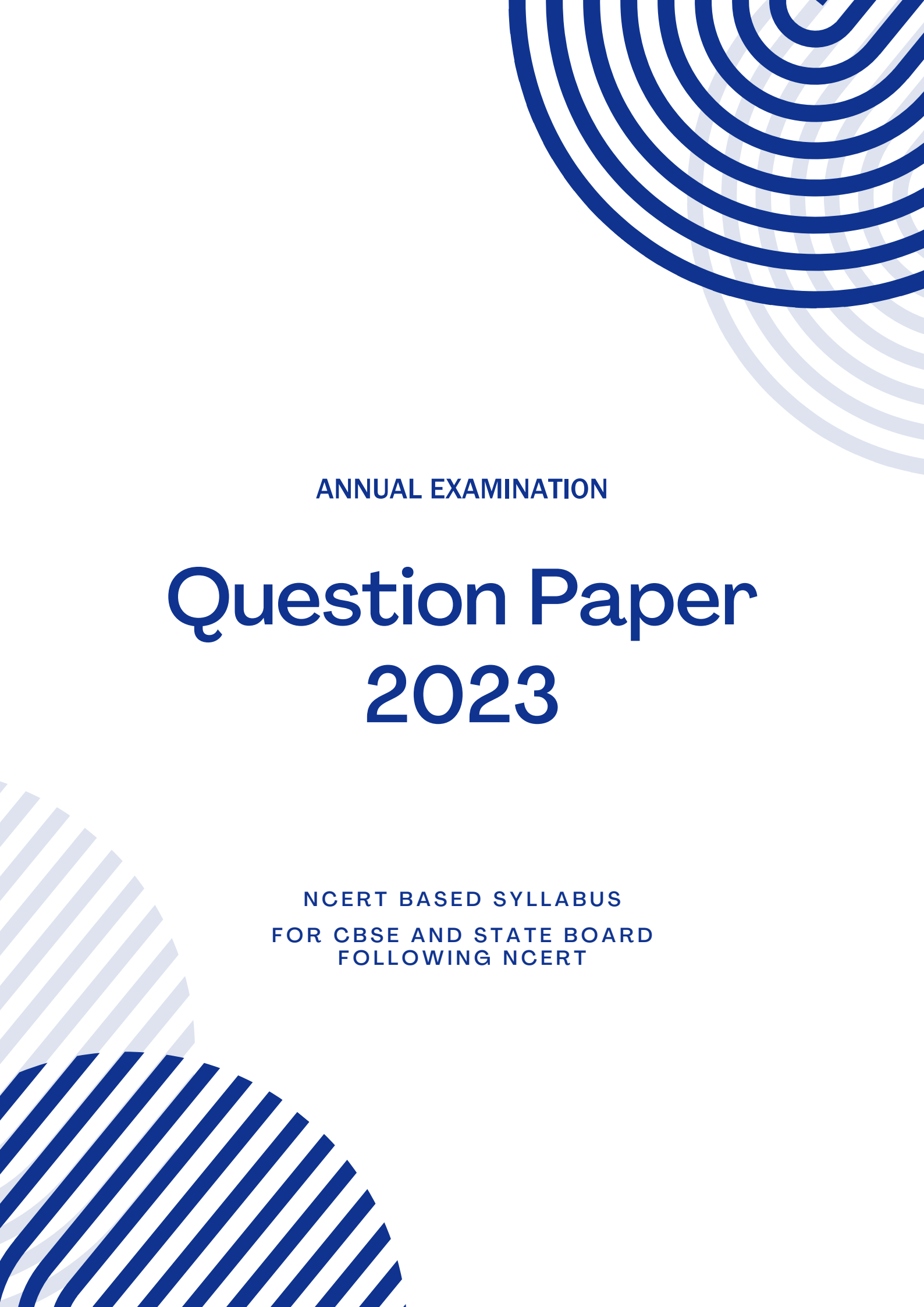




ANNUAL EXAMINATION

Question Paper 2023

NCERT BASED SYLLABUS
FOR CBSE AND STATE BOARD
FOLLOWING NCERT

Class - IX
Time - 3 Hours

Subject - Mathematics
Maximum Marks - 80

General Instruction:-

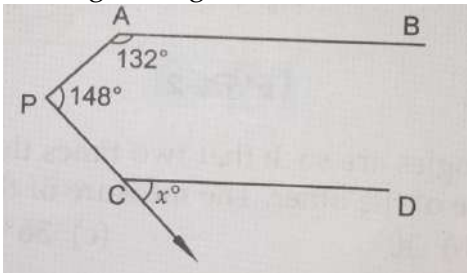
1. This question paper has 5 Sections A to E.
 2. Section A has 20 MCQs carrying 1 mark each.
 3. Section B has 5 questions carrying 2 marks each.
 4. Section C has 6 questions carrying 3 marks each.
 5. Section D has 4 questions carrying 5 marks each.
 6. Section E has 3 case based integrated units of assessment (04 marks each) with marks of the subparts indicated in each respectively.
 7. All questions are compulsory. However, an internal choice in 2 questions of 5 marks, 2 questions of 3 marks and 2 questions of 2 marks has been provided. 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.
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SECTION A

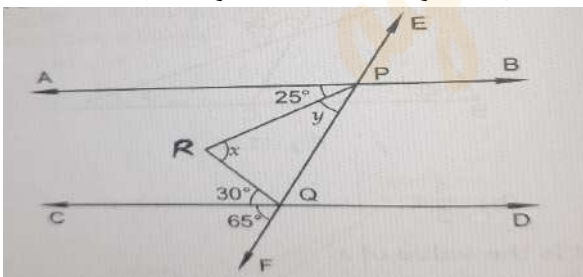
1. The value of $\sqrt{5 + 2\sqrt{6}}$ is :
 - a) $\sqrt{3} - \sqrt{2}$
 - b) $\sqrt{3} + \sqrt{2}$
 - c) $\sqrt{5} - \sqrt{6}$
 - d) $\sqrt{5} + \sqrt{6}$
2. If 0.142857142857.... is expressed in the form of $\frac{m}{n}$, then the value of $(2m+n)$ is :
 - a) 1
 - b) 2
 - c) 7
 - d) 9
3. The value of $\frac{(2.3)^3 - 0.027}{(2.3)^2 + 0.69 + .09}$ is :
 - a) 2
 - b) 3
 - c) 2.327
 - d) 2.273
4. The remainder when $x^3 + 3x^2 + 3x + 1$ is divided by $x - 1$ is :
 - a) -1
 - b) 8
 - c) -7
 - d) 3

5. If $x^2 + \frac{1}{x^2} = 102$, then the value of $x - \frac{1}{x}$ is :
- 8
 - 10
 - 12
 - 13
6. The distance between the graphs of the equation $y = -2$ and $y = 3$ is :
- 5
 - 1
 - 6
 - 1
7. The area of the triangle formed by the points A(2,0) , B(6,0) and C(4,6) is :
- 24 sq units
 - 12 sq units
 - 10 sq units
 - None of these

8. In the given figure if $AB \parallel CD$, then $x = ?$

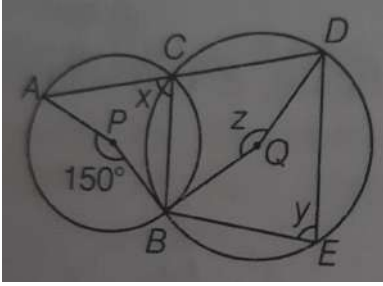


- 100°
 - 105°
 - 110°
 - 115°
9. In the given figure $AB \parallel CD$ and transversal EF intersects them at P and Q respectively. If $\angle APR = 25^\circ$, $\angle RQC = 30^\circ$ and $\angle CQF = 65^\circ$, then :

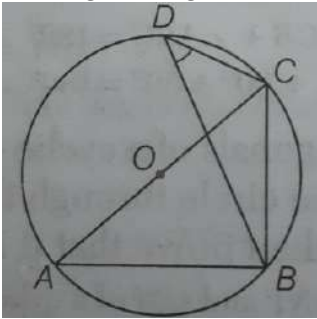


- $x = 55^\circ$, $y = 45^\circ$
 - $x = 55^\circ$, $y = 40^\circ$
 - $x = 65^\circ$, $y = 45^\circ$
 - $x = 65^\circ$, $y = 40^\circ$
10. The figure formed by joining the mid points of adjacent sides of a rectangle is a :
- Square
 - Rectangle
 - Rhombus
 - None of these

11. In the given figure, P and Q are centres of the two circles which intersect at B and C. ACD is a straight line. Find the values of x , y and z .



- a) $x=y=70^\circ$ and $z=140^\circ$
 b) $x=y=150^\circ$ and $z=75^\circ$
 c) $x=y=75^\circ$ and $z=150^\circ$
 d) $x=z=150^\circ$ and $y=75^\circ$
12. In the given figure, O is the centre of the circle and $\angle BDC=42^\circ$, then find the value of $\angle ACB$.



- a) 60°
 b) 42°
 c) 24°
 d) 48°
13. If each side of a triangle is tripled then the % change in its area is :
- a) 300%
 b) 500%
 c) 800%
 d) 200%
14. The length of three sides of a triangle are 18 cm, 24 cm and 30 cm, then the height corresponding to smallest side is :
- a) 24 cm
 b) 16 cm
 c) 12 cm
 d) 32 cm
15. The vertical cross section of a right circular cylinder is always a :
- a) square
 b) rectangle
 c) rhombus
 d) trapezium

16. A cone, a hemisphere and a cylinder stand on equal bases and have the same height. The ratio of their volumes is :
- 1:2:3
 - 2:1:3
 - 2:3:1
 - 3:2:1
17. The mean of a,b,c,d and e is 28. If the mean of a,c and e is 24, what is the mean of b and d?
- 32
 - 33
 - 34
 - 4
18. A die is thrown 100 times. If the probability of getting an even number is $\frac{2}{5}$. How many times an odd number is obtained?
- 15
 - 30
 - 45
 - 60

DIRECTION: In the question number 19 and 20 , a statement of Assertion (A) is followed by a statement of Reason (R).Choose the correct option :

19. **Assertion (A):** An irrational number can't be represented on a real number line.
Reason (R): Irrational numbers are real numbers.
- Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
 - Both assertion (A) and reason (R) are true and reason (R) is **not** the correct explanation of assertion (A).
 - Assertion (A) is true but reason (R) is false.
 - Assertion (A) is false but reason (R) is true.
20. **Assertion (A):** Let a pair of parallel lines be intersected by a transversal. Then the bisectors of a pair of co-interior angles on the same side of the transversal enclose a right angle.
- Reason (R):** The angle between the bisectors of any two interior angles of a triangle is equal to $90^\circ + \text{half the } 3^{\text{rd}} \text{ angle}$.
- Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)
 - Both assertion (A) and reason (R) are true and reason (R) is **not** the correct explanation of assertion (A)
 - Assertion (A) is true but reason (R) is false.
 - Assertion (A) is false but reason (R) is true.

SECTION B

21. Simplify : $\frac{4+3\sqrt{5}}{4-3\sqrt{5}} + \frac{4-3\sqrt{5}}{4+3\sqrt{5}}$.
22. Express y in terms of x in the equation $2x + 3y = 12$. Find the point where
 (i) the line cuts the x - axis .
 (ii) the line cuts the y - axis .
23. If lines PQ, PR , PS and PT are parallel to a line 'l' then what can be said about the points P, Q, R, S and T? Explain by drawing figure.

OR

State Euclid's fifth postulate and explain how it implies the existence of parallel lines.

24. The height and the slant height of a cone are 21 cm and 28 cm respectively. Find the volume of the cone.

OR

The paint in a certain container is sufficient to paint an area equal to $9.375m^2$. How many bricks of dimensions 22.5 cm X 10 cm X 7.5 cm can be painted out of this container?

25. The mean of 50 observations was found to be 80.4. But later on, it was discovered that 96 was misread as 69. Find the correct mean ?

SECTION C

26. It is given that $\angle ABC = 60^\circ$ and AB is produced to a point P. Draw a figure from the given information. If ray BQ bisects $\angle CBP$, then find $\angle ABQ$ and reflex $\angle QBP$.

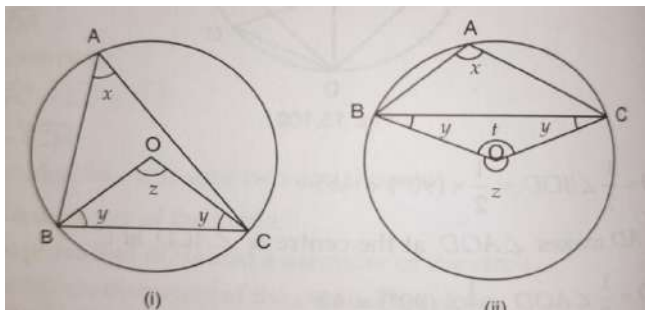
OR

ABCDE is a regular pentagon and bisectors of $\angle BAE$ meet CD at M. If bisectors of $\angle BCD$ meets AM at P, then find $\angle CPM$?

27. Three girls Reshma, Salma and Mandip are playing a game by standing on a circle of radius 5 m drawn in a park. Reshma throws a ball to Salma, Salma to Mandip and Mandip to Reshma. If the distance between Reshma and Salma and between Salma and Mandip is 6 m each, What is the distance between Reshma and Mandip?
28. D and E are respectively, the points on equal sides AB and AC of an isosceles triangle ABC such that B, C, E and D are concyclic. If O is the point of intersection of CD and BE, prove that AO is the perpendicular bisector of line segment DE.

OR

BC is a chord of a circle with centre O. A is a point on an arc BC as shown in the figure.



Prove that:

(i) $\angle BAC + \angle OBC = 90^\circ$ if A is a point on the major arc.

(ii) $\angle BAC - \angle OBC = 90^\circ$ if A is a point on the minor arc.

29. Water flows out through a circular pipe whose internal diameter is 2 cm. The water is collected in a cylindrical vessel of base diameter 1.2 m. The water level rises by 3 m in 30 minutes. Find the speed of water flow through the pipe.

30. ABCD is a trapezium in which $AB \parallel DC$, $AB = 18$ cm, $BC = 30$ cm, $CD = 46$ cm and $AD = 26$ cm. Find the area of the trapezium.

31. The table shows the number of people visiting the "Good living pavilion" in a trade fair during different times of the day.

Time	9am-11am	11am-1pm	1pm-3pm	3pm-5pm	5pm-7pm
No. of people	175	125	225	200	120

Find the probability that the randomly chosen person visited the pavilion :

(i). After 1 pm but before 5 pm

(ii). Between 9 am to 1 pm.

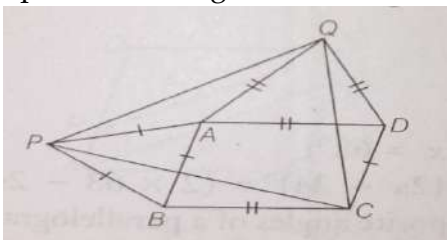
(iii). After 5 pm.

SECTION D

32. (i) The polynomial $f(x) = ax^3 - 3x^2 + 4$ and $g(x) = 2x^3 - 5x + a$ when divided by $(x-2)$ and $(x-3)$ leave the remainders p and q respectively. If $p-2q=4$, then find the value of a. [3]

(ii) Prove that $a^2 + b^2 + c^2 - ab - bc - ca$ is always non-negative for all values of a, b and c. [2]

33. In the parallelogram ABCD of the given figure, $\angle PAQ$ is an obtuse angle. Two equilateral triangles ABP and ADQ are drawn outside the parallelogram. Prove that $\triangle CPQ$ is also an equilateral triangle.



OR

ABCD is a rectangle and P, Q, R and S are mid - points of the sides AB, BC, CD and DA respectively. Show that the quadrilateral PQRS is a rhombus .

34. The difference between outside and inside curved surface areas of a cylindrical metallic pipe 21 cm long is 66 cm^2 . If the pipe is made of $181\frac{1}{2} \text{ cm}^3$ of metal, find the outer and inner radii of the pipe.

OR

The external length, breadth and height of a closed rectangular wooden box are 18 cm, 10 cm and 6 cm respectively and thickness of wood is $\frac{1}{2} \text{ cm}$. When the box is empty, it weighs 15 kg and when filled with sand it weighs 100 kg. Find the weight of 1 cubic cm of wood and 1 cubic cm of sand.

35. The following table gives the distribution of students of two sections according to the marks obtained by them.

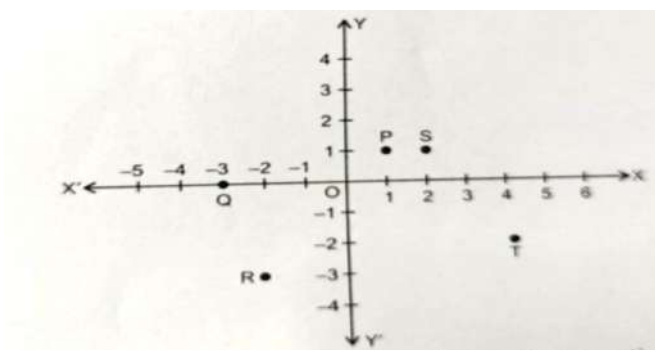
SECTION A		SECTION B	
MARKS	Frequency	MARKS	Frequency
0-10	3	0-10	2
10-20	5	10-20	1
20-30	2	20-30	3
30-40	7	30-40	11
40-50	10	40-50	15
50-60	13	50-60	9
60-70	8	60-70	6
70-80	2	70-80	3

Represent the marks of the students of both the sections on the same graph by two frequency polygons.

SECTION-E

Case study based questions are compulsory. (Questions 36-38)

36. Five friends playing a game in which they are standing at different position, P, S, T, R and Q. On the basis of the given graph, answer the following questions:

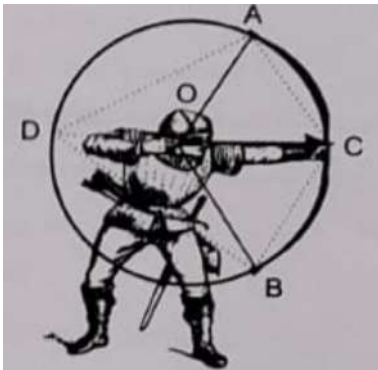


- (i) Name the point whose y - coordinate is zero: [1]
- (ii) Name the polygon formed on joining all these five points in an order: [1]
- (iii) Find the distance between friend P and T. [2]

OR

- (iii) Who is at farthest distance from P. Justify.

37. In the given figure a sports person is trying to shoot an arrow from his bow which is in the shape of an arc of a circle with centre O and radius 14 cm. A and B are the end points of the bow and C is the point where the arrow touches the bow. D is a point on the circle such that DC is a diameter. Answer the following questions:

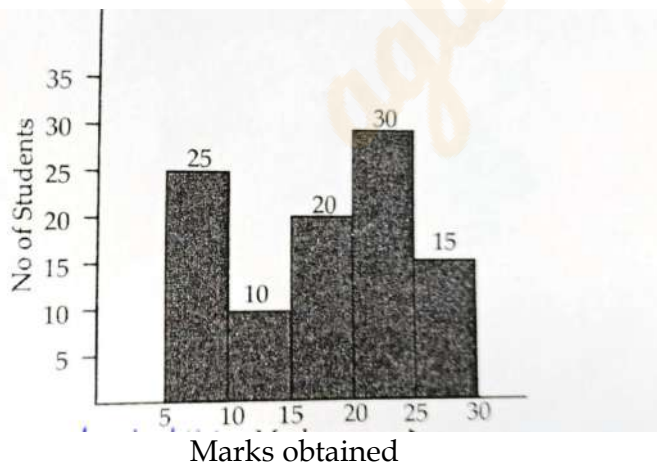


- (a) Find the length of chord AB if AB and OC bisect each other. [2]

OR

- (a) If $DC = 14$ cm and $AC = 7$ cm, find AD. [1]
- (b) If $\angle AOB = 110^\circ$, find $\angle ACB$. [1]
- (c) If $\angle AOC = 55^\circ$, find $\angle OAC$. [1]

38. Given below is the bar graph indicating the mark obtained out of 30 in science paper by 100 students. Study the following graph and answer the following questions:



- (i) What is the probability of students getting less than 20 marks? [1]
- (ii) What is the probability of students belonging to the highest marks group? [1]
- (iii) What is probability of students getting more than 20 marks. [2]

OR

- (iii) What is the probability of students getting at most 15 marks