DELHI PUBLIC SCHOOL INDIRAPURAM, GHAZIABAD
PRE-BOARD EXAMINATION-2 : 2023-2024

Time: 3 Hours	M. M. 80	CLASS – X MATHEMATICS SET-B	No. of Q.: 38	No. of Pages :05
Name			Roll No.	

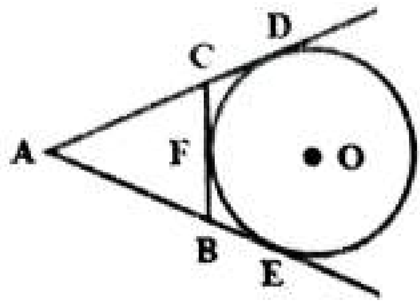
General Instructions :

1. This Question Paper has 5 Sections A, B, C, D and E
2. Section A has 20 Multiple Choice Questions (MCQs) carrying 1 mark each.
3. Section B has 5 Short Answer-I (SA-I) type questions carrying 2 marks each.
4. Section C has 6 Short Answer-II (SA-II) type questions carrying 3 marks each.
5. Section D has 4 Long Answer (LA) type questions carrying 5 marks each.
6. Section E has 3 Case Based integrated units of assessment (4 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Qs of 2 marks, 2 Qs of 3 marks and 2 Qs of 5 marks has been provided. An internal choice has been provided in the 2 marks questions of section E.
8. Draw neat figure wherever required. Take $\pi = 22/7$ wherever required if not stated.

SECTION A

Section A consists of 20 questions of 1 mark each.

1.	$\tan 2A = 2\tan A$ is true when value of A is. (a) 30° (b) 60° (c) 45° (d) 0°	[1]
2.	If the centroid of the triangle formed by $(3, -5)$, $(-7, 3)$ and $(10, -b)$ is at $(a, -1)$, then the values of a and b respectively are: (a) 1, 3 (b) 3, 1 (c) 2, 1 (d) 1, 2	[1]
3.	The point of intersection of the line $3x + 7y = 12$ and the y axis is. (a) (0, 4) (b) (0, 12/7) (c) (12/7, 0) (d) (4,0)	[1]
4.	If $5\tan\beta - 4 = 0$, then value of $\frac{5\sin\beta - 4\cos\beta}{5\sin\beta + 4\cos\beta}$ is. (a) 5/3 (b) 5/6 (c) 0 (d) 1/6	[1]
5.	The greatest possible speed at which a man can walk 52 m and 91 m in an exact number of minutes is. (a) 17 m/min (b) 19 m/min (c) 23 m/min (d) 13 m/min	[1]
6.	The ratio of the area of a circle and an equilateral triangle whose diameter and a side are respectively equal is: (a) $\pi:\sqrt{2}$ (b) $\pi:\sqrt{3}$ (c) $\sqrt{3}:\pi$ (d) $\sqrt{2}:\pi$	[1]
7.	If the distance between points P (x, 2) and Q (3, –6) is 10 units, then the product of values of x is : (a) –27 (b) 27 (c) 18 (d) –18	[1]
8.	If the height of a vertical pole is $\sqrt{3}$ times the length of its shadow on the ground, then the angle of elevation of the sun at the time is: (a) 30° (b) 60° (c) 45° (d) 75°	[1]
9.	$\triangle ABC$ is such that AB=3cm, BC=2cm and CA=2.5cm. $\triangle DEF$ is similar to $\triangle ABC$. If EF=4cm, then the perimeter of $\triangle DEF$ is: (a) 7.5cm (b) 15cm (c) 22.5cm (d) 30cm	[1]
10.	The number of real roots of the equation $(x-1)^2+(x-2)^2+(x-3)^2=0$ is: (a) 1 (b) 2 (c) 3 (d) no real roots	[1]

11.	If three cubes of metal whose edges are 6cm, 8cm and 10cm melted and formed into a single cube. Then length of the diagonal of the larger cube formed is: (a) $4\sqrt{3}$ cm (b) $15\sqrt{3}$ cm (c) $12\sqrt{3}$ cm (d) $\sqrt{3}$ cm	[1]
12.	The value of x for which 2x, x + 10 and 3x + 2 are the three consecutive terms of an A.P. is: (a) –6 (b) 18 (c) 6 (d) –18	[1]
13.	In figure AD, AE, and BC are tangents to the circle at D, E and F respectively, then:  (a) AD=AB+BC+CA (b) 2AD=AB+BC+CA (c) 3AD=AB+BC+CA (d) 4AD=AB+BC+CA	[1]

14. Consider the data : [1]

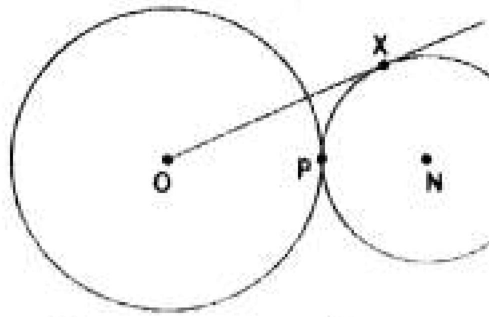
Class	30-50	50-70	70-90	90-110	110-130	130-150	150-170
Frequency	5	6	13	20	14	7	5

The difference between the upper limit of the median class and the lower limit of the modal class is.
(a) 0 (b) 19 (c) 20 (d) 38

15. 2 cards of hearts and 4 cards of spades are missing from a pack of 52 cards. The probability of getting a black card from the remaining pack is: [1]
(a) 11/26 (b) 10/27 (c) 10/23 (d) 11/23

16. The sum of the first n even natural numbers is: [1]
(a) 2n (b) n^2 (c) $n^2 + n$ (d) $n^2 - 1$

17. Two circles with centres O and N touch each other at point P as shown in the figure. O, P and N are collinear. The radius of the circle with centre O is twice that of the circle with centre N. OX is a tangent to the circle with centre N, and OX is 8cm. What is the radius of the circle with center N? [1]



(a) $\sqrt{3}$cm (b) $3\sqrt{2}$cm (c) $\sqrt{2}$ cm (d)$2\sqrt{2}$cm

18. Cards marked with the numbers 21 to 40 are placed in the box and mixed thoroughly. One card is drawn from this box. The probability that the number on the card is an even composite number is: [1]
(a) 1/4 (b) 3/4 (c) 21/40 (d) 1/2

19. Choose the correct option from the following: [1]

Assertion: Total surface area of the toy top (lattu) is the sum of the curved surface area of the hemisphere and the curved surface area of the cone.

Reason: The toy top (lattu) is obtained by fixing the plane surfaces of the hemisphere and cone together.

(a) Both, A and R, are true and R is the correct explanation of A
(b) Both, A and R, are true but R is not the correct explanation of A
(c) A is true but R is false
(d) A is false but R is true

20. Choose the correct option from the following: [1]

Assertion: The quadratic polynomial with 1/2 and 1/3 as its zeroes is $6x^2 - 5x + 1$.

Reason: Quadratic polynomial having α and β as zeroes are given by $f(x)=k\{x^2-(\alpha+\beta)x+\alpha\beta\}$, where k is a non-zero constant

(a) Both, A and R, are true and R is the correct explanation of A
(b) Both, A and R, are true but R is not the correct explanation of A
(c) A is true but R is false
(d) A is false but R is true

SECTION B

Section B consists of 5 questions of 2 marks each.

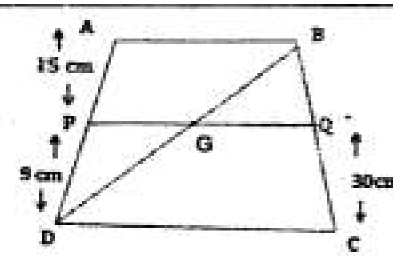
21. Find the perimeter of the sector of a circle whose radius is 7cm and angle of sector is 45^0. [2]

OR

A chord of a circle of radius 7cm subtends an angle 90^0 at the center. Find the area of the corresponding segment of the circle.

22. Find the smallest natural number which when divided by 10, 50, 15 leaves a remainder of 5 in each case. [2]

23. ABCD is a trapezium in which AB is parallel to DC. P and Q are points on sides AD and BC such that PQ is parallel to AB. If PD=9cm, AP=15cm, and QC=30 cm, find BC. [2]

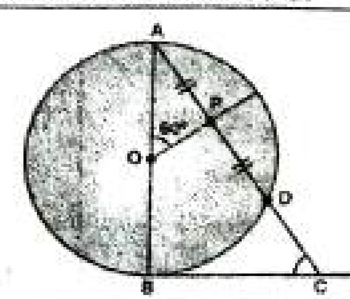


24. Find the value of $[5(\sin^2 60^\circ + \cos^2 30^\circ) - 3(\cos^2 45^\circ + \sin^2 90^\circ)] \times \frac{2\cos^2 30^0 + 2\sec^2 60^0 - 2\tan^2 45^0}{\sin^2 30^0 + \cos^2 45^0}$ [2]

OR

In a ΔABC, if $\angle B = 90^\circ$, BC = 5 cm, AC − AB = 1 cm, then Determine the value of cos C.

25. In figure, AB is diameter of a circle centered at O. BC is tangent to the circle at B. If OP bisects the chord AD and $\angle AOP = 60^\circ$, then, find $\angle C$. [2]

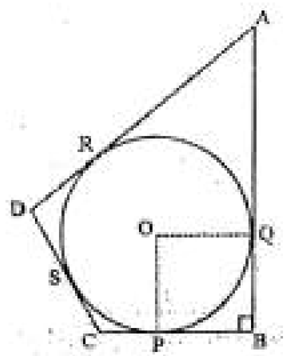


SECTION C

Section C consists of 6 questions of 3 marks each.

26. If the zeroes of the polynomial $x^2 + px + q$ are double in value to the zeroes of the polynomial $2x^2 - 5x - 3$, then find the value of p and q. [3]

27. Prove that $4+3\sqrt{5}$ is an irrational number. [3]

28.	Prove that $sin^2\theta+cos^2\theta=1$ and using this identity Prove that: $\frac{1+cos\theta - sin^2\theta}{sin\theta(1+cos\theta)}=cot\theta$	[3]
29.	Draw the graph of the following pair of linear equations 2x−3y+6=0 and 4x−y−8=0. Determine the coordinates of the vertices of the triangle formed by these lines and the y-axis, and shade the triangular region. **OR** Determine the values of a and b for which the following system of linear equations has infinite number of solutions. 2x − 3y = 7; (a−b)x − (a +b−3)y = 4a+b	[3]
30.	In the given figure, a circle is inscribed in a quadrilateral ABCD, in which ∠B = 90°. If AD = 23 cm, AB =29cm and DS = 5cm. Find the radius r of the circle.  Fig.8.61 **OR** Prove that opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles the centre of the circle.	[3]
31.	Find the value of p from the following data, if its mean is 33.	[3]

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	7	4	8	2	p	2	4	2

SECTION D

Section D consists of 4 questions of 5 marks each.

32.	A solid toy is in the form of a hemisphere surmounted by a right circular cone of the same base radius as that of the hemisphere. If the radius of base of the cone is 21cm and its volume is ⅔ of the volume of the hemisphere. Calculate the height of the cone and the surface area of the toy. [use π=22/7] **OR** Raghav made a bird-bath for his garden in the shape of a hollow cylinder with a hemispherical depression at one end. The height of the cylinder is 1.45 m and its radius is 30 cm. Find the total surface area of the bird-bath in sq.m. and also find the volume of the vessel containing the water. (Take π = 22/7)	[5]
33.	A rectangular field is 16m long and 10m wide. There is a path of equal width all around it having an area of 120 sq. m. Find the width of the path. **OR** For what value of m, are the roots of the quadratic equation x^2 - 2x(1+3m) + 7(3+2m) are equal.	[5]
34.	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 ΔABC ~ Δ PQR.	[5]

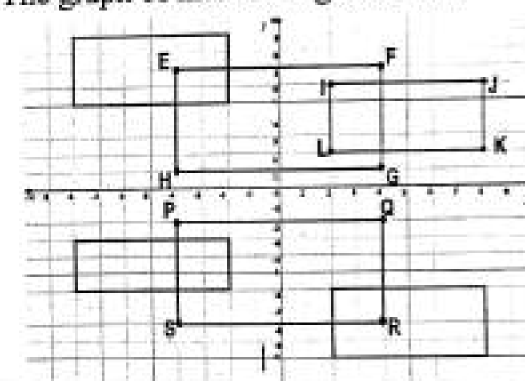
35.	Find the median of the following data.	[5]

Marks	Number of students
Less than 10	3
Less than 20	8
Less than 30	20
Less than 40	40
Less than 50	80
Less than 60	85
Less than 70	90
Less than 80	100

SECTION E

Section E consists of 3 questions of 4 marks each.

36. Bani has interesting wall shelves in her living room. The graph of intersecting shelves is given: [1] [1] [2]



(a) Find the distance of point J(8,6) from origin.

(b) Find the distance between H(-4,1) and L (2,2)

(c) What are the coordinates of a point which divides the line segment joining the points E(-4,7) and G(4,2) in the ratio 2:3?

OR

Find the ratio in which x axis divides the line segment joining the points I (2,6) and Q(4,-2)

37. A farmer has a triangular piece of land. He grows plants in 9 rows such that there are 20 plants in 1st row, 19 plants in the next row, 18 plants in the row next to it and so on. [1] [1] [2]

(a) In the above situation, does the arrangement of plants make an arithmetic progression. If yes, then find the common difference.

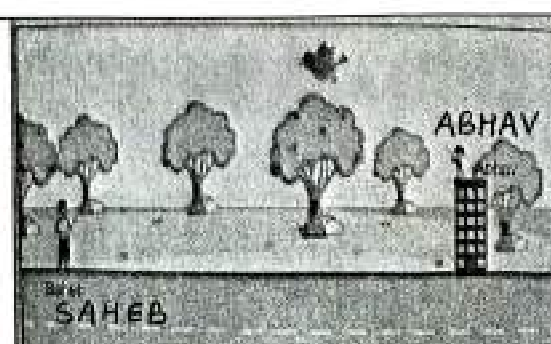
(b) How many plants does the farmer grow in the middle row?

(c) If he wants to increase two more rows then how many more plants does he need?

OR

If the farmer changes the arrangement of plants and grows 20 plants in the first row, 18 plants in the next row, 16 plants in the row next to it and so on. Find the number of rows required for planting 104 trees in all?

38. Saheb standing on a horizontal plane finds a bird, flying at a distance of 200 m from him at an elevation of 30^0. Abhav standing on the roof of a 50m high building, finds the angle of elevation of the same bird to be 45^0. Saheb and Abhav are on the opposite sides of the bird. [1] [1] [2]



(a) Draw a well labeled diagram.

(b) Find the height at which the bird is flying from the ground.

(c) Find the distance of the bird from Abhav.

OR

What is the horizontal distance of Saheb from the building?