



Delhi Public School, Howrah

Pre-Board I Examination (2024 – 2025)

Class-X

Care must be taken not to write anything on the question paper. All the questions must be attempted in the correct sequence.

Subject: - Mathematics Standard (Code No-041)

Time: 3 Hours

F.M. :80

General Instructions:

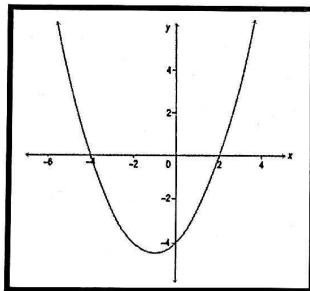
Read the following instructions carefully and follow them:

1. This question paper contains 38 questions.
2. This Question Paper is divided into 5 Sections A, B, C, D and E.
3. In Section A, Questions no. 1-18 are multiple choice questions (MCQs) and questions no. 19 and 20 are Assertion- Reason based questions of 1 mark each.
4. In Section B, Questions no. 21-25 are very short answer (VSA) type questions, carrying 02 marks each.
5. In Section C, Questions no. 26-31 are short answer (SA) type questions, carrying 03 marks each.
6. In Section D, Questions no. 32-35 are long answer (LA) type questions, carrying 05 marks each.
7. In Section E, Questions no. 36-38 are case study based questions carrying 4 marks each with sub parts of the values of 1, 1 and 2 marks each respectively.
8. All Questions are compulsory. However, an internal choice in 2 Question of Section B, 2 Questions of Section C and 2 Questions of Section D has been provided. An internal choice has been provided in all the 2 marks questions of Section E.
9. Draw neat and clean figures wherever required.
10. Take $\pi = 22/7$ wherever required if not stated.
11. Use of calculators is not allowed.

SECTION A

(All questions are compulsory. In case of internal choice, attempt any one question only)

(1) Shown below is the graph of a quadratic polynomial.



Which of these is the polynomial graphed above?

- a) $(x - 2)(x + 4)$ b) $(x - 2)(x - 4)$ c) $(x + 2)(x + 4)$ d) $(x - 2)(x - 4)$ 1

(2) Given below is a pair of linear equations in two variables.

$$4x + 2y = 18$$

$$3x - 6y = 6$$

Which of the following pairs of equations have the same number of solution(s) as the given pair? 1

a) $3x + 3y = 18; x + y = 6$

b) $x - y = 4; y - x = 4$

c) $6x - 2y = 10; 3x + y = 5$

d) $7x + 9y = 27; 28x + 36y = 76$

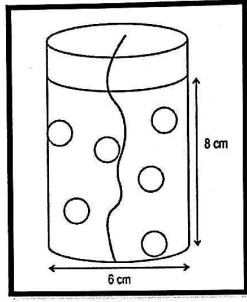
(3) Which of the following points is the mid-point of the line segment joining $P(5, 2)$ and $Q(7, 6)$? 1

- a) $(6, 4)$ b) $(6, -4)$ c) $(-6, 4)$ d) $(3, 4)$

(4) If a_n is the n th term of an arithmetic progression whose common difference is d , then which of the following statements is valid? 1

- a) $a_{24} = a_1 + 24d$ b) $a_{25} = a_2 + 24d$
 c) $a_{26} = a_2 + 24d$ d) $a_{27} = a_1 + 24d$

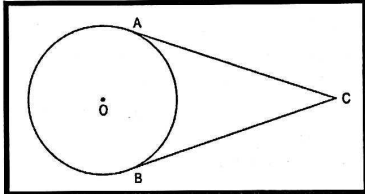
(5) 6 spherical glitter balls with diameter 1 cm are present in a cylindrical candle made with transparent wax as shown in the figure below.



Find the volume (in cm^3) of wax used to make the candle. 1

- a) 70π b) 71π c) 72π d) 73π

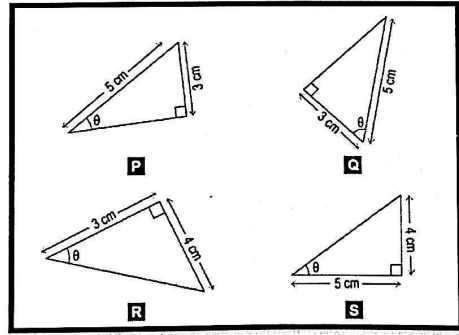
(6) A circle with center O is shown below, where CA and CB are tangents to the circle.



If measure of $\angle ACB = 50^\circ$, find the measure of $\angle AOB$. 1

- a) 40° b) 50° c) 130° d) 140°

(7) Which of these triangles have $\sin \theta = \frac{3}{5}$? 1



- a) only P b) only Q and S c) only Q, R and S d) all P, Q, R and S

(8) $P(t)$ is a polynomial in t such that, $P(t) = (t^2 + 5t - 14)(t^2 - 7t + 10)(t^2 + 2t - 35)$. Which of these is the square root of $P(t)$? 1

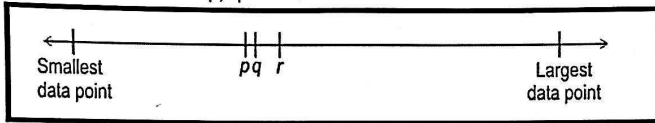
a) $(t + 2)(t - 5)(t + 7)$

b) $(t - 2)(t - 5)(t + 7)$

c) $(t + 2)(t + 5)(t - 7)$

d) $(t - 2)(t - 5)(t - 7)$

(9) In the given number line, p , q and r represent the measures of central tendency of the data: 3, 4, 6, 5, 6, 10. Which of these is true for p , q and r ? 1



a) p = Mean, q = Median and r = Mode

b) p = Median, q = Mean and r = Mode

c) p = Mode, q = Median and r = Mean

d) cannot be determined unless specific numbers are provided

(10) If the diagonals of a quadrilateral divide each other proportionally, then it is a 1

a) parallelogram

b) rectangle

c) square

d) trapezium

(11) If $x^2(a^2 + b^2) + 2x(ac + bd) + c^2 + d^2 = 0$ has no real roots, then 1

a) $ad \neq bc$

b) $ad < bc$

c) $ad > bc$

d) None of these

(12) If $\sin \theta = \cos \theta$, then find the value of $\tan^2 \theta + \cot^2 \theta$. 1

a) 2

b) 4

c) 1

d) $\frac{10}{3}$

(13) The volume of a right circular cone whose area of the base is 156 cm^2 and the vertical height is 8 cm is 1

a) 2496 cm^3

b) 1248 cm^3

c) 1664 cm^3

d) 416 cm^3

(14) The probability of getting 53 Sundays in a leap year is 1

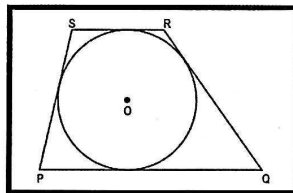
a) $\frac{1}{7}$

b) $\frac{2}{7}$

c) 1

d) $\frac{3}{7}$

(15) Shown below is a circle O inscribed in a trapezium such that $PQ \parallel RS$. The radius of the circle is 6 cm .



(Note: The figure is not to scale.) What is the height of the trapezium? 1

a) 12 cm

b) 6 cm

c) 14 cm

d) 13 cm

(16) If the mean and the median of a data are 12 and 15 respectively, then its mode is 1

a) 13.5

b) 21

c) 6

d) 14

(17) The co-ordinates of the point where the line $2y = 4x + 5$ crosses X-axis is 1

a) $(0, \frac{-5}{4})$

b) $(0, \frac{5}{2})$

c) $(-\frac{5}{4}, 0)$

d) $(\frac{-5}{2}, 0)$

(18) Jyoti and Dara are playing a game of tic-tac-toe. The probability of Jyoti winning the game is 0.7.

What is the probability that Dara will win the game? 1

a) 0.3

b) 0.7

c) 0

d) 0.1

For questions 19 and 20, two statements are given – one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (i), (ii), (iii) and (iv) as given below:

(i) Both A and R are true and R is the correct explanation of the A.

(ii) Both A and R are true but R is not the correct explanation of the A.

(iii) A is true, but R is false

(iv) A is false, but R is true

(19) Assertion (A): If the HCF of two numbers is 5 and their product is 150, then their LCM is 40. 1

Reason (R): Product of HCF and LCM of two numbers is equal to the product of those numbers.

- a) (i) b) (ii) c) (iii) d) (iv)

(20) Assertion (A): Perpendicular bisectors of two chords of a circle intersect at its centre. 1

Reason (R): A line drawn through the centre of a circle to bisect a chord is perpendicular to the chord. 1

- a) (i) b) (ii) c) (iii) d) (iv)

SECTION B

(All questions are compulsory. In case of internal choice, attempt any one question only)

(21) (a) Two friends, Raj and Rupesh, decide to exercise regularly by jogging on a circular track. Raj completes one round of the track in 18 minutes, while Rupesh takes 24 minutes to complete one round. They both start jogging together at 6:00 AM. Based on the above information, answer the following questions:

(i) At what time will they both meet again at the starting point? 1

(ii) How many rounds would each of them have completed by the time they meet again? 1



OR

(21) (b) Ravi, Suman, and Alok are organizing a charity event and have decided to donate packs of pencils, erasers, and sharpeners. Ravi has 168 pencils, Suman has 252 erasers, and Alok has 360 sharpeners. They want to create identical gift packs, each containing the same number of pencils, erasers, and sharpeners, with no items left over. Based on the above information, answer the following questions:

(i) What is the maximum number of gift packs they can make? 1

(ii) How many pencils, erasers, and sharpeners will each pack contain? 1

(22) (a) A standard deck of 52 playing cards is shuffled, and two cards are drawn one after another without replacement. What is the probability that both cards drawn are Aces? 2

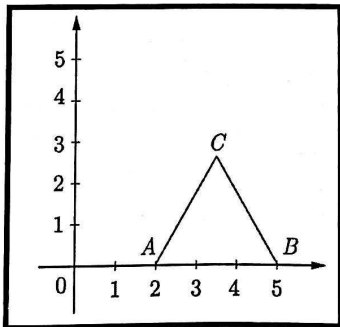
OR

(22) (b) Two dice are rolled. The first die is numbered from 1 to 6, with each face showing a different number: 1, 2, 3, 4, 5, and 6. The second die has faces numbered 1, 1, 2, 2, 3, and 3. Find the probability of obtaining each possible sum of 2 and 5. 2

(23) Evaluate: $\frac{\operatorname{cosec}^2 30^\circ + \tan^2 45^\circ}{\cos^2 60^\circ + \sin^2 30^\circ}$ 2

(24) Find the length of the median through the vertex B of the triangle ABC with vertices $A(9, -2)$, $B(-3, 7)$ and $C(-1, 10)$. 2

(25) In the given figure ABC is an equilateral triangle of side 3 units. Find the co-ordinates of the three vertices. 2



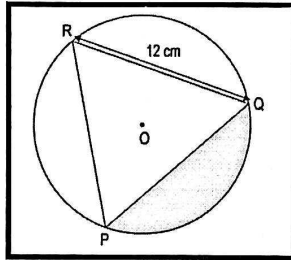
SECTION C

(All questions are compulsory. In case of internal choice, attempt any one question only)

- (26) State and prove Basic Proportionality Theorem. 3
- (27) A ball is thrown vertically upward from the ground. The maximum height, h meters, the ball reaches with respect to time t seconds, is represented by the polynomial $h(t) = -5t^2 + 30t$. After what time; it will hit the ground from its maximum height position? 3
- (28) Without actually calculating the zeroes, form a quadratic polynomial whose zeroes are reciprocals of the zeroes of the polynomial: $5x^2 + 2x - 3$. 3
- (29) If $\tan \theta + \sin \theta = m$ and $\tan \theta - \sin \theta = n$, then prove that $m^2 - n^2 = 4\sqrt{mn}$. 3
- (30) (a) In a circle of radius 21 cm, an arc subtends an angle of 60° at the centre. Find the area of the sector formed by the arc. Also, find the area of the minor segment. 3

OR

- (30)(b) Shown below is a circle with centre O. PQR is an equilateral triangle of side of length 12 cm. Find the area of the shaded region. 3



- (31) Prove that $\sqrt{5}$ is an irrational number. 3

SECTION D

(All questions are compulsory. In case of internal choice, attempt any one question only)

- (32) (a) Solve the following pairs of linear equations in two variables graphically.

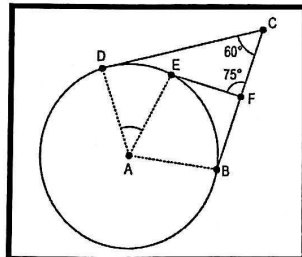
$$\begin{aligned} x + 3y &= 6 \\ 2x - 3y &= 12 \end{aligned}$$

Identify the shape resulting from the intersection of the pair of equations with the Y-axis and write the co-ordinates of the vertices of the figure obtained. Also calculate the area obtained from the resulting shape. 5

OR

- (32)(b) Ravi and Suman run food stalls selling two items: sandwiches and smoothies. Ravi earns ₹1600 in a day by selling 50 items, with sandwiches priced at ₹40 each and smoothies at ₹30 each. Suman earns ₹1800 by selling 60 items, pricing sandwiches at ₹35 each and smoothies at ₹25 each. Formulate the linear equations representing the situation for both Ravi and Suman. Also, determine how many sandwiches and smoothies each of them sold. 5

- (33) Shown below is a circle with centre A. CD, CB and EF are three tangents to the circle. $\angle DCF = 60^\circ$, $\angle EFC = 75^\circ$. Find the measure of $\angle DAE$. 5



(34) The angle of elevation of a jet plane from a point A on the ground is 60° . After a flight of 30 seconds, the angle of elevation changes to 30° . If the jet plane is flying at a constant height of $3600\sqrt{3}$ m, then find the speed of the jet plane.

(35) (a) The median of the following frequency distribution is 35. Find the value of x.

CLASS INTERVAL	FREQUENCY
0-10	2
10-20	3
20-30	x
30-40	6
40-50	5
50-60	3
60-70	2

Also, find the mode of the given data.

OR

(35)(b) The Median and Mode of the following wage distribution are known to be ₹ 33.5 and ₹ 34 respectively. Three frequency values from the table however are missing. Find the missing frequencies.

Wages	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	Total
No. of persons	4	16	X	Y	Z	6	4	230

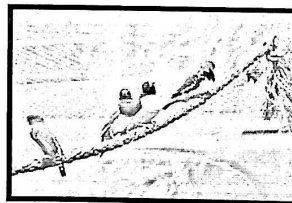
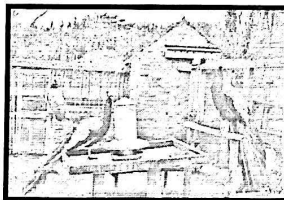
SECTION E

(All questions are compulsory. In case of internal choice, attempt any one question only)

36. CASE STUDY – I:

An aviary houses several species of birds and observes changes in their populations each month due to seasonal breeding, migration, and adoption programs. The birds are housed in separate enclosures by species, and each enclosure has a different number of birds. The aviary's management has noticed that the bird population for each species tends to increase in an arithmetic progression (AP) each month. The following details are provided:

- **Parrots:** The parrot enclosure started with 10 parrots, and each month, 6 new parrots are added.
- **Peacocks:** The peacock enclosure started with 5 peacocks, and each month, 3 more peacocks are added.
- **Finches:** The finch enclosure started with 15 finches, and each month, the count increases by 4 finches.
- **Owls:** The owl enclosure started with 2 owls, with an increase of 1 owl each month.



The aviary manager wants to use this monthly pattern to predict future numbers and plan for food, space, and maintenance. Based on the above information, answer the following questions:

- How many parrots will there be in the 8th month?
- After how many months will the parrot population reach or exceed the enclosure limit of 100 birds?
- (a) What will be the combined total population of all bird species after 12 months?

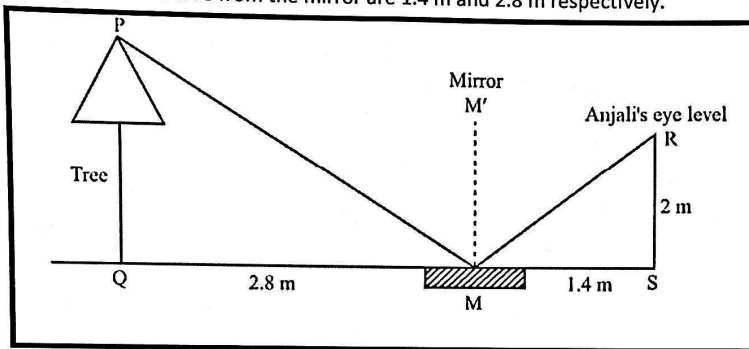
OR

(iii) (b) To avoid overcrowding, the aviary limits the population of each species' enclosure to a maximum of 100 birds. How many parrots and peacocks should be shifted from the aviary house to avoid overcrowding after one year?

2

37. **CASE STUDY – II:**

Anjali places a mirror on the level ground to determine the height of a tree. She stands at a certain distance so that she can see the top of the tree reflected from the mirror. Anjali's eye level is 2 m above the ground. The distance of Anjali and the tree from the mirror are 1.4 m and 2.8 m respectively.



Based on the above information, answer the following questions:

(i) Which of the two triangles in the figure are similar? State the criterion of similarity.

1

(ii) (a) What is the height of the tree?

2

OR

(ii) (b) Find the value of $PM + RM$.

2

(iii) If the height of the tree is doubled, what should be the distance of the tree from the mirror to have the same value of $\angle PMQ$.

1

(38) **CASE STUDY – III:**

A decorative fountain is designed in the shape of a combination of a cylinder topped with a cone. The fountain has the following dimensions:

- The cylindrical base has a height of 3 meters and a radius of 1 meter.
- The cone on top has a height of 2 meters and the same radius of 1 meter as the cylinder.

Based on the above information, answer the following questions:

(i) Calculate the volume of the conical top of the fountain.

1

(ii) Calculate the curved surface area of the conical part of the fountain.

1

(iii) (a) If the fountain is filled with water, how many liters of water can it hold?

2

OR

(iii) (b) If the cost of painting the outer surface of the fountain is ₹150 per square meter, what will be the total cost to paint the outer surface of the fountain?

2
