

Please check that this question paper contains 38 questions and 09 printed pages.

Roll No. : _____

**D.A.V. INSTITUTIONS, CHHATTISGARH
PRACTICE PAPER-4**

CLASS: X

SUBJECT: MATHEMATICS (BASIC)

TIME: 3 HOURS

MAX MARKS: 80

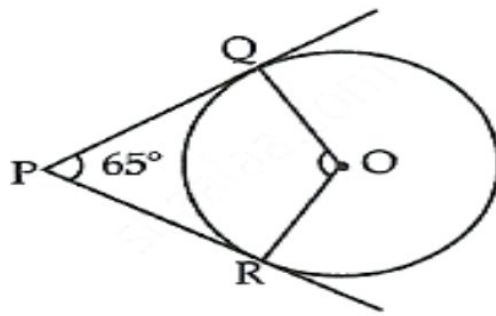
General Instructions:

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 common difference of an AP is -6, then value of $a_{20} - a_{14}$ is a) 36 b) 6 c) -36 d) -6	1
2	In the given figure, PQ and PR are tangents drawn from P to the circle with centre O such that $\angle QPR = 65^\circ$, the measure of $\angle QOR$ is –	1



- a) 65° b) 125° c) 115° d) 90°

3 If $2 \cos \theta = 1$, then the value of θ is-
 a) 60° b) 45° c) 30° d) 90°

4 For the following distribution

Marks Below	No. of students
10	1
20	5
30	13
40	15
50	16

The modal class is
 a) 30-40 b) 40-50 c) 20-30 d) 10-20

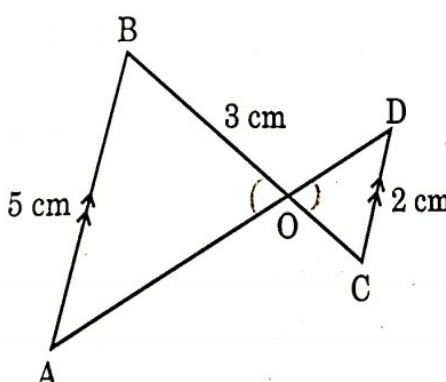
5 The pair of linear equations $x + 2y + 5 = 0$ and $-3x - 6y + 1 = 0$ has
 a) a unique solution b) exactly two solutions
 c) infinitely many solutions d) no solution

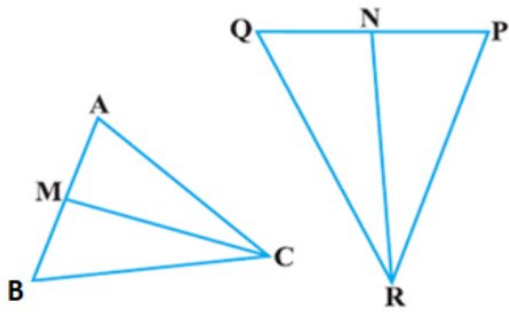
6 If $x = a \sin \theta$ and $y = b \cos \theta$ then $b^2 x^2 + a^2 y^2$ is equal to
 a) 1 b) $a^2 b^2$ c) $\frac{a^2 + b^2}{a^2 b^2}$ d) $a^2 + b^2$

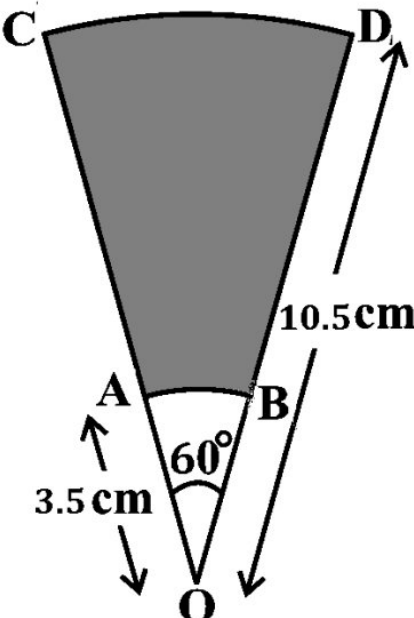
7 The volume of a cone of radius r and height $3r$ is
 a) $\frac{1}{3} \pi r^3$ b) $3 \pi r^3$ c) $9 \pi r^3$ d) πr^3

8 The sum and product of the zeros of the polynomial $p(x) = x^2 + 5x + 6$ are respectively
 a) 5, -6 b) -5, 6 c) 2, 3 d) -2, -3

9 The prime factorization of natural number 288 is

	a) $2^4 \times 3^3$	b) $2^4 \times 3^2$	c) $2^5 \times 3^2$	d) $2^5 \times 3^1$	
10	The two roots of the equation $3x^2 - 2\sqrt{6}x + 2$ are				1
	a) real and distinct	b) not real	c) real and equal	d) rational	
11	The distance between the points (3,0) and (0, - 3) is				1
	a) $2\sqrt{3}$ units	b) 6 units	c) 3 units	d) $3\sqrt{2}$ units	
12	Two cubes each of 5 cm edge are joined end to end. The surface area of the resulting cuboid is				1
	a) 200cm^2	b) 300cm^2	c) 125cm^2	d) 250cm^2	
13	A die is rolled once. The probability that a composite number comes up is				1
	a) $\frac{1}{2}$	b) $\frac{2}{3}$	c) $\frac{1}{3}$	d) 0	
14	Median and mode of a distribution are 25 and 21 respectively. Mean of the data using empirical relationship is				1
	a) 27	b) 29	c) 18	d) $\frac{29}{3}$	
15	The length of the arc of a circle of radius 14 cm which subtends an angle of 60° at the centre of the circle is				1
	a) $\frac{44}{3}$ cm	b) $\frac{88}{3}$ cm	c) $\frac{308}{3}$ cm	d) $\frac{616}{3}$ cm	
16	The zeros of the quadratic polynomial $16x^2 - 9$ are				1
	a) $\frac{3}{4}, \frac{3}{4}$	b) $-\frac{3}{4}, \frac{3}{4}$	c) $\frac{9}{16}, \frac{9}{16}$	d) $-\frac{3}{4}, -\frac{3}{4}$	
17	 <p>In the given figure, $AB \parallel CD$, if $AB = 5\text{cm}$, $CD = 2\text{cm}$ and $OB = 3\text{cm}$ then length of OC is</p>				
	a) $\frac{15}{2}$ cm	b) $\frac{10}{3}$ cm	c) $\frac{6}{5}$ cm	d) $\frac{3}{5}$ cm	1

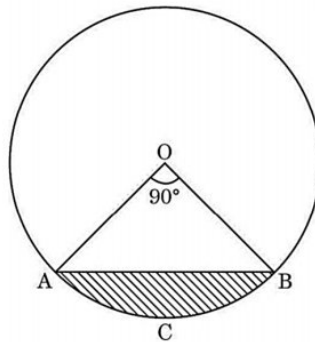
22	Find the HCF of the numbers 540 and 630 using the prime factorization method. OR Show that $(15)^n$ cannot end with digit 0 for any natural number n.	2
23	Three coins are tossed together: i) Write all possible outcomes. ii) Find the probability of having atmost 2 Heads.	2
24	Prove that $\sec\theta(1 - \sin\theta)(\sec\theta + \tan\theta) = 1$ OR Evaluate $\sin^2 60^\circ - 2\cos^2 45^\circ + \frac{1}{2} \operatorname{cosec}^2 30^\circ$	2
25	Find the centre and radius of a circle having end points of its diameter as (3, -10) and (1,4).	2
SECTION C		
Section C consists of 6 questions of 3 marks each.		
26	E is a point on the side AD produced of a parallelogram ABCD and BE intersects CD at F. Show that $\triangle ABE \sim \triangle CFB$ OR  In the given figure CM and RN are respectively the medians of $\triangle ABC$ and $\triangle PQR$, If $\triangle ABC \sim \triangle PQR$ then prove that $\triangle AMC \sim \triangle PNR$	3
27	Find the zeros of the quadratic polynomial $x^2 + 6x + 8$ and verify the relationship between the zeros and the coefficients.	3
28	Prove that $\frac{1 - \cos\theta}{1 + \cos\theta} = (\operatorname{cosec}\theta - \cot\theta)^2$	3
29	Prove that $4 + 2\sqrt{3}$ is an irrational number. Given that $\sqrt{3}$ is an irrational number. OR	3

	Prove that $\sqrt{5}$ is an irrational number.	
30	The diagonal of a rectangular field is 60 m more than the shorter side. If the longer side is 80 m more than the shorter side, find the length of the sides of the field.	3
31	AB and CD are arcs of two concentric circles of radii 3.5 cm and 10.5 cm respectively with centre at O. Find the area of shaded region if $\angle AOB = 60^\circ$. Also find the length of the arc CD.	3
		
SECTION D		
Section D consists of 4 questions of 5 marks each.		
32	Find the values of a and b for which the system of linear equations $3x + 4y = 12$ and $(a + b)x + 2(a - b)y = 24$ have infinitely many solutions. OR 5 chairs and 1 table together cost Rs 1750 while 4 chairs and 3 tables together cost Rs 1950. Find the cost of 1 chair and 1 table. What would be the total cost of 10 chairs and 10 tables?	5
33	Prove that the length of tangents drawn from an external point to a circle are equal. Using the above theorem prove that the parallelogram circumscribing a circle is a rhombus.	5

34	Prove that if a line is drawn parallel to one side of a triangle, to intersect the other two sides in distinct points then the other two sides are divided in the same ratio.	5																																
35	<p>Find the Mean and Median of the following data:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>MARKS</th> <th>NUMBER OF STUDENTS</th> </tr> </thead> <tbody> <tr> <td>0-10</td> <td>3</td> </tr> <tr> <td>10 -20</td> <td>5</td> </tr> <tr> <td>20-30</td> <td>16</td> </tr> <tr> <td>30-40</td> <td>12</td> </tr> <tr> <td>40 - 50</td> <td>13</td> </tr> <tr> <td>50-60</td> <td>20</td> </tr> <tr> <td>60-70</td> <td>6</td> </tr> <tr> <td>70-80</td> <td>5</td> </tr> </tbody> </table> <p style="text-align: center;">OR</p> <p>Find the Mean and Mode of the data given below:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>WEIGHT (in kg)</th> <th>NUMBER OF STUDENTS</th> </tr> </thead> <tbody> <tr> <td>40 – 45</td> <td>5</td> </tr> <tr> <td>45 – 50</td> <td>11</td> </tr> <tr> <td>50- 55</td> <td>20</td> </tr> <tr> <td>55-60</td> <td>24</td> </tr> <tr> <td>60-65</td> <td>28</td> </tr> <tr> <td>65-70</td> <td>12</td> </tr> </tbody> </table>	MARKS	NUMBER OF STUDENTS	0-10	3	10 -20	5	20-30	16	30-40	12	40 - 50	13	50-60	20	60-70	6	70-80	5	WEIGHT (in kg)	NUMBER OF STUDENTS	40 – 45	5	45 – 50	11	50- 55	20	55-60	24	60-65	28	65-70	12	5
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36	<p>Case Study -1</p> <p>Age of a tree: The most accurate way to determine the age of a tree is to count the annual rings of wood growth. One such trunk has been shown here.</p>	1 + 1 + 2																																



To make an identification mark, the forest department has painted segment ACBA. If chord AB makes an angle 90° at the centre and radius of the trunk is 21 cm, then find the :



- i) Length of chord AB.
- ii) Area of ΔOAB .
- iii) a) Area of segment ACBA.

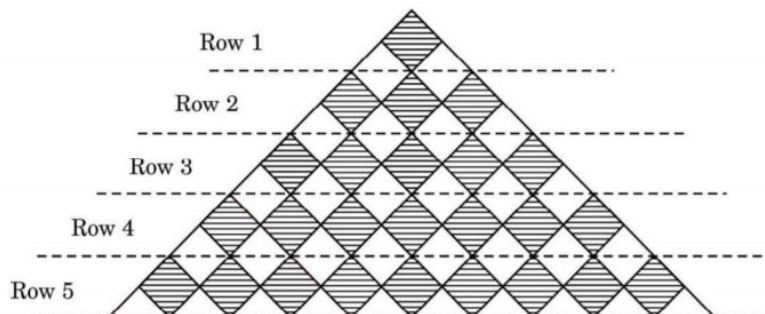
OR

- b) Perimeter of sector OACBO.

37

Case Study -2

A fashion designer is designing a fabric pattern. In each row, there are some shaded squares and unshaded triangles.



1 + 1 + 2

Based on the above, answer the following questions:

- i) Identify A.P. for the number of squares in each row.
- ii) Identify A.P. for the number of triangles in each row.
- iii) If the length of each shaded square is 2 cm, then find the shaded area when 15 rows have been designed.

OR

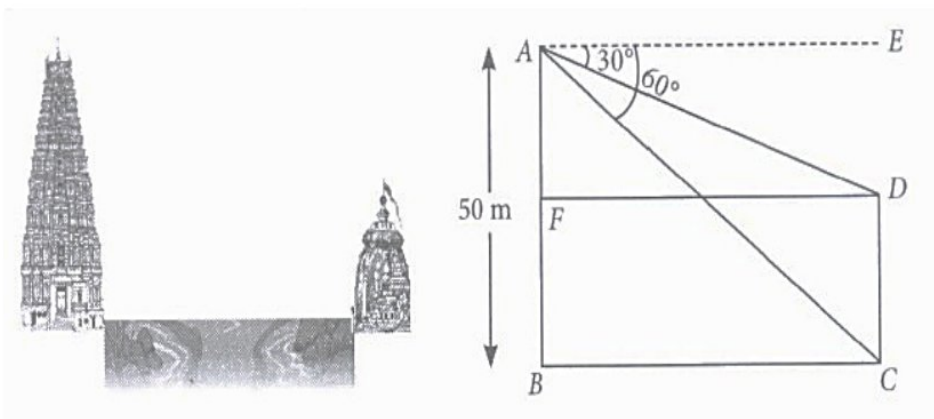
Write a formula for finding the total number of triangles in 'n' number of rows.
Hence, find S_{10} .

38

Case Study -3

There are two temples on each bank of a river. One temple is 50 m high. A man, who is standing on the top of 50 m high temple, observed from the top that angle of depression of the top and foot of another temple are 30° and 60° respectively.

1 + 1 + 2



Based on the above information, answer the following questions-

- i) Find the measure of $\angle ADF$.
- ii) Find the measure of $\angle ACB$.
- iii) Find the width of the river.

OR

Calculate the height of the other temple.