

ASN SENIOR SECONDARY SCHOOL
PRE BOARD EXAMINATION (2019-20)
MATHEMATICS -X
SET-B

Time: 3 hour

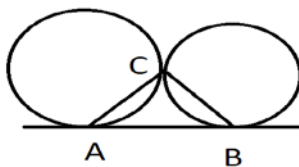
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General Instruction: -

1. All questions are compulsory.
2. This question paper consists of 40 questions divided into four sections- A, B, C and D.
3. **Section A** contains 20 questions of **1 mark each**. **Section B** contains 6 questions of 2 marks each. **Section C** contains 8 questions of 3 marks each and **Section D** contains 6 questions of 4 marks each.
4. Use of calculator is not permitted.
5. There is no overall choice. However, an internal choice has been provided in two questions of Section A, two questions of Section B, three questions of Section C and three questions of Section D. You have to attempt only one of the alternatives in all such questions.

SECTION - A

- | | | |
|----|---|---|
| Q1 | $\triangle ABC$ and $\triangle BDE$ are two equilateral triangles such that D is the mid-point of BC. Ratio of the area of $\triangle ABC$ to $\triangle BDE$ is | 1 |
| | (a) 2 : 1 (b) 1 : 2 (c) 1 : 4 (d) 4 : 1 | |
| Q2 | The coordinates of the point which is equidistant from the three vertices of the triangle ABC, A(0,2y), B(2x,0) and C(0,0) are | 1 |
| | (a) (x, y) (b) (y, x) (c) (x/2, y/2) (d) (y/2, x/2) | |
| Q3 | The 6th term from end of the AP: 5, 2, -1, ..., -31 is | 1 |
| | (a) -16 (b) -19 (c) -22 (d) -25 | |
| Q4 | The product of non zero rational and an irrational number is: | 1 |
| | (a) Always irrational (b) Always rational (c) Rational or irrational (d) One | |
| Q5 | The LCM of two numbers is 1200. Which of the following cannot be their HCF? | 1 |
| | (a) 600 (b) 500 (c) 400 (d) 200 | |
| Q6 | Two circles touch each other externally at C and AB is a common tangent of circles, then | 1 |



- | | | |
|-----|---|---|
| | (a) 70° (b) 60° (c) 100° (d) 90° | |
| Q7 | The arithmetic mean of 1, 2, 3, ..., n is | 1 |
| | (a) $\frac{n+1}{2}$ (b) $\frac{n}{2}$ (c) $\frac{n-1}{2}$ (d) $\frac{n}{2} + 1$ | |
| Q8 | If $\sin^2 37^\circ + \sin^2 53^\circ + \sin^2 90^\circ = x$, then x is equals to | 1 |
| | (a) 0 (b) 3 (c) 2 (d) 1 | |
| Q9 | The length of the diagonal of a cube is $8\sqrt{3}$ cm. Its total surface area is | 1 |
| | (a) 321 cm^2 (b) 350 cm^2 (c) 384 cm^2 (d) 256 cm^2 | |
| Q10 | Given that $\sin A = \frac{1}{2}$ and $\cos B = \frac{1}{2}$, then the value of (A + B) is | 1 |
| | (a) 0° (b) 30° (c) 60° (d) 90° | |
| Q11 | The coordinates of the points P and Q are respectively (4, -3) and (-1, 7). Find the abscissa of a point R on the line segment PQ such that $\frac{PR}{PQ} = \frac{3}{5}$. | 1 |
| Q12 | Find the co-ordinate where the line $x - y = 8$ will intersect y-axis. | 1 |

OR

For what value of k pair of given lines $3x + 2ky = 2$ and $2x + 5y + 1 = 0$ are parallel.

- Q13 What is the HCF of the smallest composite number and the smallest prime number? 1
- Q14 State Thales Theorem. 1
- Q15 Cards are marked with number 3,4,5,, 50 are placed in a box and mixed thoroughly. A card is drawn at random from the box. Find the probability that the selected card bears a perfect square number. 1
- Q16 The graph of the polynomial intersects the x- axis at only one point, hence it is a quadratic polynomial. State whether the above statement is True or False. Justify your answer. 1
- Q17 Centroid of triangle formed by the points (a, b), (b, c) and (c, a) is at origin, then $a + b + c = \dots\dots\dots$ 1
- Q18 If $\frac{2}{3}$ is one of the root of the quadratic equation $6x^2 - x - k = 0$, then $k = \dots\dots\dots$ 1

OR

- If $x = -1$ and $x = -2$ are roots of $px^2 + 3x + q = 0$, the value of $q - p$ is $\dots\dots\dots$
- Q19 If a, b, c are in AP then $2a = b + c$. State whether the above statement is True or False. Justify your answer. 1
- Q20 If $\sin \theta = \frac{1}{3}$, then find the values of $(2\cot^2 \theta + 2)$ 1

SECTION - B

- Q21 Find the probability of getting 53 Wednesdays and 53 Thursdays in a leap year. 2
- OR**
- A jar contains 24 marbles, some are green and other are blue. If a marble is drawn at random from the jar, the probability that it is green is $\frac{2}{3}$. Find the number of blue marbles in the jar.
- Q22 Water in a canal, 5.4 m wide and 1.8 m deep, is flowing with the speed of 25km/hour. How much area can it irrigate in 40 minutes, if 10 cm of standing water is required for irrigation? 2
- Q23 Prove that the lengths of two tangents drawn from an external point to a circle are equal. 2
- Q24 Prove that : $\frac{\sin \theta - 2 \sin^3 \theta}{2 \cos^3 \theta - \cos \theta} = \tan \theta$ 2
- Q25 The length of the diagonals of a rhombus are 16 cm and 12 cm. Find the length of side of the rhombus. 2
- Q26 If the ratio of sum of the first m and n terms of an AP is $m^2 : n^2$, show that the ratio of its mth and nth term is $(2m - 1):(2n - 1)$. 2

OR

The first term of the AP is 5, the last term is 45 and the sum is 400. Find the number of terms and the common difference.

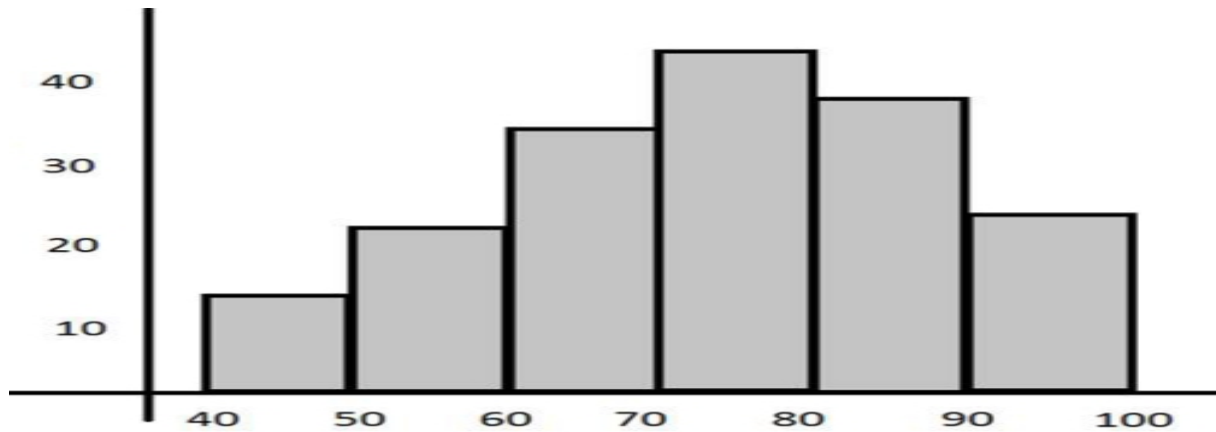
SECTION - C

- Q27 Under what conditions an equation is called identity. Prove that $1 + \cot^2 A = \operatorname{cosec}^2 A$. 3
- OR**
- Without using trigonometric tables, evaluate the following:
 $\frac{2}{3} \operatorname{cosec}^2 58^\circ - \frac{2}{3} \cot 58^\circ \tan 32^\circ - \frac{5}{3} \tan 13^\circ \tan 37^\circ \tan 45^\circ \tan 53^\circ \tan 77^\circ$
- Q28 The sum of the 5th and the 9th terms of an AP is 30. If its 25th term is three times its 8th term, find the AP. 3
- OR**
- If the sum of the first p terms of an AP is q and the sum of the first q terms is p; then show that the sum of the first (p + q) terms is $\{-(p + q)\}$.
- Q29 A boat goes 30 km upstream and 44 km downstream in 10 hours. In 13 hours, it can go 40 km upstream and 55 km downstream. Determine the speed of the stream and that of the boat in still water. 3
- OR**
- Determine graphically, the vertices of the triangle formed by the lines $y = x$, $3y = x$, $x + y = 8$.
- Q30 A dense toxic smog in New Delhi blocks out the sun. In November 2019, Delhi's chief minister described the city as a "gas chamber". The air quality in Delhi, the capital territory of India, according to a WHO survey of 1650 world cities, is the worst of any major city in the world. It also affects the districts around Delhi. Air pollution in India is estimated to kill about 2.5 million people every year; it is the fifth largest killer in India. India has the world's highest death rate 3

from chronic respiratory diseases and asthma, according to the WHO. In Delhi, poor quality air irreversibly damages the lungs of 2.2 million or 50 percent of all children.

India's Ministry of Earth Sciences published a research paper in October 2018 attributing almost 41% to vehicular emissions, 21.5% to dust and 18% to industries. The director of Centre for Science and Environment (CSE) alleged that the Society of Indian Automobile Manufacturers (SIAM) is lobbying "against the report" because it is "inconvenient" to the automobile industry.

ASN SENIOR SECONDARY SCHOOL took initiative to spread awareness and organises a quiz for people of different age group. Following histograms depict the visual representation of data showing % of harmful gases which are emitted in atmosphere by human activities and number of people who are aware about those activities.



Read the above data carefully and answer the following questions carefully

- Prepare frequency distribution table for given data.
- Find the difference between the frequencies of median class and modal class.
- Find mode of given data.

Q31 If α and β are the zeroes of the quadratic polynomial $f(x) = 2x^2 - 5x + 7$, find a polynomial whose zeroes are $(2\alpha + 3\beta)$ and $(3\alpha + 2\beta)$. 3

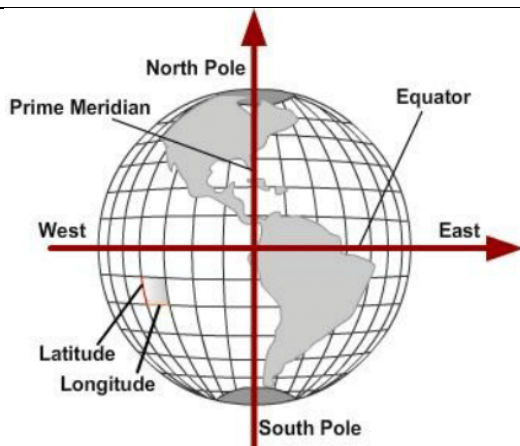
OR

If one zero of the polynomial $3x^2 - 8x + 2k + 1$ is seven times the other, find the value of k .

Q32 The coordinates of Kolkata is 22.6° N and 88.4° E and the coordinates of Bangalore is 13° N & 77.5° E . 3



To find the distance between the Bangalore and Kolkata use the following information:
Equator divides the entire earth into two equal halves horizontally.



Prime Meridian divides the entire earth into two equal halves vertically.

Lines parallel to equator are called latitudes.

Lines parallel to Prime Meridian are called longitudes.

To locate position of any place on map longitudes and latitudes are used.

Distance between two parallel longitudes 1° apart = 104 km

Distance between two parallel latitudes 1° apart = 110 km

Use the above information find

- Distance between longitudes of Bangalore and Kolkata
- Distance between latitudes of Bangalore and Kolkata
- Distance between Bangalore and Kolkata using Pythagoras Theorem.

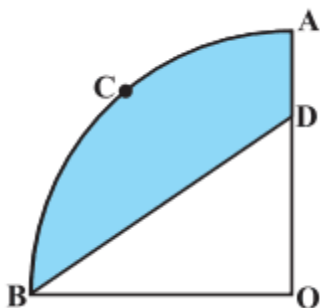
Q33 Prove that $\frac{2}{3} + \sqrt{5}$ is an irrational number.

3

Q34 In the given figure, OACB is a quadrant of a circle with centre O and radius 3.5 cm. If OD = 2 cm, find the area of the

3

- quadrant OACB
- shaded region



SECTION - D

Q35 A cone of radius 10cm is divided into two parts by drawing a plane through the mid-point of its axis, parallel to its base. Compare the volume of two parts.

4

Q36 Draw a pair of tangents to a circle of radius 4cm which are inclined to each other at an angle of 60° .

4

Q37 A boy standing on a horizontal plane finds a bird flying at a distance of 100m from him at an angle of elevation of 30° . A girl standing on the roof of 20m high building, finds the angle of elevation of the same bird to be 45° . Both the boy and girl are on the opposite sides of the bird. Find the distance of bird from the girl.

4

OR

The angles of depression of the top and the bottom of an 8 m tall building from the top of a multi-storeyed building are 30° and 45° , respectively. Find the height of the multi-storeyed building and the distance between the two buildings.

Q38 State and prove Pythagoras Theorem.

4

OR

Sides AB and AC and median AD of a triangle ABC are respectively proportional to sides PQ and PR and median PM of another triangle PQR. Show that $\triangle ABC \sim \triangle PQR$.

Q39 Two water taps together can fill a tank in 9 hours 36 minutes. The tap of larger diameter takes 8 hours less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank. 4

OR

Solve for x: $3\left(\frac{3x-1}{2x+3}\right) - 2\left(\frac{2x+3}{3x-1}\right) = 5$; $x \neq \frac{1}{3}, -\frac{3}{2}$

Q40 The marks obtained by 100 students of a class are given below. Draw 'a more than' type cumulative frequency curves. Hence find median. 4

MARKS	NO. OF STUDENTS
0 - 5	2
5 -10	5
10 - 15	6
15 -20	8
20 - 25	10
25 - 30	25
30 - 35	20
35 - 40	18
40 - 45	4
45 -50	2