Roll No. :_____

Please check that this question paper contains 38 questions and 8 printed pages.

D.A.V. INSTITUTIONS, CHHATTISGARH
PRACTICE PAPER- 1
CLASS: X
SUBJECT: MATHEMATICS (STANDARD)

TIME: 3 HOURS   MAX. MARKS: 80
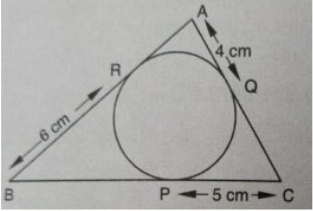
General Instructions:

1. **This Question Paper has 5 sections A – E.**

2. **Section A has 20 MCQs carrying 1 mark each.**

3. **Section B has 5 questions carrying 2 marks each.**

4. **Section C has 6 questions carrying 3 marks each.**

5. **Section D has 4 questions carrying 5 marks each.**

6. **Section E has 3 case based integrated units of assessment (04 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 of 2 questions of 5 marks, 2 questions of 3 marks and 2 Questions of 2 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 $\pi=\frac{22}{7}$ wherever required if not stated.**
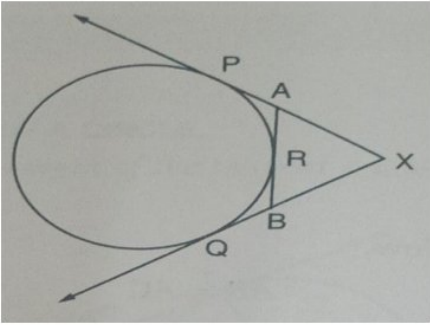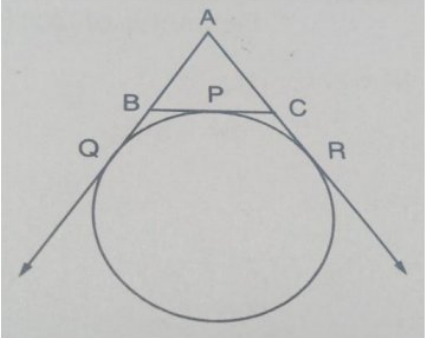
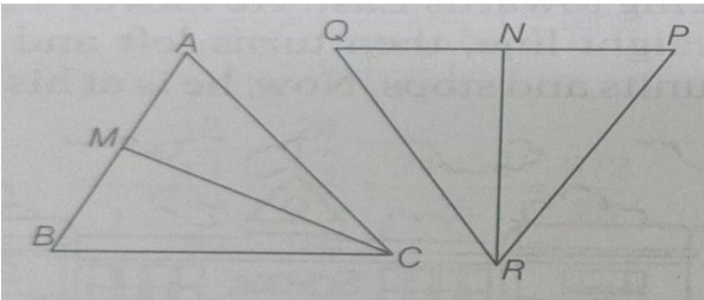|	SECTION A	
	Section A consists of 20 questions of 1 mark each.	
Q. No.		Marks
1	If α and β are the zeros of polynomial $p(x) = x^2 - p(x + 1) - c$, then $(\alpha + 1)(\beta + 1) =$ (a) c-1 (b) 1-c (c) c (d) 1+c	1
2	If the system of equations $2x + 3y = 7$ and $(a + b)x + (2a - b)y = 21$ has infinitely many solution then (a) $a = 1, b = 5$ (b) $a = 5, b = 1$ (c) $a = -1, b = 5$ (d) $a = 5, b = -1$	1
3	If the sum of the roots of the equation $x^2 - x(k + 6) + 2(2k - 1) = 0$ is equal to half of their product then the value of k is (a) 6 (b) 7 (c) 1 (d) 5	1
4	The first three terms of an A.P. respectively are (3y-1), (3y+5) and (5y+1), then y is equal to (a) -3 (b) 4 (c) 2 (d) 5	1

5	If nth term of an A.P. is 2n+1, then the sum of first n terms of the A.P. is (a) n(n-2) (b) n(n+2) (c) n(n+1) (d) n(n-1)	1
6	The ratio in which the line segment joining $P(x_1, y_1)$ and $Q(x_2, y_2)$ is divided by x-axis is (a) $y_1 : y_2$ (b) $-y_1 : y_2$ (c) $x_1 : x_2$ (d) $-x_1 : x_2$	1
7	If the centroid of the triangle formed by (7, x), (y, -6) and (9, 10) is at (6, 3), then (x, y) is (a) (4,5) (b) (5, 4) (c) (-5, -2) (d) (5, 2)	1
8	If $\Delta ABC \sim \Delta DEF$ such that AB = 9.1 cm. and DE = 6.5 cm. If the perimeter of ΔDEF is 25 cm., then the perimeter of ΔABC is (a) 36 cm (b) 30 cm (c) 33 cm (d) 35 cm	1
9	If the difference between the circumference and radius of a circle is 37 cm. Then the circumference (in cm.) of the circle is (a) 154 (b) 44 (c) 14 (d) 7	1
10	If the area of sector of a circle bounded by an arc of length 5π cm is equal to 20π sq cm, then the radius of the circle is (a) 12 cm (b) 16 cm (c) 8 cm (d) 10 cm	1
11	The radius of a wheel is 0.25 m. The number of revolutions it will make to travel a distance of 11 km. will be (a) 2800 (b) 4000 (c) 5500 (d) 7000	1
12	Two dice are thrown together. The probability of getting the different number on both dice is (a) 5/6 (b) 1/6 (c) 1/12 (d) 1/2	1
13	A bag contains cards numbered from 1 to 25. A card is drawn at random from the bag, the probability that the number on this card is divisible by 2 and 5 both is (a) 1/5 (b) 3/25 (c) 4/25 (d) 2/25	1
14	If $sin\theta - cos\theta = 0$, then the value of $sin^4\theta + cos^4\theta$ is (a) 1 (b) ¾ (c) ½ (d) 1/4	`1
15	If $acos\theta + bsin\theta = m$ and $asin\theta - bcos\theta = n$, then $m^2 + n^2$ is equal to (a) $a^2 + b^2$ (b) $a^2 - b^2$ (c) $a + b$ (d) $a - b$	1
16	The ratio of the length of a rod and its shadow is $1:\sqrt{3}$. Then angle of elevation of the sun is (a) 30^0 (b) 45^0 (c) 60^0 (d) 90^0	1.
17	The length of the tangent drawn from a point 8 cm. away from the centre of a circle of radius 6 cm. is (a) $\sqrt{7}$ cm. (b) $2\sqrt{7}$ cm. (c) 10 cm. (d) 5 cm.	1

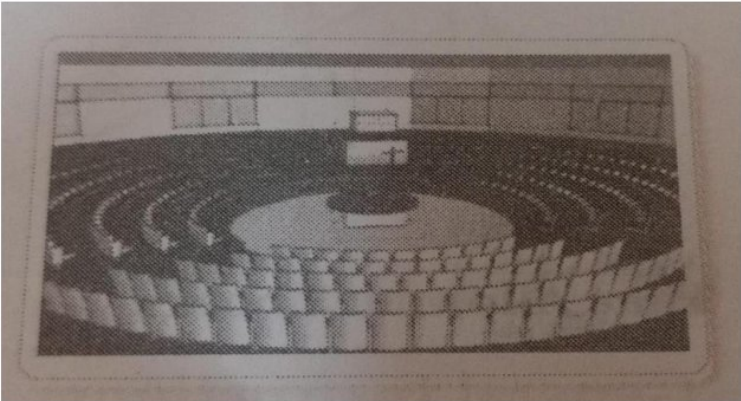| 18	In the figure:- the perimeter of triangle ABC is (a) 30 cm (b) 60 cm (c) 45 cm (d) 15 cm	1
19	**Assertion (A):** If the value of mode and mean are 60 and 66 respectively then the value of median is 64 **Reason (R):** median = mode + 2 mean a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A). b) Both Assertion (A) and Reason (R) are true and Reason (R) is not the correct explanation of Assertion (A). c) Assertion (A) is true but Reason (R) is false. d) Assertion (A) is false but Reason (R) is true.	1
20	**Assertion (A):** If the product of two numbers is 5780 and their HCF is 17, then their LCM is 340 **Reason (R):** HCF is always a factor of LCM a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A). b) Both Assertion (A) and Reason (R) are true and Reason (R) is not the correct explanation of Assertion (A). c) Assertion (A) is true but Reason (R) is false. d) Assertion (A) is false but Reason (R) is true.	1
	SECTION B	
	Section B consists of 5 questions of 2 marks each.	
21	The perimeter of a sector of a circle of radius 5.2 cm is 16.4 cm. Find the area of the sector. **OR** Find the area of the sector of circle of radius of 5 cm , If the corresponding arc length is 3.5 cm	2

22	Prove that :- $cosec^2\theta + sec^2\theta = cosec^2\theta \cdot sec^2\theta$ **OR** Find the value of x if $\quad 2cosec^2 30^0 + xsin^2 60^0 - \frac{3}{4}tan^2 30^0 = 10$	2
23	A vertical stick 12 m long cast a shadow 8 m long on the ground .At the same time a tower casts the shadow 40 m long on the ground. Determine the height of the tower.	2
24	On a morning walk, three person step off together and their steps measure 40 cm , 42 cm and 45 cm respectively .What is the minimum distance each should walk so that they can cover the distance in complete steps .	2
25	In figure XP and XQ are tangents from X to the circle with centre O. R is a point on the circle prove that XA+ AR = XB +BR 	2
	SECTION C	
	Section C consists of 6 questions of 3 marks each.	
26	Prove that $\sqrt{3}$ is an irrational number.	3
27	Find the zeroes of polynomial $x^2 + \frac{1}{6}x - 2$ and verify the relation between the coefficients and zeroes of the polynomial.	3
28	The sum of the numerator and denominator of a fraction is 4 more than twice the numerator. If the numerator and denominator are increased by 3 ,then they are in the ratio 2 : 3. Determine the fraction. **OR** In a competitive examination 1 mark is awarded for each correct answer while ½ mark is deducted for every wrong answer. Jayanti answered 120 questions and got 90 marks. How many questions did she answer correctly?	3

29	In the figure:- a circle is touching the side BC of Δ ABC at P and touching AB and AC produced at Q and R respectively . Prove that AQ = $\frac{1}{2}$ (perimeter of Δ ABC) .	3

30	Find the mean of following frequency distribution.	3

Classes	25- 30	30- 35	35-40	40-45	45-50	50-55	55-60
frequency	14	22	16	6	5	3	4

31	Prove that $\frac{tan\theta}{1-cot\theta} + \frac{cot\theta}{1-tan\theta} = 1 + cosec\theta\,sec\theta$	3

OR

Show that $\frac{2-cosec^2 A}{cosec^2 A + 2\cot A} = \frac{sinA - cosA}{sinA + cosA}$

SECTION D

Section D consists of 4 questions of 5 marks each.

32	If the median of the distribution on given below is 30 then find the values of x and y.	5

Class	0-10	10-20	20-30	30-40	40 -50	50-60	Total
Frequency	5	x	20	15	y	5	60

33	From a solid cylinder whose height is 12 cm and diameter 10 cm, a conical cavity of same height and same diameter is hollowed out. Find the volume and total surface area of remaining solid.	5

OR

A solid is composed of a cylinder with hemispherical ends If the whole length of solid is 104 cm and the radius of each hemispherical end is 7 cm then find the cost of polishing its surface at a rate of Rs 2 per cm^2 use ($\pi = \frac{22}{7}$).

34	Two pipes together can fill a tank in $\frac{15}{8}h$. The pipe with larger diameter takes 2 h less than the pipe with smaller diameter to fill the tank separately. Find the time in which each pipe can fill the tank separately.	5

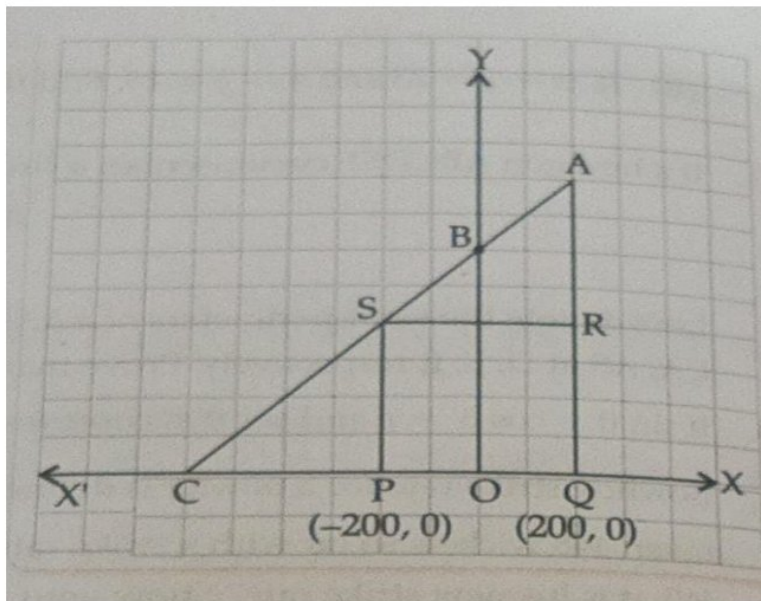| 35 | In the given figure , CM and RN are respectively the medians of triangle ABC and ΔABC and ΔPQR . If $\Delta ABC \sim \Delta PQR$, then prove that (a) $\Delta AMC \sim \Delta PNR$ (b) $\dfrac{CM}{RN} = \dfrac{AB}{PQ}$ (c) $\Delta CMB \sim \Delta RNQ$ | 5 |

<div align="center">

SECTION E

Section E consists of 3 questions of 4 marks each.

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| 36 | The school auditorium was to be constructed to accommodate at least 1500 people. The chairs are to be placed in concentric circular arrangement in such a way that each succeeding circular row has 10 seats more than the previous one. 1) If the first circular row has 30 seats, how many seats will be there in the 10th row? 2) For 1500 seats in the auditorium, how many rows need to be there? <div align="center">**OR**</div> If 1500 seats are to be arranged in the auditorium, how many seats are still left to be put after 10th row ? 3) If there were 17 rows in the auditorium, how many seats will be there in the middle row? | 1 2 1 |

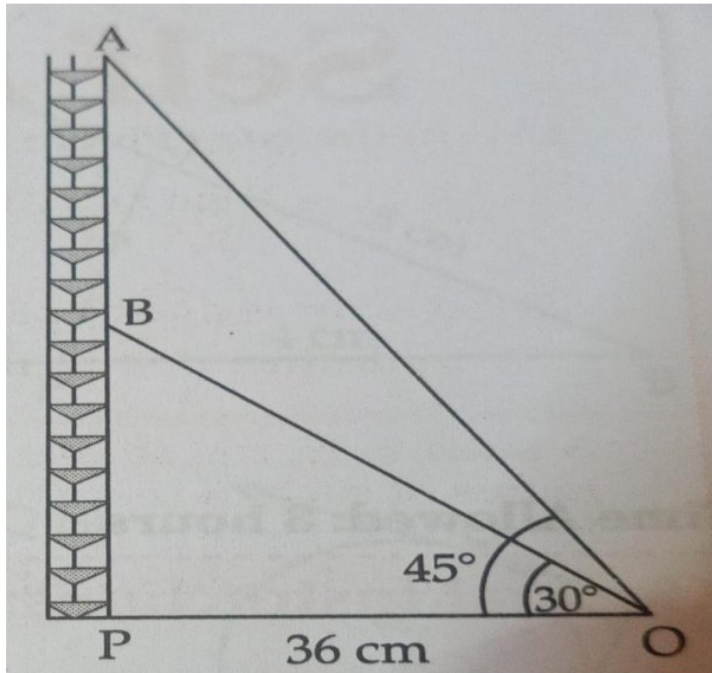| 37	Jagdish has a field which is in the shape of a right angled triangle AQC. He wants to leave a space in the form of a square PQRS inside the field for growing wheat and the remaining for growing vegetables (as shown in the figure). In the field, there is a pole marked as O.	
	Based on the above information, answer the following questions	
	(i) Taking O as origin, coordinates of P are (-200, 0) and of Q are (200, 0). PQRS being a square, what are the coordinates of R and S?	1
	ii) What is the area of square PQRS ?	2
	OR	
	What is the length of diagonal PR in square PQRS?	
	(iii) If S divides CA in the ratio K : 1, what is the value of K, where point A is (200, 800) ?	1

| 38 | Radio towers are used for transmitting a range of communication services including radio and television. The tower will either act as an antenna itself or support one or more antennas on its structure. On a similar concept, a radio station tower was built in two Sections A and B. Tower is supported by wires from a point O.

 Distance between the base of the tower and point O is 36 cm. From point O, the angle of elevation of the top of the Section B is 30^0

 and the angle of elevation of the top of Section A is 45^0

 Based on the above information, answer the following questions :

 (i) Find the length of the wire from the point O to the top of Section B.

 (ii) Find the distance AB.

        OR

   Find the area of $\triangle$OPB.

 (iii) Find the height of the Section A from the base of the tower. | 1

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