# MATHS

# BOOKS - S CHAND MATHS (ENGLISH)

# SELF ASSESSMENT PAPER 3

## Section A

**1.** If A = {1,2,3,4}, then the number of subsets of

A is:

A. (a) 8

B. (b) 16

C. (c) 7

D. (d) 15

**Answer: A::B**

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**2.** The maximum value of sin x cos x is .....

A. 1

B. 0

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

D. $\sqrt{2}$

**Answer: B::C**

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**3.** The value of $\frac{1-\tan^2 15^\circ}{1+\tan^2 15^\circ}$ is

A. $2-\sqrt{3}$

B. 1

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

D. $\frac{\sqrt{3}}{2}$

**Answer: A::B::C**

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**4.** The tenth term of the AP: 1,3,5,7, ..... Is .....

A. 19

B. 21

C. 23

D. 25

**Answer:**

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**5.** If $\alpha$ and $\beta$ are the roots of the equation $2x^2 - 3x + 4 = 0$, then $\alpha^2 + \beta^2$ = ____

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

B. $\frac{7}{4}$

C. $\frac{-7}{4}$

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

**Answer: A::B**

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**6.** Find the number of terms in the following expansions.

$(x+y)^{100}+(x-y)^{100}$

A. 101

B. 202

C. 50

D. 51

**Answer: A::B::D**

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**7.** The value of $i + i^2 + i^3 + i^4$ is _____

A. i

B. -1

C. 0

D. 1

**Answer:**

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**8.** The radius of the circle $x^2 + y^2 - 2x + 4y - 4 = 0$ is _____

A. 2

B. 3

C. 4

D. 5

**Answer:**

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**9.** Slope of the line joining the points (2,3) and (k,5) is 2,then k = _____

A. 0

B. 3

C. 6

D. 9

**Answer: A::B**

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**10.** $\lim_{x \to 0} \frac{\sin x^{\circ}}{x}$ = _____

A. 1

B. $\frac{180}{x}$

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

D. 0

**Answer:**

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**11.** Find the range of $(x) = |\sin x|$.

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**12.** How many three digit numbers can be formed using the digits from 1 to 5 ?

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**13.** Find the middle term in the expansion of $(x+2)^6$.

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**14.** Find the derivative of x + sin x with respect to x when x = 0.

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**15.** A = {1,3,5,7}, B = {1,2,3,4), find A $\Delta$ B.

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**16.** The probability that atleast one of the events A and B occurs is 0.7. If A and B occurs simultaneously with probability 0.35 then find $P(\overline{A}) + P(\overline{B})$

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**17.** If A = $\{3n + 5 : n \in N \text{ and } n \leq 6\}$, then represent set A I the roster form.

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**18.** If $\tan A = \frac{a}{a+1}$ and $\tan B = \frac{1}{2a+1}$, then find the value of A + B.

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**19.** Evaluate $\sin(\pi + x)\sin(\pi - x)\cos ec^2 x$

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**20.** Prove that $\sin^2\left(\frac{\pi}{6}\right) + \cos^2\left(\frac{\pi}{3}\right) - \tan^2\left(\frac{\pi}{4}\right) = -\frac{1}{2}$

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**21.** If $\frac{2+3i}{3-4i} = a + ib$, find the values a and b.

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**22.** Given the $\alpha + \beta$ are the roots of the quadratic equation $px^2 + qx + 1 = 0$ find the

value of $\alpha^3\beta^2 + \alpha^2\beta^3$.

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**23.** If $f(x) = \frac{1+x}{1-x}$ Prove that $\left(\frac{f(x)f(x^2)}{1+[f(x)]^2}\right) = \frac{1}{2}$

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**24.** If $\tan - A\tan B = x, \cot B - \cot A = y$ prove that cot (A - B) = $\frac{1}{x} + \frac{1}{y}$

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**25.** Prove that : $\frac{\sec 8\theta - 1}{\sec 4\theta - 1} = \frac{\tan 8\theta}{\tan 2\theta}$

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**26.** Prove by the principle of mathematical induction $4^n + 15n - 1$ is divisible 9 for all $n \in N$.

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**27.** Using principle of mathematical induction, prove that

$$1 + 3 + 3^2 + \ldots 3^{n-1} = \frac{3^n - 1}{2}$$

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**28.** Solve the following inequality $\frac{x + 8}{x - 2} \geq 0$

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**29.** Let $f(x) = \dfrac{k\cos x}{\pi - 2x}$ if $x \neq \dfrac{\pi}{2}$ and $f(x) = 3$ if $x = \dfrac{\pi}{2}$ then find the value of $k$ if $\lim\limits_{x \to \frac{\pi}{2}} f(x) = f\left(\dfrac{\pi}{2}\right)$

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**30.** Differentiate the function $\sqrt{\sin x}$ by first principal of differentiation.

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**31.** In an A,P if the pth term is $\frac{1}{q}$ and $q^{th}$ terms is $\frac{1}{p}$. Prove that the sum of first pq term is $\frac{1}{2}$ (pq+1) where, $(p \neq q)$

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**32.** The sum of three consecutive numbers of a G.P is 56. If we sunbtract 1,7 and 21 from the these numbers in the order the resulting numbers from an A.P. Find the numbers.

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**33.** Find the equation of one of the side of an isosecles right angled triangle whose hypotenuse is given by $3x + 4y = 4$ and the opposite vertex of the hypotenuse is (2,2).

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**34.** Find the mean deviation about mean for the following data:

| $x_i$ | 10 | 30 | 50 | 70 | 90 |
|---|---|---|---|---|---|
| $f_i$ | 4 | 24 | 28 | 16 | 8 |

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## Section B

**1.** The eccentricity of the conlc $x^2 = 6y$ is

_____

A. $\sqrt{2}$

B. 2

C. 0

D. 1

**Answer: The given conic is a parabola.**

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**2.** Distance of the point (-2,3,4) from x axis is _____

A. 2

B. 3

C. 4

D. 5

**Answer: Foot of perpendicular to x - axis = (-2, 0, 0)**

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**3.** Find the length of latus rectum of the ellipse $\frac{x^2}{25} + \frac{y^2}{36} = 1.$

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**4.** Find the equation of parabola having vertex (0,0) and focus (3,0).

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**5.** Write the negation of the statement : New Delhi is the capital of India'.

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**6.** Write converse and inverse of the given conditional statement : If a number n is even, then $n^2$ is even.

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**7.** Prove that

$\sim(p \vee q) \cong \sim p \wedge \sim q$

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**8.** Draw the shape of ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$ and find the following:

(i) major axis, (ii) minor axis, (iii) vetices, (iv) eccentricity, (v) foci, (vi) Length of latus rectum.

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**9.** Draw the shape o hyperbola $\frac{x^2}{49} - \frac{y^2}{9} = 1$ and find the following :

(i) Centre, (ii) Transverse axis, (iii) conjugate axis, (iv) vetices, (v) eccentricity, (vi) foci, (vii) Directrices.

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**10.** Find the length of the medians of the triangle with vertices A(0,0,6), B(0,4,0) and

C(6,0,0)

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## Section C

**1.** For the data 1,2,3,4,5,6,7, $Q_1 + Q_3$ is

A. (a)2

B. (b)4

C. (c)6

D. (d)8

**Answer:**

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**2.** The inter - quartile range of the data 1, 3, 5, 7, 9, 11, 13, 15, 17, 19

A. 2

B. 4

C. 6

D. 10

**Answer: 8**

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**3.** A student secured the following marks in seven subjects 50, 53, 61, 49, 45, 63, 48. Find the median score.

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**4.** The mean age of 40 students is 16 years and the mean age of another group of 60 students

is 20 years. Find out the mean age of all the 100 students combined together.

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**5.** Construct Cost of Living Index on the basis of the following data :

| Items | Price | Weight |
|---|---|---|
| Wheat | 241 | 10 |
| Rice | 150 | 4 |
| Maida | 200 | 2 |
| Pulses | 170 | 2 |
| Oil | 125 | 2 |

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**6.** Two samples of sizes 50 and 100 are given. The means of these samples respectively are 56 and 50 find the mean of size 150 by combining the two samples.

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**7.** Calculate the covariance of observation (3,5), (6,7),(9,9), (12,11), (15,13), (18,15), (21,17), (24, 19) using assumed mean A = 13 and B = 12.

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**8.** The price of six different items for year 2012 and year 2014 are as follows.

| Items | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| Price in 2015 (₹) | 35 | 80 | 25 | 30 | 80 | $a$ |
| Price in 2014 (₹) | 50 | $b$ | 45 | 70 | 120 | 105 |

The index number for all the year 2014 taking 2012 as the year for the above data was calculated to be 125. If total price in 2012 is Rs 360 then find the value of product a and b.

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**9.** If the median of the following distribution is 28, find the values of x and y.If the total frequency is 50.

| Marks | 0 – 10 | 10 – 20 | 20 – 30 | 30 – 40 | 40 – 50 |
|---|---|---|---|---|---|
| Number of Students | 5 | $x$ | 15 | $y$ | 6 |

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**10.** Calculate the index number for year 2019 with 2015 as base year by weighted aggregate

method.

| Commodity | Price (₹) in the year 2015 | Price (₹) in the year 2019 | Weights |
|---|---|---|---|
| A | 180 | 150 | 8 |
| B | 400 | 480 | 10 |
| C | 200 | 300 | 12 |
| D | 125 | 180 | 15 |
| E | 300 | 350 | 11 |

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