGLISH)

MODEL TEST PAPER-2

Section A

1. The value of $\tan 840^\circ$ is equal to

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

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

C. $\sqrt{3}$

D. $-\sqrt{3}$

Answer: D



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2. In $\triangle ABC$, given $\angle A = 45^\circ$, $\angle B = 105^\circ$,

$c = \sqrt{2}$, then

A. $b = \sqrt{3}$, $\angle C = 30^\circ$

B. $b = \sqrt{3} + 1$, $\angle C = 30^\circ$

C. $b = \sqrt{2}$, $\angle C = 30^\circ$

$$D. b = \sqrt{3} - 1, \angle C = 30^\circ$$

Answer: B



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3. If A and B are two sets, then $(A \cup B')' \cap (A' \cup B)'$ is (i) null set (ii) universal set (iii) A' (iv) B'

A. null set

B. universal set

C. A'

D. B'

Answer: A



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4. Solution of $x^2 + x + 1 = 0$ is

A. $\pm i$

B. $\pm 2i$

C. ω and ω^2

D. $-\omega$ and ω^2

Answer: C



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5. The polar form of the complex number $(i^{25})^3$ is

A. $\cos. \frac{\pi}{3} - i \sin. \frac{\pi}{3}$

B. $\cos\left(-\frac{\pi}{2} + i \sin\left(-\frac{\pi}{2}\right)\right)$

C. $\cos. \frac{\pi}{6} - i \sin. \frac{\pi}{6}$

D. $\cos. \frac{\pi}{6} + i \sin. \frac{\pi}{6}$

Answer: B



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6. The domain of the function $f(x) = \frac{1}{\sqrt{|x|} - x}$

is

A. $(-\infty, 0)$

B. $(-\infty, \infty) - \{0\}$

C. $(-\infty, \infty)$

D. $(0, \infty)$

Answer: A



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7. The sum of n odd natural numbers is

A. n^2

B. $2n$

C. $\frac{n + 1}{2}$

D. $n^2 + 1$

Answer: A



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8.
$$\lim_{n \rightarrow \infty} \frac{n!}{(n + 1)! - n!}$$

A. 0

B. 2

C. -1

D. -2

Answer: A



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9. The area of the circle centred at $(1, 2)$ and passing through $(4, 6)$ is

A. 20π sq. units

B. 25π sq. units

C. 22π sq. units

D. 25π sq. units

Answer: B



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10. The slope of a line which passes through the origin the mid-point of the line segment joining the points $(0, -4)$ and $(8, 0)$ is

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

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

C. 1

D. 2

Answer: B



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11. If $f(x) = \lambda x^2 + \mu x + 12$, $f'(4) = 15$ and $f'(2) = 11$, then find the value of $\lambda + \mu$.



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12. Find the number of ways in which 6 men and 5 women can dine around a circular table if no two women are to sit together.



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13. If two dice are thrown simultaneously, find the probability of getting a sum of 7 or 11.



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14. A committee of 7 members has to be formed from 9 boys and 4 girls . In how many ways can

this be done when the committee consists of exactly 3 girls.



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15. Which term of the expansion

$$\left(\sqrt{\frac{x}{3}} - \frac{\sqrt{3}}{2x} \right)^{12}$$

is independent of x .



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16. Let $A = \{x : x \text{ is a positive prime number less than } 10\}$ and $B = \{x : x \in N \text{ and}$

$0 < x - 2 \leq 6$ }. Find $P(A - B)$.



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17. Find the domain and range of the function

$$f(x) = [\sin x]$$



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18. Prove that: $\sin 20^\circ \sin 40^\circ \sin 80^\circ = \frac{\sqrt{3}}{8}$



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19. In a $\triangle ABC$, show that $\sum (b + c) \cos A = 2s$,

where $s = \frac{a + b + c}{2}$

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20. Prove the following identity:

$$\cot A + \cot(60^\circ + A) + \cot(120^\circ + A) = 3 \cot 3A$$

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21. Find the square root of complex number $-i$.

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22. For what value of k will be the equations $x^2 - kx - 21 = 0$ and $x^2 - 3kx + 35 = 0$ have one common root.



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23. Draw the graph of the function $y = |x - 2| + |x - 3|$



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24. In a ΔABC prove that

$$\cot A + \cot B + \cot C = \frac{a^2 + b^2 + c^2}{4\Delta}$$



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25. Find the principal value solution of

$$\sin 3x - 3 \sin 2x + \sin x = \cos 3x - 3 \cos 2x + \cos x$$



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26. Prove by the method of induction

$$\frac{1}{1 \cdot 2} + \frac{1}{2 \cdot 3} + \frac{1}{3 \cdot 4} + \dots \text{ upto } n$$

terms $= \frac{n}{n+1}$ where $n \in \mathbb{N}$

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27. Differentiate by first principle

$$f(x) = \sqrt{3x + 4}$$

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28. Show that $\lim_{x \rightarrow 2} \frac{|x - 2|}{x - 2}$ does not exist.

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29. Find the n th term and deduce the sum to n terms of the series

$$4+11+22+37+ 56 + \dots$$



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30. If $(p + q)^{th}$ term and $(p - q)^{th}$ terms of G.P. are a and b respectively, prove that p^{th} term is \sqrt{ab}



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31. If x is real, prove that the value of the expression $\frac{(x - 1)(x + 3)}{(x - 2)(x + 4)}$ cannot be between $\frac{4}{9}$ and 1.

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32. Find the bisector of the obtuse angle between the lines $12x + 5y - 4 = 0$ and $3x + 4y + 7 = 0$

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33. Write the equation of the circle having radius 5 and tangent as the line $3x - 4y + 5 = 0$ at $(1, 2)$



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34. Calculate the standard deviation of the following distribution :

| Age | 20 - 25 | 25 - 30 | 30 - 35 | 35 - 40 | 40 - 45 | 45 - 50 |
|----------------|---------|---------|---------|---------|---------|---------|
| No. of persons | 170 | 110 | 80 | 45 | 40 | 35 |



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Section B

1. For the statement "19 is real number or a positive integer", "Or" is

- A. (a) inclusive
- B. (b) exclusive
- C. (c) both (a) and (b)
- D. (d) none of these

Answer: A



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2. Equation of the parabola with focus $(0, -3)$

and the directrix $y = 3$ is: (a) $x^2 = -12y$ (b)

$x^2 = 12y$ (c) $x^2 = 3y$ (d) $x^2 = -3y$

A. $x^2 = -12y$

B. $x^2 = 12y$

C. $x^2 = 3y$

D. $x^2 = -3y$

Answer: A



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3. Find the lengths of transverse axis of the hyperbola $16x^2 - 3y^2 - 32x - 12y - 44 = 0$



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4. Find the focus and directrix of the conic represented by the equation $5x^2 = -12y$



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5. Find the equation of the set of points which are equidistant from the points $(1, 2, 3)$ and

(3, 2, - 1)



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6. Construct the truth table $(\sim p \wedge \sim q) \vee (p \wedge \sim q)$



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7. Write the converse and contra positive of statement "If $x \div 3 = 9$, then $x = 6$ "



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8. Find the equation of the hyperbola whose one focus is $(1, 1)$ the corresponding directrix is $2x + y - 1 = 0$ and $e = \sqrt{3}$.



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9. Find the equation of tangents to the ellipse $4x^2 + 5y^2 = 20$ which are perpendicular to the line $3x + 2y - 5 = 0$



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10. Show that the point $(1, 2, 3)$ is common to the lines which join $A(4, 8, 12)$ to $B(2, 4, 6)$ and $C(3, 5, 4)$ to $D(5, 8, 5)$



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Section C

1. During a certain period the cost of living index number goes from 150 to 180 and salary of a worker is also raised from $Rs.13000$ to $Rs.18000$.

The real wage of the employee in the current year is

A. (a) $Rs.10000$

B. (b) $Rs.15000$

C. (c) $Rs.18000$

D. (d) none of these

Answer: A



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2. The cumulative frequency proceeding to the median class for the following data is

| C.I. | 2.5 – 3.5 | 3.5 – 4.5 | 4.5 – 5.5 | 5.5 – 6.5 | 6.5 – 7.5 | 7.5 – 8.5 |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Frequency | 7 | 31 | 33 | 17 | 11 | 1 |

A. 71

B. 88

C. 38

D. 40

Answer: C



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3. Two sample sizes of 50 and 100 are given . The mean of these samples respectively are 56 and 50. Find the mean of the size 150 by combining the two samples.



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4. Find the consumer price index for 2007 on basis of 2005, given that $\sum w = 80$, $\sum Iw = 11800$



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5. If $r\%$ of students scored less than 33 marks, then find r , given $N = 50$, class size=10, frequency of the r th. Percentile class = 12 and cumulative frequency of the r th percentile class = 22, lower limit of r th percentile class = 30



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6. Calculate P_{95} for the following data

| Marks | 0 - 10 | 10 - 20 | 20 - 30 | 30 - 40 | 40 - 50 | 50 - 60 |
|-----------|--------|---------|---------|---------|---------|---------|
| Frequency | 3 | 7 | 11 | 12 | 23 | 4 |



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7. Calculate Mode for the following data

| | | | | | | |
|-----------|-------|-------|-------|------|-----|-----|
| C.L. | 17-19 | 14-16 | 11-13 | 8-10 | 5-7 | 2-4 |
| Frequency | 4 | 11 | 16 | 8 | 4 | 12 |



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8. Calculate Speraman's Rank Correlation for the following data and interpret the result

| | | | | | | | | | | |
|----------------------|----|----|----|----|----|----|----|----|----|----|
| Marks in Mathematics | 36 | 48 | 27 | 36 | 29 | 30 | 36 | 39 | 42 | 48 |
| Marks in Statistics | 27 | 45 | 24 | 27 | 31 | 33 | 35 | 45 | 41 | 45 |



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9. Find Karl Pearson's correlation coefficient from the given data

| | | | | | | | | | | |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| X | 21 | 24 | 26 | 29 | 32 | 43 | 25 | 30 | 35 | 37 |
| Y | 120 | 123 | 125 | 128 | 131 | 142 | 124 | 129 | 134 | 136 |



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10. Using the following data. Find out the trend using Quarterly moving average and plot them on graph

| Year/Quarter | Q ₁ | Q ₂ | Q ₃ | Q ₄ |
|--------------|----------------|----------------|----------------|----------------|
| 1994 | 29 | 37 | 43 | 34 |
| 1995 | 90 | 42 | 55 | 43 |
| 1996 | 47 | 51 | 63 | 53 |



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