



INDIAN SCHOOL DARSAIT
SAMPLE PAPER 2 – TERM I, SEPTEMBER 2017
MATHEMATICS



Class: XI
 Date:

Max. Marks: 100
 Time: 3 hrs

General Instructions:

- (i) All questions are compulsory.
 (ii) Section A has 4 questions of 1 mark each, section B has 8 questions of 2 marks each, section C has 11 questions of 4 marks each and section D has 6 questions of 6 marks .

SECTION – A

- | | | |
|---|--|---|
| 1 | Find the domain and range:
$f(x) = x $ | 1 |
| 2 | If $U = \{x \in N : x \leq 8\}$, $A = \{x \in N : 5 < x^2 < 50\}$,find 'A' | 1 |
| 3 | Find the value of $\sin\left(\frac{3\pi}{3}\right)$ | 1 |
| 4 | Find the distance between the line $12x - 5y + 9 = 0$ and the point (2, 1). | 1 |

SECTION – B

- | | | |
|----|---|---|
| 5 | If $A = \{x : x \text{ is a natural number } \}$
$B = \{x : x \text{ is an even natural number } \}$
$C = \{x : x \text{ is an odd natural number } \}$
$D = \{x : x \text{ is a prime number } \}$
Find i) $A \cap B$ ii) $C \cap D$. | 2 |
| 6 | If $f(x) = x^2 + 1$ and $g(x) = x + 1$, be real functions then find:
$2g^2 - 3f$ | 2 |
| 7 | Solve: $\frac{5x-2x}{3} \leq \frac{x}{6} - 5$ | 2 |
| 8 | Prove that :
$\tan 225^\circ \cot 405^\circ + \tan 765^\circ \cot 675^\circ = 0$ | 2 |
| 9 | $P(n) = x^{2n} - y^{2n}$ is divisible by $x + y$ for all $n \in N$, prove that $P(k + 1)$ is true if $P(k)$ is true. | 2 |
| 10 | Find the equation of the line joining the points $(at_1^2, 2at_1)$ and $(at_2^2, 2at_2)$ | 2 |
| 11 | Two vertices of a triangle are (2, -6, 4), (4, -2, 3) and its centroid is $(\frac{8}{3}, -1, 3)$. Find the third vertex. | 2 |
| 12 | If three consecutive vertices of a parallelogram are (3, 4,-1), (7, 10, -3) and (8, 1, 0). Find the fourth vertex. | 2 |

SECTION – C

13 If $U = \{1,2,3,4, \dots \dots 10\}$ is the universal set for the sets $A=\{2,3,4,5\}$ and $B=\{1,2,3,4,5,6\}$, then verify that $(A \cup B)' = A' \cap B'$. 4

14 Find the domain and range of the functions f defined by: 4

$$f(x) = \frac{1}{\sqrt{9-x^2}}$$

15 Let $f \{(1, 1), (2, 3), (0 - 1), (-1, -3)\}$ be a function from Z to Z , defined by $f(x)=ax + b$, for some integers a and b . Find a and b . 4

16 Solve: $\frac{2}{1+t} + \frac{3}{2x} + \frac{3}{c} = 0$ 4

17 Prove that : $\cos 10^\circ \cos 30^\circ \cos 50^\circ \cos 70^\circ = \frac{3}{1}$ 4

(OR)

In any triangle ABC , prove that
 $a \sin (B - C) + b \sin (C - A) + c \sin (A - B) = 0$

18 Prove by PMI that $4^n + 15n - 1$ is divisible by 9 for all $n \in N$ 4

19 Find all pairs of consecutive odd natural numbers both of which are greater than 10, such that their sum is less than 40. 4

20 If p is the length of perpendicular from the origin to the line whose intercepts on the axes are a and b , then show that $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$. 4

(OR)

If the lines $2x + y - 3 = 0$, $5x + ky - 3 = 0$ and $3x - y - 2 = 0$ are concurrent, find the value of k .

21 A line passing through the points $(a, 2a)$ and $(-2, 3)$ is perpendicular to the line $4x+3y+5=0$; find the value of a . 4

22 Show that the points $A(1,-2, -8)$, $B(5, 0, -2)$ and $C(11,3, 7)$ are collinear using distance formula. Also find the ratio in which B divides AC . 4

23 Find the ratio in which the join of $A (2, 1, 5)$ and $B (3, 4, 3)$ is divided by the plane $2x + 3y - 2z = 1$. 4

SECTION – D

24 In a town of 10,000 families, it was found that 40% families buy newspaper A, 20% buy newspaper B and 10% buy newspaper C. 5% families buy A and B, 3% buy B and C and 4% buy A and C. If 2% families buys all the three papers, find the number of families which buy 6

i) A only ii) B only iii) none of A, B and C.

This survey was done to know the literacy rate and improve the educational facilities. What value is depicted from this act?

25 6

Prove that $\tan 4x = \frac{4\tan x (1 - \tan^2 x)}{1 - 6\tan^2 x + \tan^4 x}$

(OR)

If $\sin n = n \sin (n + 2\alpha)$, then $\tan (n + \alpha) = \frac{1+n}{1-n} \tan \alpha$.

26 6

Prove that : $\sin^2 A + \sin^2(A + \frac{\pi}{3}) + \sin^2(A - \frac{\pi}{3}) = \frac{3}{2}$

27 Prove by PMI: 6

$$\frac{1}{3.7} + \frac{1}{7.11} + \frac{1}{11.15} + \dots + \frac{1}{(4n-1)(4n+3)} = \frac{n}{3(4n+3)}$$

28 Solve the following system of inequalities graphically: 6

$x + 2y \leq 10, x + y \geq 1, x - y \leq 0, x \geq 0, y \geq 0$.

29 Find the equation of the lines through the point (3, 2) which make an angle of 45° with the line. 6

(OR)

If three lines whose equations are $y = m_1x + c_1, y = m_2x + c_2$ and $y = m_3x + c_3$ are concurrent, then

Show that $m_1(c_2 - c_3) + m_2(c_3 - c_1) + m_3(c_1 - c_2) = 0$.