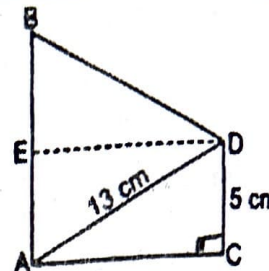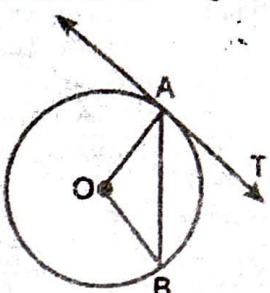# DELHI PUBLIC SCHOOL INDIRAPURAM, GHAZIABAD
PRE-BOARD EXAMINATION–1 : 2023-2024
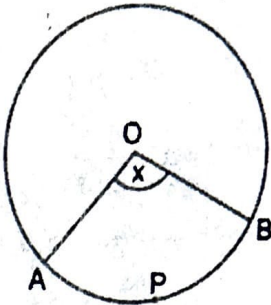
Time: 3 Hours	M. M. 80	CLASS – X MATHEMATICS SET-A	No. of Q.: 38	No. of Pages:04
Name Ananya Aggarwal			**Roll No.**	5

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 Questions of 5 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E.
8. Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.

Section A
Section A consists of 20 questions of 1 mark each.

1.	The ratio between the LCM and HCF of 5 , 15 , 20 is (a) 9:1 (b) 4:3 (c) 11:1 (d) 12:1	[1]
2.	If $4x^2 - 6x - m$ is divisible by $x - 3$,the value of m is a multiple of (a) 9 (b) 45 (c) 20 (d) 36	[1]
3.	For what value of k, the pair of equations $2x + 3y + 5 = 0$ and $kx + 4y = 10$, has a unique solution? (a) $k = 8/3$ (b) $k \neq 8/3$ (c) $k = 3$ (d) $k \neq 3$	[1]
4.	If the roots of the equation $ax^2 + bx + c = 0$ are equal in magnitude but opposite in sign , then (a) $a = 0$ (b) $b = 0$ (c) $c = 0$ (d) none of these	[1]
5.	If a , b , c , d , e and f are in A.P, then $e - c$ is equal to (a) $2(c - a)$ (b) $2(f - d)$ (c) $2(d - c)$ (d) $d - c$	[1]
6.	Three vertices of a parallelogram taken in order are $(-1, -6)$, $(2, -6)$ and $(7, 2)$. The fourth vertex is (a) $(1, 4)$ (b) $(1, 1)$ (c) $(4, 2)$ (d) $(4, 1)$	[1]
7.	If the distance of the point $(4, a)$ from x-axis is half its distance from y-axis, then a is (a) 4 (b) 8 (c) 2 (d) 6	[1]
8.	The 15th term of the sequence $x-7, x-2 , x+3 , \ldots\ldots$ is (a) $x + 63$ (b) $x + 73$ (c) $x + 83$ (d) $x + 53$	[1]
9.	The value of x in the given figure is (a) 5 cm (b) 4 cm (c) 2 cm (d) 3 cm	[1]
10.	$2\cos^2 30^0 - 1$ is (a) $\sin 60^0$ (b) $\cos 60^0$ (c) $\tan 60^0$ (d) $\sec 60^0$	[1]

11.	In the given figure , if AB =14 cm, then the value of tanB is:	[1]
	(a) 4/3 (b) 14/3 (c) 3/5 (d) 12/5	

12.	If a flagstaff 6m high throws a shadow $2\sqrt{3}$m along the ground , then the angle of elevation of the Sun is (a) 60° (b) 30° (c) 90° (d) 45°	[1]

13.	In the given figure, O is the centre of a circle, AB is a chord and AT is the tangent at A. If $\angle AOB = 100°$, then supplement of $\angle BAT$ is equal to (a) 50° (b) 40° (c) 130° (d) 90°	[1]

14.	A line touches a circle of radius 4cm. Another line is drawn which is tangent to the circle. If two lines are parallel, then distance between them is (a) 4cm (b) 6cm (c) 7cm (d) 8cm	[1]

15.	If the circumferences of two circles are in the ratio 4:9 , then the ratio of their area is (a) 9:4 (b) 4:9 (c) 2:3 (d) 16:81	[1]

16.	The radius of the largest right circular cone that can be cut from a cube of edge 4.2 cm is (a) 4.2cm (b) 2.1cm (c) 8.4cm (d) 1.05cm	[1]

17.	During conversion of a solid from one shape to another, the volume of the new shape will (a) increase (b) decrease (c) remain unaltered (d) be doubled	[1]

18.	The mean and median of the same data are 24 and 26 respectively. The value of mode is (a) 23 (b) 26 (c) 25 (d) 30	[1]

19.	The probability of getting a number between 1 and 100 which is divisible by 1 and the number itself only is (a) 25/100 (b) 23/100 (c) 25/98 (d) 23/98	[1]

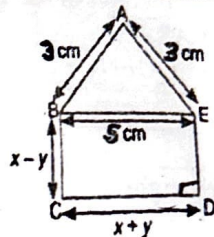| 20.	From a pack of 52 playing cards, jacks , queens, kings and aces of red colour are removed. From the remaining cards , a card is drawn at random.Probability of the card being a red card or a number 3 card is- (a) 1/2 (b) 10/22 (c) 2 /22 (d) 9/22	[1]

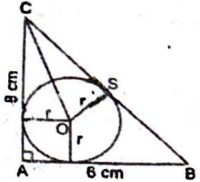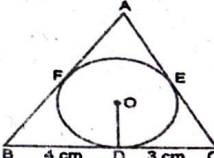|	**Section B**	
	Section B consists of 5 questions of 2 marks each.	
21.	Prove that $\sqrt{7}$ is an irrational number.	[2]
22.	Prove that tangents drawn from the same external point to a circle are equal in length.	[2]
23.	If tan (A+B) = $\sqrt{3}$ and tan (A - B) = $1/\sqrt{3}$; $0° < A+B \le 90°$; A > B, find A and B. **OR** If $3x = cosec\Theta$ and $3/x = cot\Theta$, find the value of $3(x^2 - 1/x^2)$	[2]

24.	E is a point on the side AD produced of a parallelogram ABCD and BE intersects CD at F. Show that $\triangle ABE \sim \triangle CFB$.	[2]

25.	In the given figure, O is the centre of the circle. The area of sector OAPB is 5/18 of the area of the circle. Find x. Find the ratio of the area of minor sector to that of major sector.	[2]

OR

In a circle of radius 21cm, an arc subtends an angle of $60°$ at the centre. Find:
(i) length of the arc
(ii) area of the sector formed by the arc.

Section C
Section C consists of 6 questions of 3 marks each.

26.	Write a quadratic polynomial whose one zero is $3-\sqrt5$ and product of zeroes is 4. $k[\alpha+\beta-\gamma\beta]$	[3]

27.	In the given figure, ABCDE is a pentagon with BE ∥ CD and BC ∥ DE. BC is perpendicular to CD. If the perimeter of ABCDE is 21m, find the value of x and y.	[3]

OR

Find the four angles of a cyclic quadrilateral ABCD in which $\angle A =(2x - 1)°$, $\angle B = (y+ 5)°$, $\angle C = (2y+ 15)°$ and $\angle D = (4x- 7)°$.

28.	*Evaluate:* $\dfrac{2\cos^2 90° + 4\cos^2 45° + \tan^2 60° + 3\csc^2 60° + 1}{3\sec 60° - \dfrac{7}{2}\sec^2 45° + 2\csc 30° - 1}$	[3]

29.	The greatest number that will divide 76, 112, 172 and 184 so as to leave remainder 40 in each case is $k^2 \times 3$. Find value of k.	[3]

30.	In the given figure, ABC is a right angled triangle, right angled at A, with AB =6cm and AC= 8cm. A circle with centre O is inscribed inside the triangle. Find radius of the circle.	[3]

OR

In the given figure, a triangle ABC is drawn to circumscribe a circle of radius 2cm such that the side BC is divided into segments BD and DC by the point of contact D in lengths of 4cm and 3cm respectively. If the area of $\triangle ABC$ is $21 cm^2$, then find the length of sides AB and AC.

31.	Determine the modal lifetime of the components.	[3]

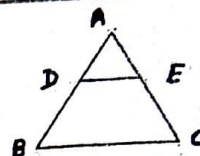| LIFETIMES(in hours):	0-20	20-40	40-60	60-80	80-100	100-120
FREQUENCY:	10	35	52	61	38	29

Section D
Section D consists of 4 questions of 5 marks each.

32.	In a class test , the sum of the marks obtained by Gaurav in Mathematics and Science is 28. Had he got 3 more marks in Maths and 4 marks less in Science, the product of marks obtained in two subjects would have been 180. Find the marks obtained in the two subjects separately.	[5]

OR

	Solve for x : $9x^2 - 9(a+b)x + (2a^2 + 5ab + 2b^2) = 0$	[5]
33.	State and prove Basic Proportionality Theorem. In the given figure, DE‖ BC. If BD= x – 3, AB= 2x, CE= x-2 and AC= 2x + 3. Find x.	[5]
34.	A tent is in the shape of a cylinder surmounted by a conical top. If the height and diameter of the cylindrical part are 2.1 m and 4 m respectively, and the slant height of the top is 2.8 m, find the area of the canvas used for making the tent. Also, find the cost of the canvas used for the tent at the rate of rs 500 per m².How much space each person acquires, if the tent can accommodate 11 persons? **OR** An iron spherical ball is melted and recast into smaller balls of equal size. If the radius of each of the smaller balls is ¼ of the radius of the original ball, how many such balls are made? Find the ratio of the surface area of all the smaller balls combined together with that of the original ball. What is the percentage decrease in the surface area of a new sphere as compared to the original one?	[5]

35.	If the median of the following frequency distribution is 32.5, find the missing frequencies.	[5]

CLASSES:	0-10	10-20	20-30	30-40	40-50	50-60	60-70	TOTAL
FREQUENCY:	x	5	9	12	y	3	2	40

Section E

Section E consists of 3 questions of 4 marks each.

36.	The height of a hill is 3300m. From a point P on the ground, the angle of elevation of the top of the hill is 60⁰. A hot air balloon moves with constant speed vertically upwards from P. After 5 minutes, a person sitting in the balloon observes the angle of elevation of the top of the hill as 30⁰. As per the given information , answer the following questions (i) Draw a properly labeled figure for the above situation. (ii) Find distance of point P from foot of the hill. (iii) Find the speed of the balloon in m/minute. **OR** Find the ratio of the distance between top of the hill from point P to the distance of the top of the hill from the point after flight of 5 minutes.	[1] [1] [2]
37.	Deepa has to buy a scooty. She can buy scooty either making cash down payment of rs 25,000 or by making 15 monthly installments as below; 1st month— rs 3425 2nd month– rs 3225 3rd month–rs 3025 and so on. Answer the following questions based on above information (i) Do these installments form an AP? If yes, what is the common difference? (ii) Find the amount of the 6th installment. (iii) What is the total amount paid in 15 installments? **OR** Find the sum of three middle most installments.	[1] [1] [2]
38.	To raise social awareness about the hazards of smoking, a school decided to start a 'No Smoking' campaign. 10 students were asked to prepare campaign banners in the shape of a triangle. The vertices of one of the triangles are P(–3,4),Q(3,4) and R(–2,–1). Based on the above information, answer the following questions. (i) What are the coordinates of the centroid of ΔPQR? (ii) Find coordinates of the point that divides the side QR in ratio 2:1 (iii) What is the length of line segment joining mid points of PQ and PR? **OR** Find the distance between point Q and centroid of the triangle.	[1] [1] [2]