



VENKATESHWAR INTERNATIONAL SCHOOL
Sector – 10, Dwarka, New Delhi – 110075
PRE BOARD-I (2020 – 21)
CLASS – X
MATHEMATICS

Time: 3 hrs

Max.Marks:80

General Instructions:

- 1) All questions are compulsory.
- 2) This questions paper contains two parts A and B.
- 3) Both Part A and Part B have internal choices.

Part- A:

- 1) It consists of two sections- I and II.
- 2) Section I has 16 questions of 1 mark each. Internal choice is provided in 5 questions.
- 3) Section II has 4 questions on case study of 4 marks each. Each case study has 4 case-based sub-parts.

Part- B:

- 1) It consists of three sections- III, IV and V.
- 2) Section III has question no. 21 to 26 are Very short answer Type questions of 2 marks each,
- 3) Section IV has question no. 27 to 33 are Short Answer Type Questions of 3 marks each.
- 4) Section V has question no. 34 to 36 are Long Answer Type Questions of 5 marks each.
- 5) Internal choice is provided in 2 questions of 2 marks, 2 questions of 3 marks and 1 question of 5 marks.

SECTION- I

Q1) If $HCF(336, 54) = 6$, Find $LCM(336, 54)$

OR

Find the smallest number which is divisible by both 306 and 657.

Q2) If one of the zeroes of the quadratic polynomial $(K-1)x^2 + kx + 1$ is -3 , then find the value of K .

Q3) Find the nature of the roots of the quadratic equation:

$$2x^2 - 4x + 3 = 0$$

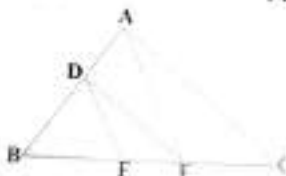
Q4) How many two digits numbers are divisible by 3?

OR

What is the common difference of an AP in which $a_{21} - a_7 = 84$?

Q5) Sides of two similar triangles are in the ratio 4: 9. Find the ratio of areas of these triangles.

Q6) In figure, $DE \parallel AC$ and $DF \parallel AE$. Prove that $\frac{BE}{FE} = \frac{BF}{EC}$



Q7) Find the coordinates of a point A, where AB is diameter of the circle with centre C (2, -3) and B is the point (3,4).

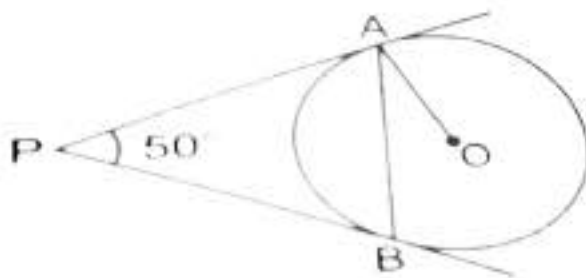
Q8) Find the ratio in which the segment joining the points (1, -3) and (4, 5) is divided by x-axis?

Q9) If $\sqrt{3} \sin A - \cos A = 0$ and $0^\circ < A < 90^\circ$, Find the value of A.

Q10) Evaluate:

$$4 (\sin^4 30^\circ + \cos^4 60^\circ) - 3 (\cos^2 45^\circ - \sin^2 90^\circ)$$

Q11) In figure, PA and PB are tangents to the circle with centre O such that $\angle APB = 50^\circ$. Write the measure of $\angle OAB$.



OR

From an external point P, tangents PA and PB are drawn to a circle with centre O. If $\angle PAB = 50^\circ$, Find $\angle AOB$.

Q12) Find the diameter of a circle whose area is equal to the sum of areas of two circles with radii 24cm and 7cm.

Q13) Volume of two spheres are in the ratio 64:27. Find the ratio of their surface areas.

Q14) A letter is chosen at random from the letter of the word "PROBABILITY". Find the probability that it is not a vowel.

OR

The King, Queen and Jack of clubs are removed from a pack of 52 cards and then the remaining cards are well shuffled. A card is selected from the remaining cards. Find the probability of getting a card-

a) of club b) of black king

Q15) Three unbiased coins are tossed together. What is the probability of getting-

a) At least two heads

b) At most two heads

Q16) If α and β are the zeroes of the quadratic polynomial - $F(x) = x^2 - 6x + 8$, Find the value of $\alpha^{-1} + \beta^{-1}$.

OR

If α and β are the roots of the polynomial- $F(x) = x^2 - 3x + K$, such that $\alpha - \beta = 1$, Find the value of K .

SECTION- II

Q17) A city school is organizing Annual Sports event in a rectangular shaped ground ABCD. The tracks are being marked with a gap of 1m each in the form of straight lines. 120 Flower pots are placed with a distance of 1m each along AD.

Shruti runs $\frac{1}{3}$ of the distance in second line along AD and post her flag. Saanvi

runs $\frac{1}{5}$ of the distance AD in the eighth line and post her flag. Answer the

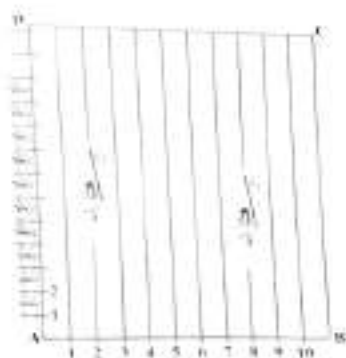
following questions-

A) The distance between the two flags are-

i) $2\sqrt{73}$ ii) $3\sqrt{73}$ iii) $\sqrt{273}$ iv) $\sqrt{73}$

B) If Reena has to post the flag exactly halfway between the line segment joining the two flags, the coordinates where she should post her flag are-

i) (2, 40) ii) (2, 30) iii) (5, 32) iv) (10, 64)



C) The coordinates where Shruti posts her flag are –

- i) (2, 40) ii) (40, 2) iii) (2, 30) iv) (3, 40)

D) The coordinates where Saanvi posts her flag are –

- i) (3, 40) ii) (24, 8) iii) (5, 32) iv) (8, 24)

Q18) A 100m Race was organized in a school sports meet. The time was recorded with the help of a stop watch.

A table shown below describes the time in which the race was finished by the number of students-

Time (in seconds)	No. of students
0-20	6
20-40	13
40-60	10
60-80	3
80-100	8



Based on the above data, answer the following questions-

A) What will be the lower limit of the modal class?

- i) 30 ii) 40 iii) 60 iv) 20

B) The average time taken by the student to finish the race is –

- i) 40 ii) 47 iii) 50 iv) 30

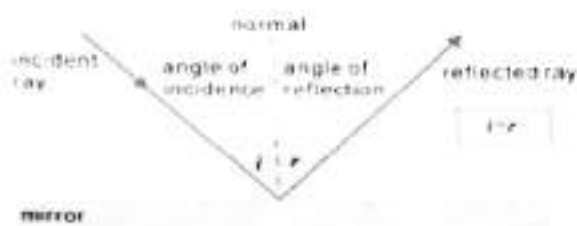
C) The cumulative frequency table is constructed to determine –

- i) Mean ii) Mode iii) Median iv) All the above

D) How many students finished the race within 1 minute?

- i) 30 ii) 40 iii) 19 iv) 29

Q19) The law of reflection states that when a ray of light reflects off a surface, the angle of incidence is equal to the angle of reflection.



Ramesh places a mirror on level ground to determine the height of a pole (with traffic light fixed on it). He stands at a certain distance so that he can see the top of the pole reflected from the mirror. Ramesh's eye level is 1.5m above the ground. The distance of Ramesh and the pole from the mirror are 1.8m and 6m respectively.



On the basis of above information, answer the following questions-

- A) Which criterion of similarity is applicable to similar triangles?
 i) SSA ii) ASA iii) SSS iv) AA
- B) What is the height of the pole
 i) 6m ii) 8m iii) 5m iv) 4m

Now Ramesh move behind such that distance between pole and Ramesh is 13m.

He place mirror between him and pole to see the reflection of light in right position.

- C) What is the distance between mirror and Ramesh?
 i) 7m ii) 3m iii) 5m iv) 4m
- D) What is the distance between mirror and pole?
 i) 9m ii) 8m iii) 12m iv) 10m

Q20) Mr. R.K. Aggarwal is owner of a famous amusement park in Delhi. Generally he does not go to park and it is managed by team of staff. The ticket charge for the park is Rs.150 for children and Rs.400 for adults. One day Mr. Aggarwal decided to random check the park and went there. When he checked the cash counter, he found that 480 tickets were sold and Rs.134500 was collected.



- A) Let the number of children visited be x and the number of adults visited be y . Which of the following is the correct system of equation that model the problem?
- $x + y = 480$ and $3x + 8y = 2690$
 - $x + 2y = 480$ and $3x + 4y = 2690$
 - $x + y = 480$ and $3x + 4y = 2690$
 - $x + 2y = 480$ and $3x + 8y = 2690$
- B) How many children and adults attended?
- 250 and 230
 - 500 and 460
 - 250 and 250
 - 230 and 250
- C) How much amount collected if 300 children and 350 adults attended?
- Rs.225400
 - Rs.154000
 - Rs.112500
 - Rs.185000
- D) One day total attended children and adult together is 750 and the total amount collected is Rs.212500. What are the number of children and adults attended?
- (700, 800)
 - (350, 400)
 - (800, 700)
 - (400, 350)

PART B
SECTION- III

Q21) Which term of the AP $-7, -12, -17, -22, \dots$ will be -82 ? Is -100 any term of the AP? Give reason for your answer.

Q22) BL and CM are medians of ΔABC , right angled at A. Prove that:

$$4(BL^2 + CM^2) = 5BC^2$$

OR

The perpendicular from A on side BC of ΔABC intersects BC at D such that $DB = 3CD$. Prove that: $2AB^2 = 2AC^2 + BC^2$

Q23) If the zeroes of the polynomial $x^3 - 3x^2 + x + 1$ are $a, b, a + b$.

Find a and b.

Q24) Draw a circle of radius 3cm. Take two points P and Q on one of its extended diameter each at a distance of 7cm from its centre. Draw tangents to the circle from these two points P and Q.

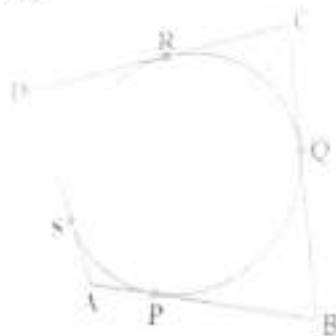
Q25) If $4 \tan \theta = 3$, Evaluate $\frac{4 \sin \theta - \cos \theta + 1}{4 \sin \theta + \cos \theta - 1}$

OR

Find A and B if $\sin(A + 2B) = \frac{\sqrt{3}}{2}$ and $\cos(A + 4B) = 0$ where A and B are acute angles.

Q26) A quadrilateral ABCD is drawn to circumscribing a circle.

Prove that $AB + CD = AD + BC$.



SECTION-IV

Q27) Prove that $\sqrt{7}$ is an irrational number.

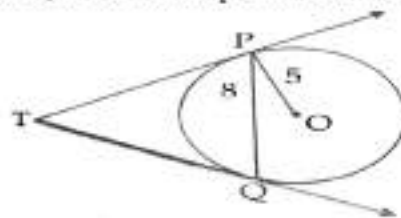
Q28) If m^{th} term of an AP is $\frac{1}{n}$ and n^{th} term is $\frac{1}{m}$, then find the sum of its first mn terms.

OR

The ratio of the sums of first m and first n terms of an AP is $m^2:n^2$. Show that the ratio of its m^{th} and n^{th} terms is $(2m - 1):(2n - 1)$.

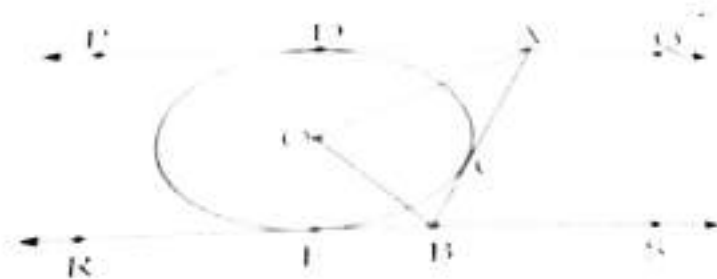
Q29) Sides of a triangular field are 15m, 16m, 17m. With the three corners of the field a cow, a buffalo, and a horse are tied separately with ropes of length 7m each to graze in the field. Find the area of the field which cannot be grazed by the three animals.

Q30) In the given figure, PQ is a chord of length 8cm of a circle of radius 5cm and centre O. The tangents at P and Q intersect at point T. Find the length of TP.



OR

In figure, PQ and RS are two parallel tangents to a circle with centre O and another tangent AB with point of contact intersecting PQ at A and RS at B. Prove that $\angle AOB = 90^\circ$.



Q31) If the median of the following frequency distribution is 32.5, Find the values of F_1 and F_2 .

Class	Frequency
0-10	F_1
10-20	5
20-30	9
30-40	12
40-50	F_2

50-60	3
60-70	2
Total	40

Q32) Prove that-

$$\frac{\sin A - \cos A + 1}{\sin A + \cos A - 1} = \frac{1}{\sec A - \tan A}$$

Q33) Determine the mean of the following distribution :

Marks	Number of students
Below 10	5
Below 20	9
Below 30	17
Below 40	29
Below 50	45
Below 60	60
Below 70	70
Below 80	78
Below 90	83
Below 100	85

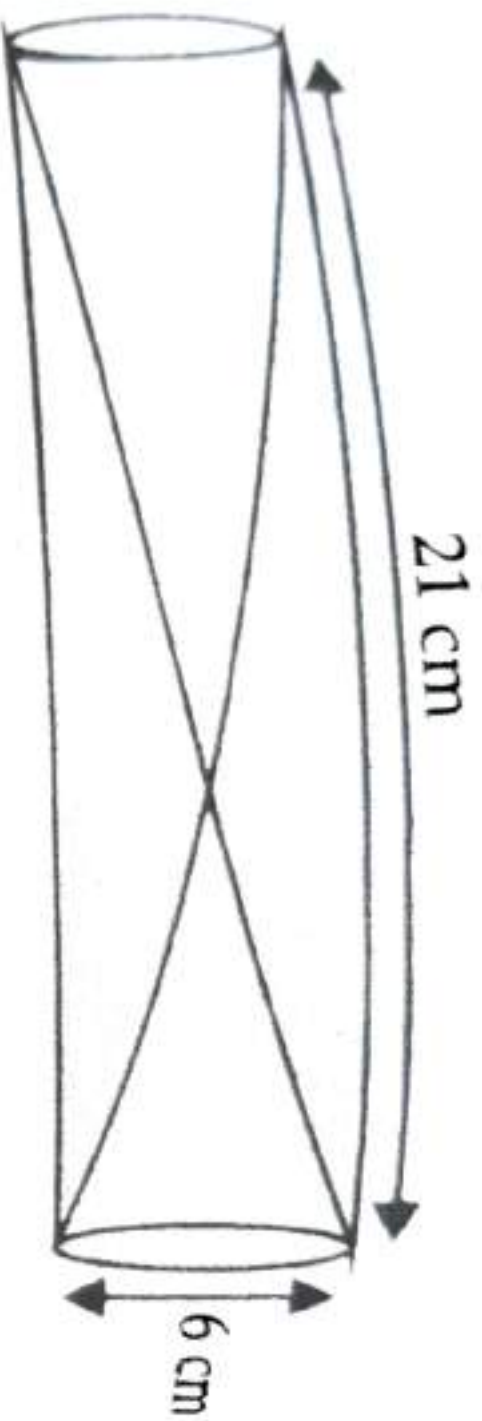
SECTION - V

Q34) A vertical tower stands on a horizontal plane and is surmounted by a vertical flagstaff of height h . At a point on the plane, the angles of elevation of the bottom and the top of the Flag staff are α and β respectively. Prove that the height of the tower is $\frac{h \tan \alpha}{\tan \beta - \tan \alpha}$

OR

If the angle of elevation of a cloud from a point h metres above a lake is α and the angle of depression of its reflection in the lake is β , prove that the height of the cloud is $\frac{h (\tan \alpha + \tan \beta)}{\tan \beta - \tan \alpha}$

Q35) Two solid cones A and B are placed in a cylindrical tube as shown in the figure. The ratios of their capacities are 2:1. Find the height and capacities of cones. Also, Find the volume of the remaining portion of the cylinder.



Q36) Solve the given quadratic equation for x –

$$9x^2 - 9(a+b)x + (2a^2 + 5ab + 2b^2) = 0$$