



INDIAN SCHOOL AL WADI AL KABIR

Practice paper

SUB: Mathematics (041)

Date: 11/11/2023

Time Allowed :3 hours

Class: XI

Maximum Marks: 80

General Instructions:

1. This Question paper contains - five sections A, B, C, D and E. Each section is compulsory. However, there are internal choices in some questions.
2. Section A has 18 MCQ's and 02 Assertion-Reason based questions of 1 mark each.
3. Section B has 5 Very Short Answer (VSA)-type questions of 2 marks each.
4. Section C has 6 Short Answer (SA)-type questions of 3 marks each.
5. Section D has 4 Long Answer (LA)-type questions of 5 marks each.
6. Section E has 3 source based/case based/passage based/integrated units of assessment (4 marks each) with sub parts.

Q.No

SECTION A (MCQ)

Mark

1. Which of the following are disjoint sets? 1
- A** Set of natural numbers, set of whole numbers **B** Set of integers, set of rational numbers
- C** Set of whole numbers, set of prime numbers **D** Set of odd numbers, set of even numbers
2. If X and Y are two sets such that $X \cup Y$ has 50 elements, X has 28 elements and Y has 32 elements, how many elements does $X \cap Y$ have? 1
- A** 12 **B** 22 **C** 10 **D** 110
3. The mean deviation about the median for data: 6, 7, 10, 13, 14, 3, 8. 1
- A** 2.75 **B** 3 **C** 0 **D** 1
4. If $\left(\frac{2x+1}{3}, 2x+y\right) = (1, 4)$, then values of x and y 1
- A** $x = 1, y=2$ **B** $x = 0, y=2$ **C** $x = 2, y=2$ **D** $x = 1, y=1$
5. The solution of inequality $\frac{x}{2} + \frac{x}{3} + \frac{x}{4} \leq 13$ 1
- A** $x \in [12, 13]$ **B** $x \in [12, \infty)$ **C** $x \in (-\infty, 12]$ **D** $x \in (-\infty, 13]$

6. Evaluate: $\cos\left(\frac{15\pi}{4}\right)$ 1
A $\frac{1}{\sqrt{2}}$ **B** $\frac{\sqrt{3}}{2}$ **C** $-\frac{1}{\sqrt{2}}$ **D** $-\frac{\sqrt{3}}{2}$
7. $\cos 1^\circ \cdot \cos 2^\circ \cdot \cos 3^\circ \dots \cos 179^\circ \cdot \cos 180^\circ =$ 1
A -1 **B** 1 **C** 0 **D** ∞
8. Simplified form of $i^4 + i^3 + i^2 + i + 1$ 1
A i **B** 1 **C** -1 **D** 0
9. The multiplicative inverse of $3 + 4i$ 1
A $3 - 4i$ **B** $\frac{3}{25} + \frac{4i}{25}$ **C** $\frac{3}{25} - \frac{4i}{25}$ **D** $\frac{25}{3} + \frac{25i}{4}$
10. If $\left(\frac{1+i}{1-i}\right)^m = 1$, then the least positive value of m 1
A 2 **B** 4 **C** 6 **D** 8
11. If $nC_2 = nC_8$, then $nC_3 =$ 1
A 10 **B** 45 **C** 120 **D** 720
12. If $\frac{1}{7!} + \frac{1}{8!} = \frac{x}{9!}$, then $x =$ 1
A 225 **B** 49 **C** 64 **D** 81
13. Number of chords which can be drawn by selecting 21 points of a circle 1
A 210 **B** 420 **C** 21 **D** 441
14. If the coefficient of x^2 in the expansion of $(1+x)^m$ is 6, then the value of m 1
A 1 **B** 6 **C** 4 **D** 2
15. If $(3, 5)$, $(2, 3)$ and $(k, -9)$ are collinear then $k =$ 1
A 4 **B** -4 **C** 2 **D** 10
16. The mean and variance of six observations are 8 and 4, respectively. If each observation is multiplied by 3, then the new mean and new variance of the resulting observations are
A 24 and 36 **B** 24 and 12 **C** 8 and 12 **D** 8 and 6
17. If sum of n terms of an AP is $S_n = 3n^2 + 2n$, then the common difference 1
A 5 **B** 6 **C** 11 **D** 16
18. If AM and GM of two numbers are 7.5 and 6 respectively, then the numbers are 1
A 15 and 36 **B** 10 and 5 **C** 6 and 6 **D** 12 and 3

27. Solve the following linear inequalities and represent the solution on a number line: 3
 $5(2x - 7) - 3(2x + 3) \leq 0; \quad 2x + 19 \leq 6x + 47.$
28. How many words can be formed with or without meaning using all letters of the word 'INDIA'? If all these words are arranged in the dictionary order, what will be the rank of the word 'NADII' 3

OR

If sum of two positive numbers is equal to 6 times their geometric mean, then prove that the numbers are in the ratio $3 + 2\sqrt{2} : 3 - 2\sqrt{2}$

29. Find the equation of a line passing through the intersection of lines $2x + 3y = 1$ and $x - y = 5$ and perpendicular to the line whose equation is $5x + y - 7 = 0$ 3

30. Expand and simplify: $(\sqrt{3} + \sqrt{2})^6 + (\sqrt{3} - \sqrt{2})^6$ 3 **OR**

Find the term independent of x in the expansion of $\left(\frac{x^2}{3} - \frac{1}{2x}\right)^{12}$

31. If $A = \{x: x \text{ is a prime number less than } 8\}$, $B = \{y: y^2 \leq 17, y \in N\}$ then write the following in roster form. a) $A \cup B$ b) $A \cap B$ 3

SECTION D Case study-based Questions

32. A set of functions are given below: 4

$f(x) = \sqrt{x}$	$g(x) = \sqrt{9 - x^2}$	$h(x) = x^2 + 1$
$p(x) = x - 1 + 1$	$t(x) = \sqrt{x - 1}$	$u(x) = 3\sin x $

Based on the above, answer the following questions:

- i) Function(s) with domain $[0, \infty)$.
- ii) Function(s) with range $[0, 3]$
- iii) Evaluate: $f(9) + g(0) - h(1)$ OR
Sketch the graph of f(x)

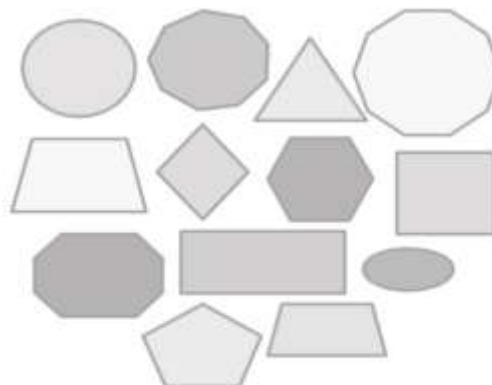
33. Hari appears in an examination. While reading the instructions he observed that the question paper consists of 12 questions divided into two parts I and II, containing 5 questions and 7 questions respectively. Based on the information given answer the following:



4

- If Hari is required to attempt 8 questions in all by selecting exactly 4 questions from section I, then in how many ways can he select the questions?
- If Hari is required to attempt 10 questions in all by selecting equal number of questions from each section, then in how many ways can he select the questions?
- If Hari is required to attempt 8 questions in all by selecting at least 4 questions from section I, then in how many ways can he select the questions? OR
If Hari is required to attempt 8 questions in all by selecting at most 3 questions from section I, then in how many ways can he select the questions?

34. A group of students are given a project to make a convex polygon. The consecutive angles need to be $120^\circ, 125^\circ, 130^\circ$ Based on the above information answer the following:



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- Write the sum of n terms of the given AP
- Find the number of sides of the polygon.

SECTION E

35. Find the foot of perpendicular to the line $x-3y=4$ from the point $P(1, 2)$. Hence find the image of P with respect to the given line. 5

36. Prove: $(1 + \cos \frac{\pi}{8})(1 + \cos \frac{3\pi}{8})(1 + \cos \frac{5\pi}{8})(1 + \cos \frac{7\pi}{8}) = \frac{1}{8}$ 5

OR

Prove: $\frac{\sin 5x - 2\sin 3x + \sin x}{\cos 5x - \cos x} = \tan x$

37. Find mean, variance and standard deviation for the following frequency distribution: 5

Class	30-40	40-50	50-60	60-70	70-80	80-90	90-100
f	3	7	12	15	8	3	2

38. The coefficients of three consecutive terms of the expansion $(1 + x)^n$ are in the ratio 1:3:5. Find n . 5

OR

Expand and simplify $(1 + x)^5 + (1 - x)^5$.

Hence evaluate $(1 + \sqrt{2})^5 + (1 - \sqrt{2})^5$
