FINAL EXAMINATION-2024
SUBJECT MATHEMATICS
(SET I)

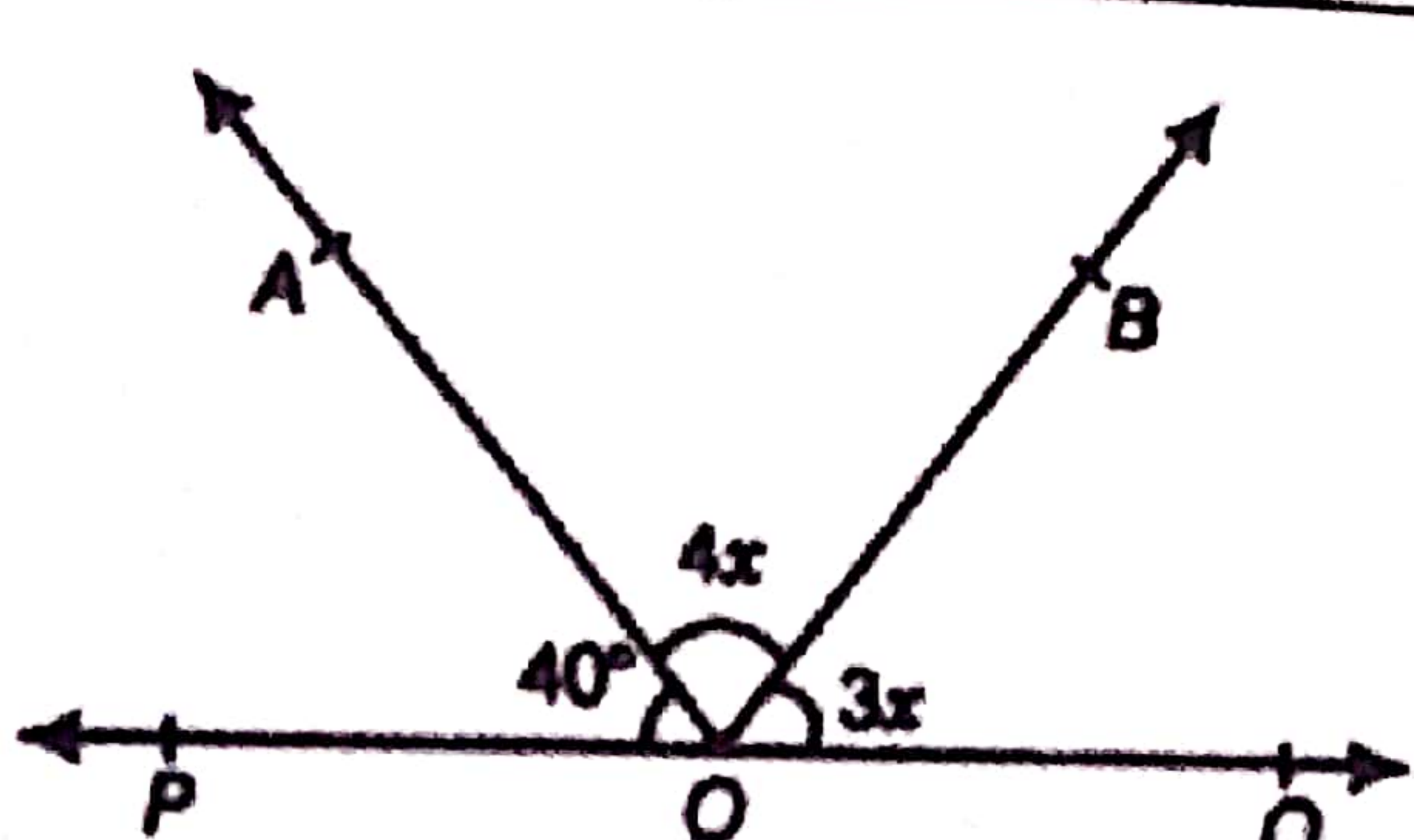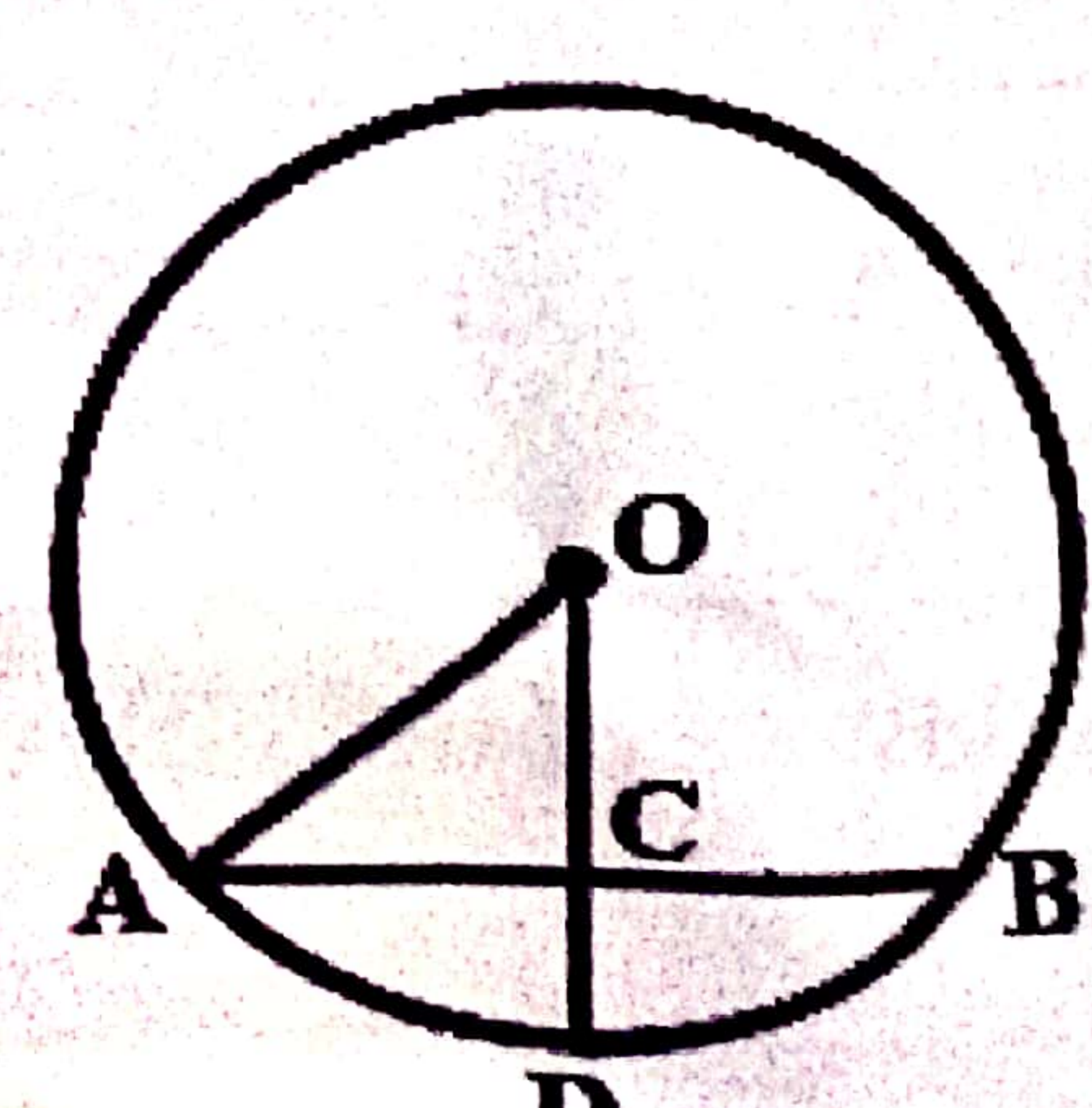**Time Allowed: 3 hrs.**   **M. M.: 80**
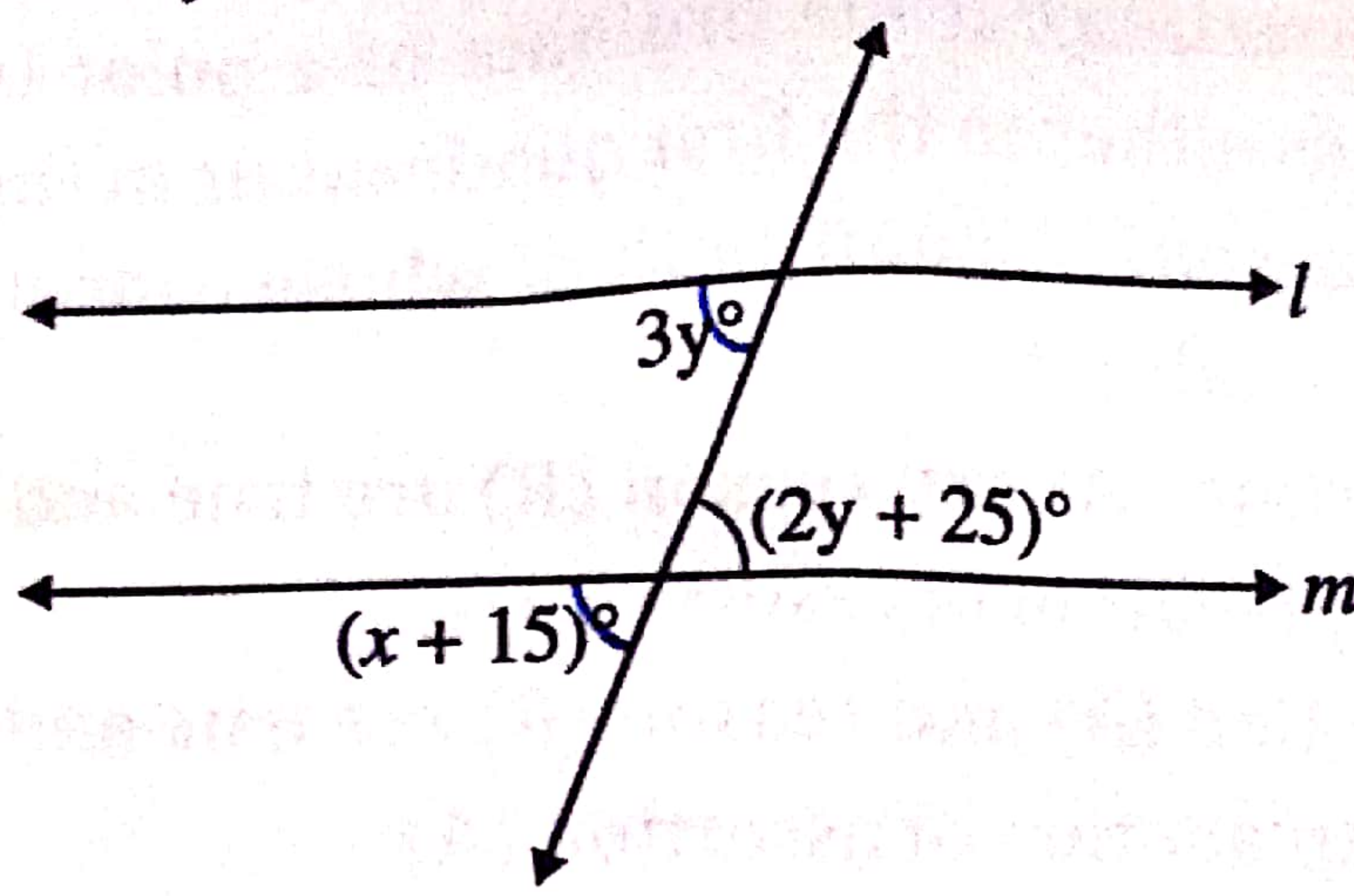
Instructions:

1. This Question Paper has 5 Sections A-E.
2. Section A has 20 MCQs carrying 01 mark each
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 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 in 2 Qs of 5 marks, 2 Qs 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 $\pi = 22/7$ wherever required if not stated.

SECTION A
Section A consists of 20 questions of 1 mark each.
1. If $p(x) = x + 4$, then $p(x) + p(-x) = $_____ a) $2x$ b) 0   c) 4   d) 8
2. The value of x in $\quad 3 + 2^x = 64^{\frac{1}{2}} + 27^{\frac{1}{3}}$ is a) 14   b) 8   c) 5   d) 3
3. The degree of the polynomial $(x^3 - 2)(x^2 - 11)$ is a) 6   b) 5   c) 3   d) 2
4. The things which are double of the same things are a) Equal b) Halves of the same thing c) Unequal d) Double of the same thing

5.	In the figure, POQ is a line. The value of x is a) 25° b) 30° c) 20° d) 35°	
6.	If the radius of the base of a right circular cone is '$3r$' and its height is equal to the radius of the base, then its volume is a) $\frac{1}{3}\pi r^3$ b) $\frac{2}{3}\pi r^3$ c) $3\pi r^3$ d) $9\pi r^3$	
7.	Which of the following is an irrational number? a) 3.14 b) 3.141414.... c) 3.1444444.... d) 3.14114111411114....	
8.	The graph of linear equation $2x - y = 4$ cuts the x-axis at the point a) (2,0) b) (−2,0) c) (0, −4) d) (0,4)	
9.	In an isosceles triangle, if the vertex angle is twice the sum of the base angles ,then the measure of the vertex angle of the triangle will be a) 100° b)120° c)110° d)130°	
10.	In the given figure, if OA $= 5$ cm, AB $= 8$ cm and OD is perpendicular to AB, then the length of CD is a) 2 cm b) 3 cm c) 4 cm d) 5 cm	
11.	In a frequency distribution, the Class Mark of a class interval is 10 and the width of the class interval is 6. The lower limit of the class interval is a) 6 b) 7 c) 8 d) 12	

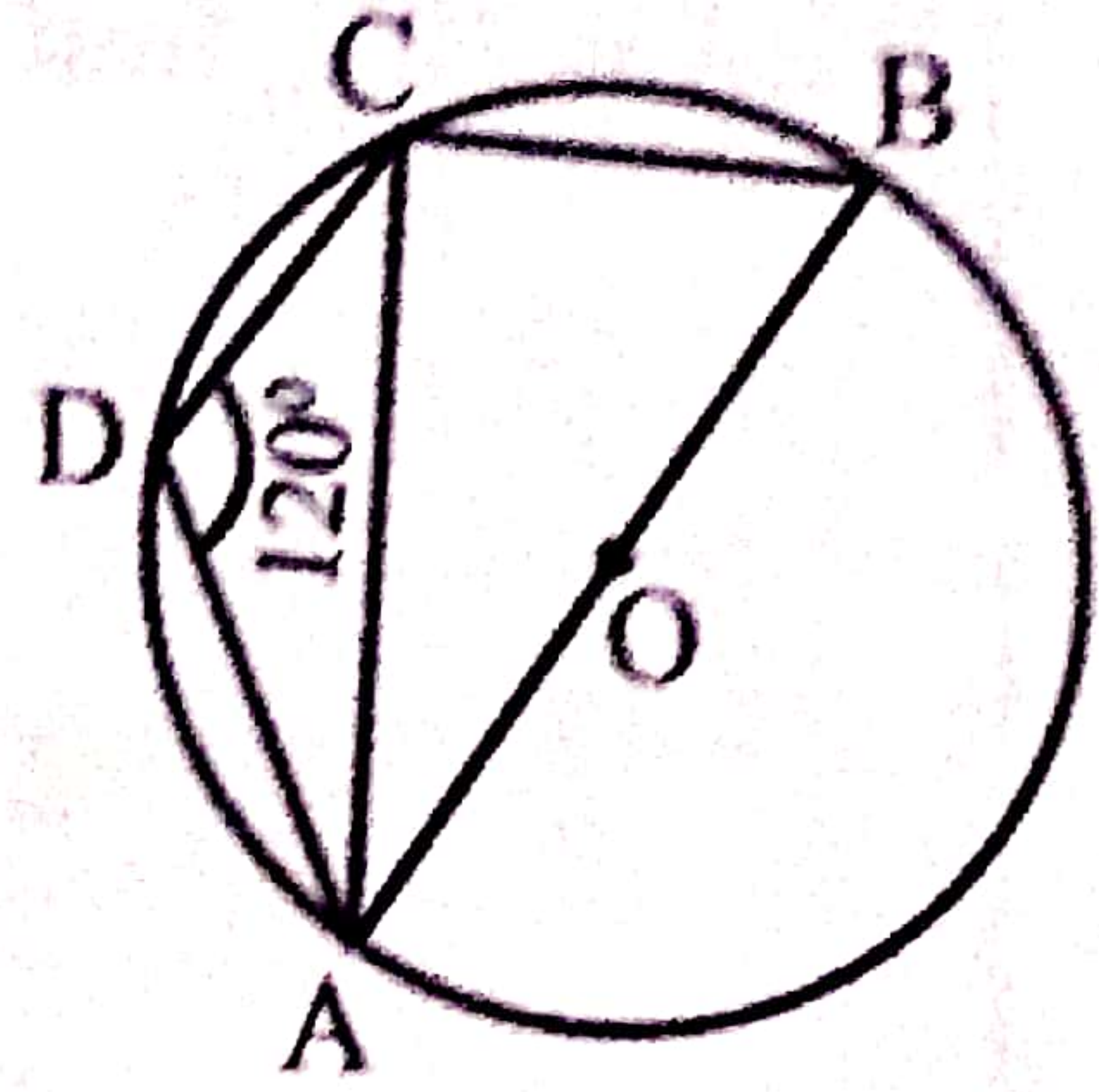|	
12.	In the given figure, if l || m, the value of x is a) 60 b) 50 c) 45 d) 30 $3y°$ l $(2y+25)°$ m $(x+15)°$
13.	The measure of an angle is five times its complement. The angle measures a) 25° b) 35° c) 75° d) 65°
14.	In quadrilateral PQRS, if $\angle P = 60°$ and $\angle Q : \angle R : \angle S = 2 : 3 : 7$, then $\angle S =$ a) 210° b) 175° c) 150° d) 135°
15.	In a parallelogram ABCD, if $\angle DAB = 75°$ and $\angle DBC = 60°$, then $\angle BDC =$ a) 75° b) 60° c) 45° d) 55°
16.	The length of each side of an equilateral triangle having an area of $4\sqrt{3}\ cm^2$ is a) 4cm b) $\dfrac{4}{\sqrt{3}}$ cm c) $\dfrac{\sqrt{3}}{4}$ cm d) 3cm
17.	In a bar graph, 0.25 cm length of a bar represents 100 people. Then, the length of bar which represents 2000 people is a) 4.5 cm b) 4 cm c) 5 cm d) 3.5 cm
18.	The base of an isosceles right triangle is 30 cm. Its area is a) $225\ cm^2$ b) $225\sqrt{5}\ cm^2$ c) $225\sqrt{2}\ cm^2$ d) $450\ cm^2$

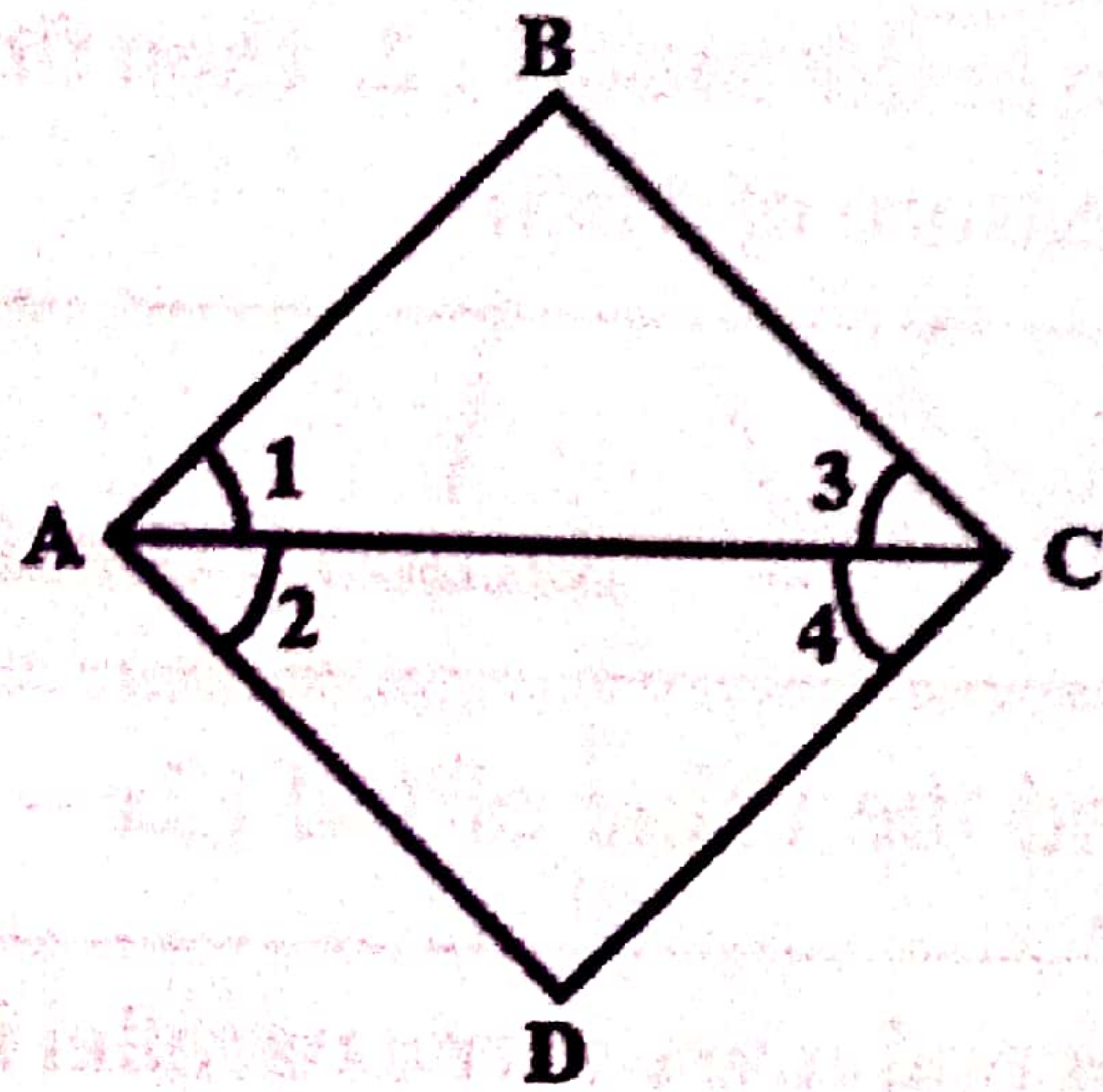| 19	**DIRECTION:** In question number 19 and 20, a statement of **Assertion (A)** is followed by a statement of **Reason (R)**: Choose the correct option
	Statement A (Assertion): If the ordinate of a point is equal to its abscissa, then the point lies either in the first quadrant or in the third quadrant.
	Statement R (Reason) : A point, both of whose coordinates are negative will lie in the fourth quadrant
	(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.
20	*Statement A (Assertion):* If $x = 2k + 1$ and $y = k$ is a solution of the equation $3x - 5y - 7 = 0$, then the value of k is 10.
	Statement R(Reason): A linear equation in two variables has infinitely many solutions.
	(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 for (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.
	SECTION B Section B consists of 5 questions of 2 marks each.
21	A cone has a slant height that is 7 times the radius of the cone. If the curved surface area of the cone is 792m², find the radius and slant height of the cone.

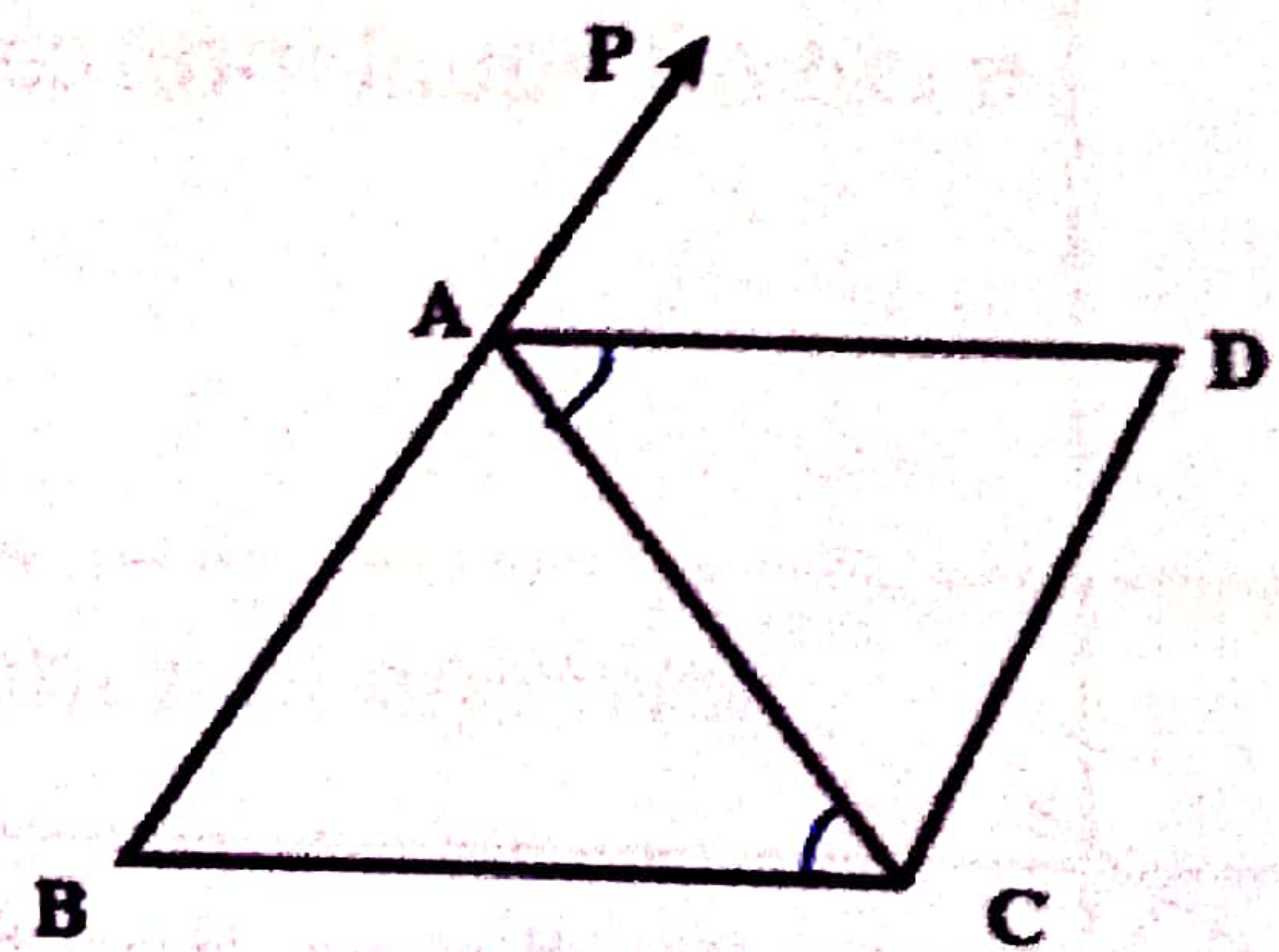|	
22.	In the given figure, AOB is the diameter of the circle and ABCD is a cyclic quadrilateral. If ∠ADC = 120°, then find the measure of ∠BAC
23	In the given figure, if ∠1=∠3 and ∠2=∠4. Prove that ∠A=∠C
24	ABC is an isosceles triangle in which AB = AC. AD bisects exterior ∠PAC as shown in the figure. Prove that ∠DAC = ∠BCA OR Prove that a diagonal of a parallelogram divides it into two congruent triangles.

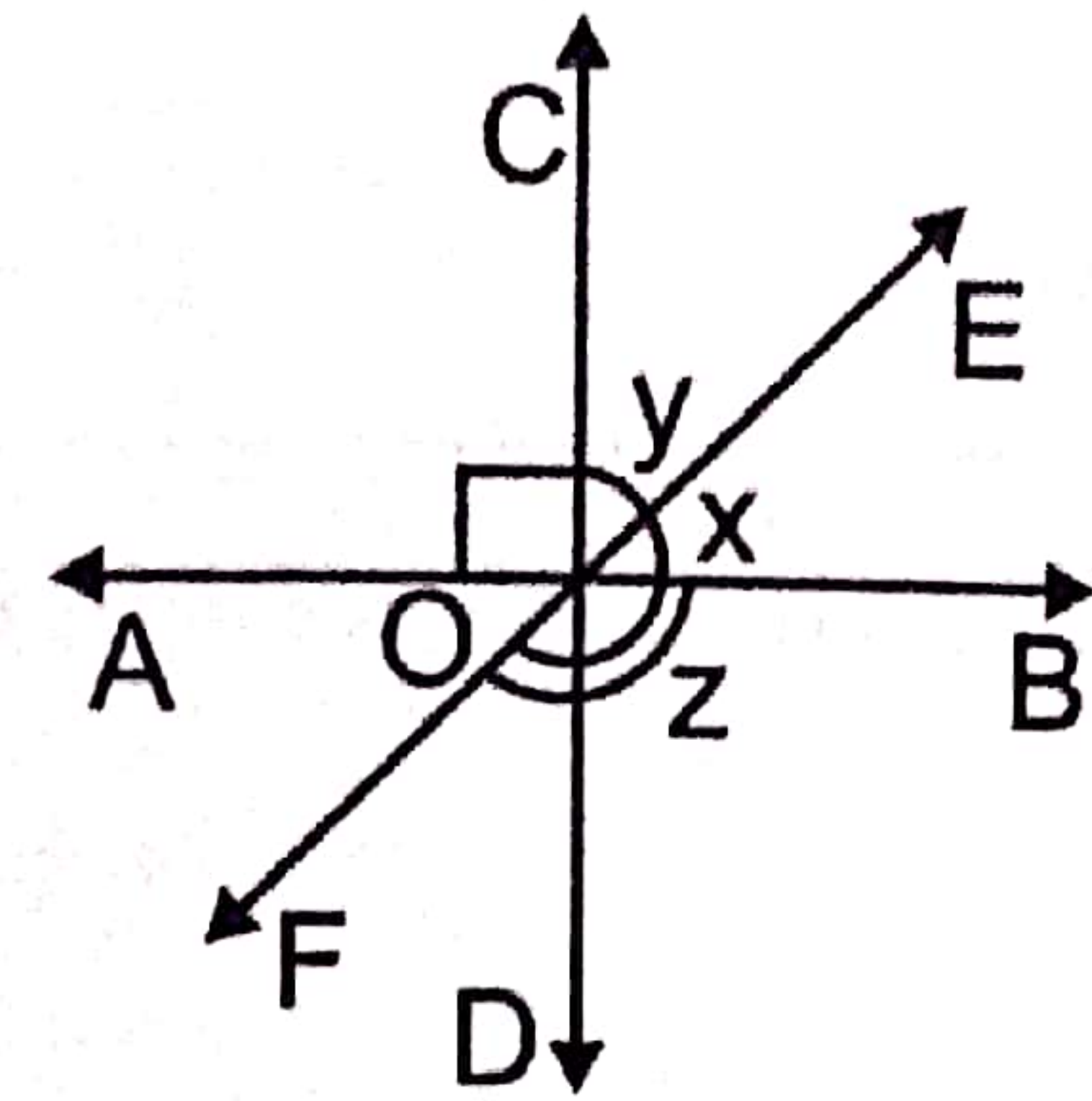|	
25.	In $\triangle ABC$, the angle bisectors of $\angle B$ and $\angle C$ meet at point O. If $\angle A = 72°$, find measure of $\angle BOC$.
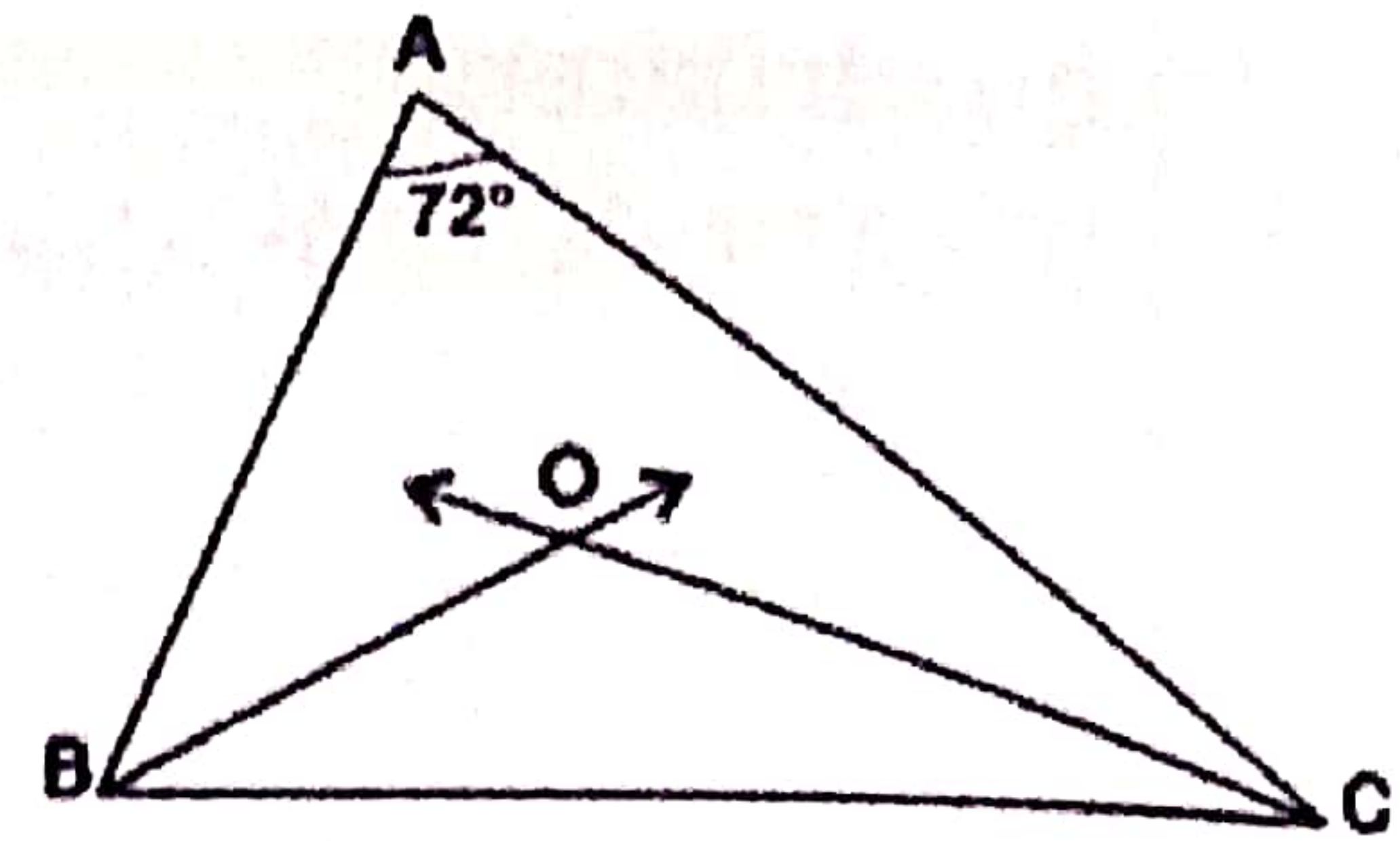
OR

In the given figure, lines AB, CD and EF meet at point O. If $\angle AOC = 90°$ and angles x and y are in the ratio $3 : 2$, then find the measure of $\angle BOF$

SECTION C

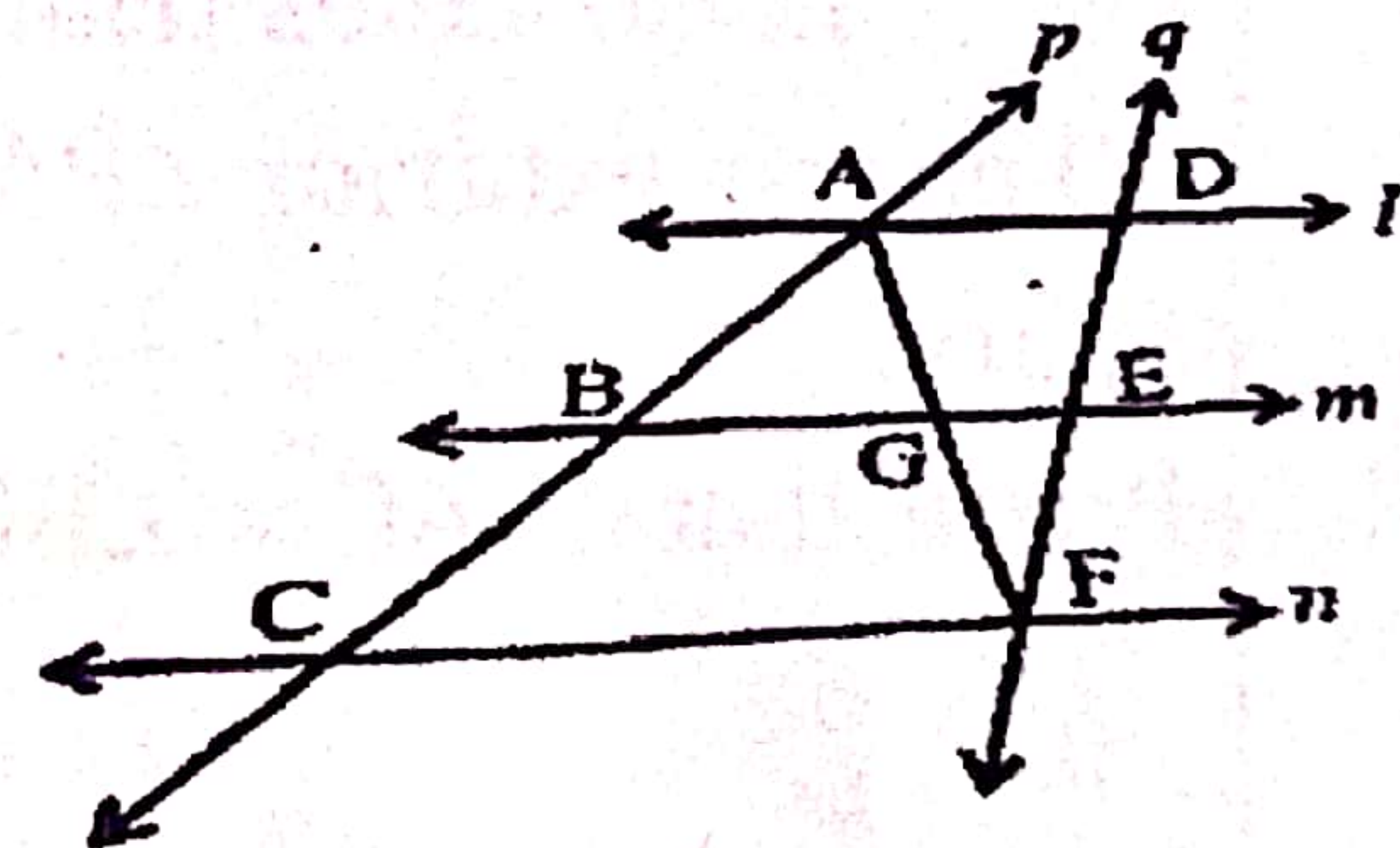### Section C consists of 6 questions of 3 marks each.

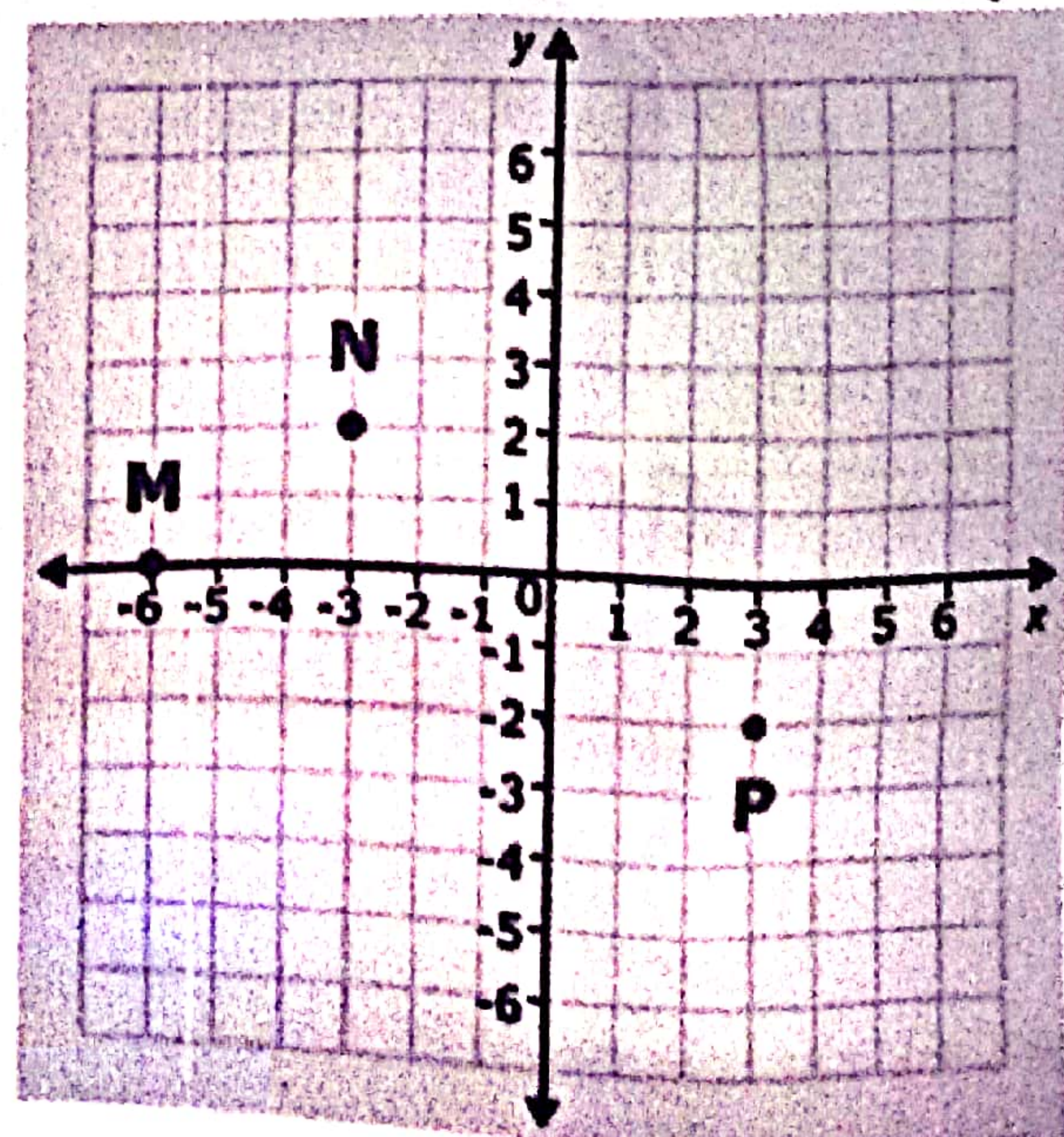|	
26	Find the value of k if $(2x - 3)$ is a factor of $2x^3 - kx^2 + x + 12$
27	l, m and n are three parallel lines intersected by transversals p and q such that l, m and n cut off equal intercepts AB and BC on p. Show that l, m and n cut off equal intercepts DE and EF on q also
28	(1+2) From the figure, find the following: (i) Coordinates of point M (ii) Value of [2(Ordinate of P)−Abscissa of N]

29 In an isosceles $\triangle ABC$ with $AB = AC$, D and E are points on BC such that $BE = CD$. Prove that $AD = AE$
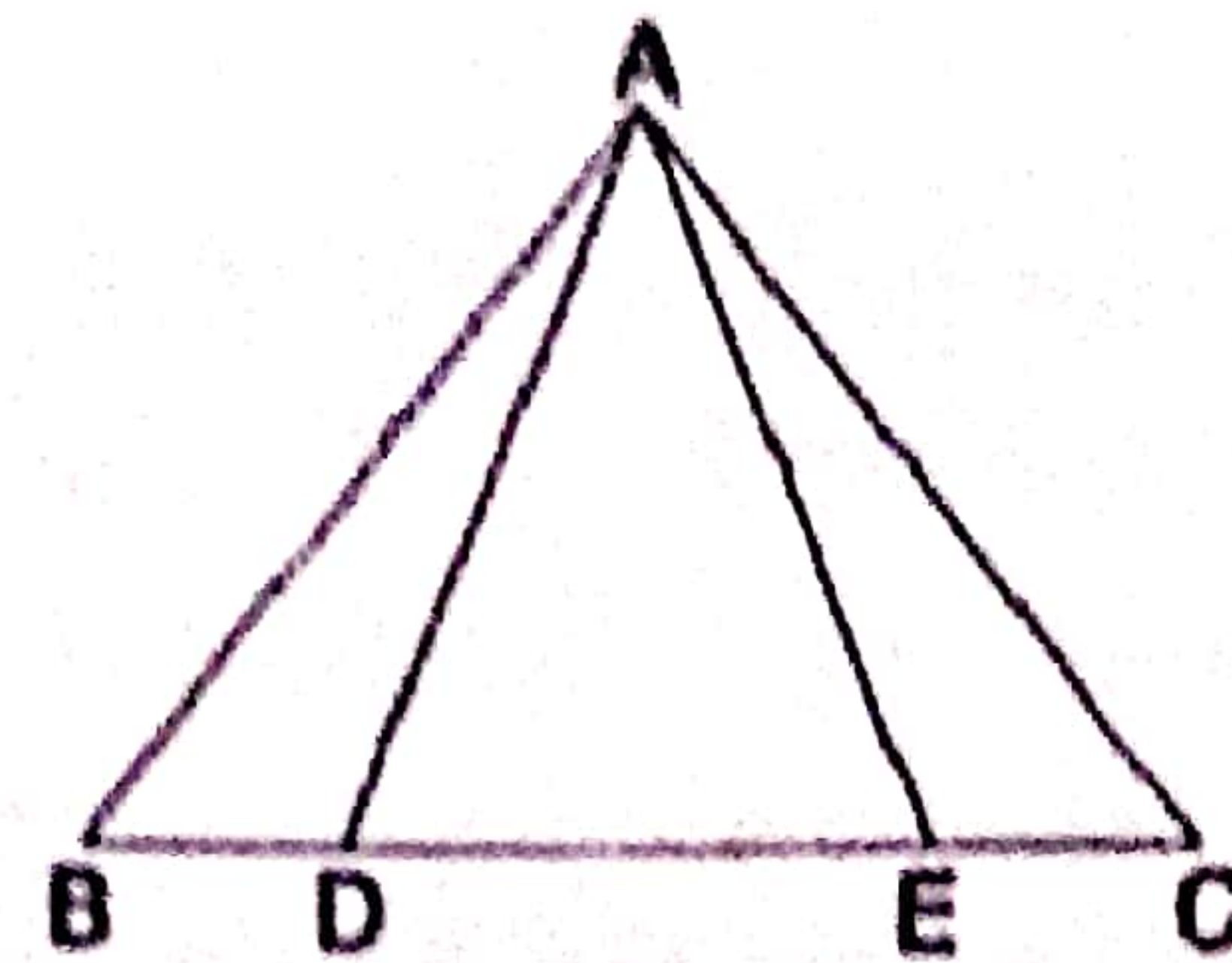
OR

In the figure, $AC = AE$, $AB = AD$ and $\angle BAD = \angle EAC$. Prove that $BC = DE$.
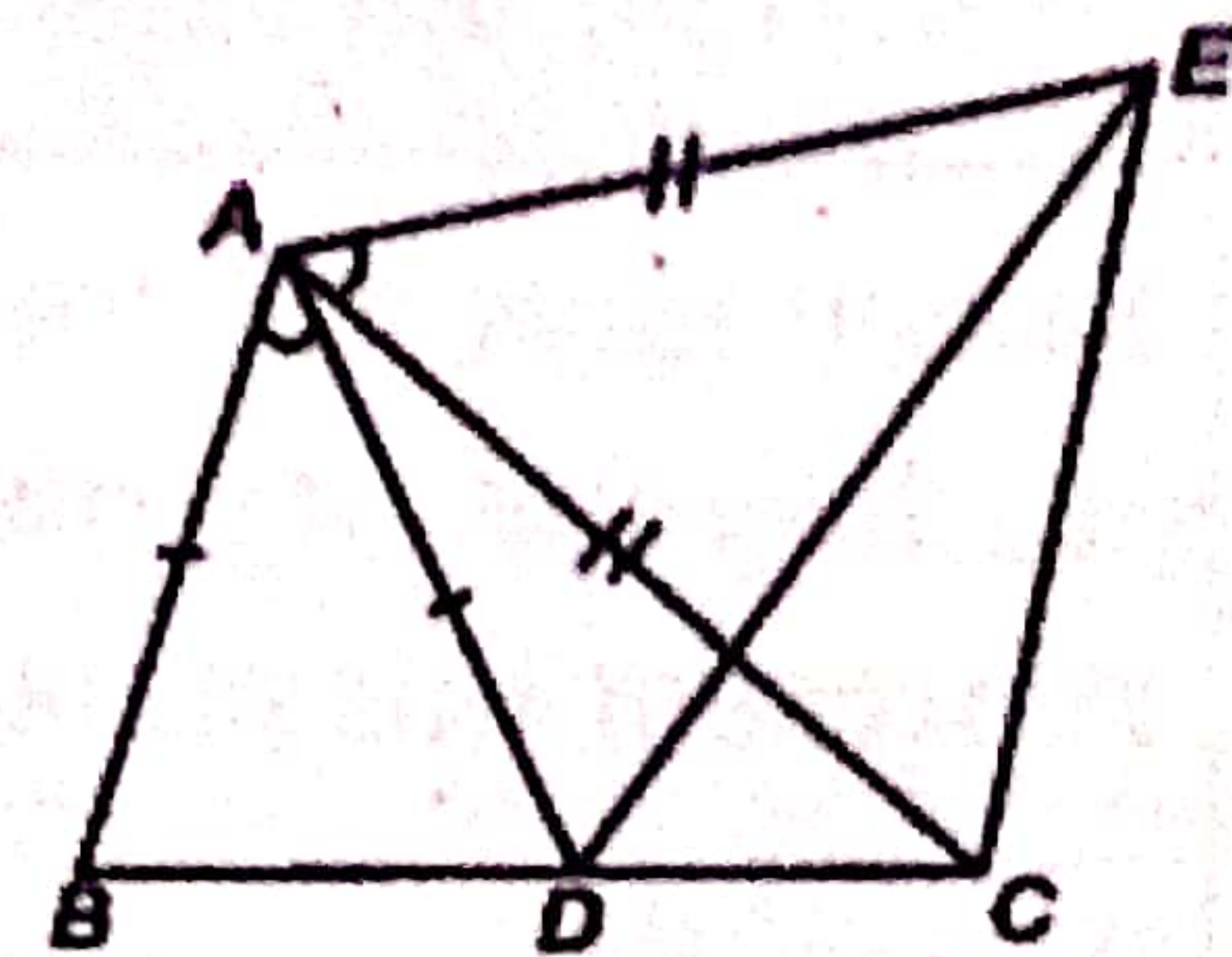
30 Simplify :

$$\left(\frac{x^{2p}}{x^{2q}}\right)^{\frac{1}{2pq}} \cdot \left(\frac{x^{2q}}{x^{2r}}\right)^{\frac{1}{2qr}} \cdot \left(\frac{x^{2r}}{x^{2p}}\right)^{\frac{1}{2rp}}$$

OR

If $p = 5 - 2\sqrt{6}$, find $p^2 + \dfrac{1}{p^2}$

31. (i) For what value of p; $x = 2, y = 3$ is a solution of equation $(p+1)x - (2p+3)y - 1 = 0$?

Also write the equation of the given line .

(ii) Find the coordinates of the point, which lies on the above line with ordinate as zero. $(2+1)$

SECTION D

Section D consists of 4 questions of 5 marks each

32 Simplify: $\dfrac{7\sqrt{3}}{\sqrt{10}+\sqrt{3}} - \dfrac{2\sqrt{5}}{\sqrt{6}+\sqrt{5}} - \dfrac{3\sqrt{2}}{\sqrt{15}+3\sqrt{2}}$

33	Factorize: $2x^3 - 9x^2 + x + 12$
	OR
	If the polynomial $f(x) = px^3 + 4x^2 + 3x - 4$ and $g(x) = x^3 - 4x + p$ are divided by $x - 3$, then the remainder in each case is the same. Find the value of p. Also find the remainder.
34	Prove that the angle subtended by an arc at the centre is double the angle subtended by it at the remaining part of the circle.
	OR
	If non parallel sides of a trapezium are equal, prove that it is cyclic.
35.	Sakshi pays ₹44 for 4 pens and 12 pencils. If the cost of a pen and a pencil is ₹x and ₹y respectively, write a linear equation in two variables to represent this statement and draw its graph.

SECTION E
Case study based questions are compulsory.

36.	In Agra in a grinding mill, there were installed 5 types of mills. These mills used steel balls of radius 5 mm, 7 mm, 10 mm, 14 mm and 16 mm respectively. All balls were in the spherical shape. For repairing purposes mills need 10 balls of 7 mm radius and 20 balls of 3.5 mm radius. The workshop had 20000 mm³ steel. This 20000 mm³ steel was melted and 10 balls of 7 mm radius and 20 balls of 3.5 mm radius were made and the remaining steel was stored for future use.
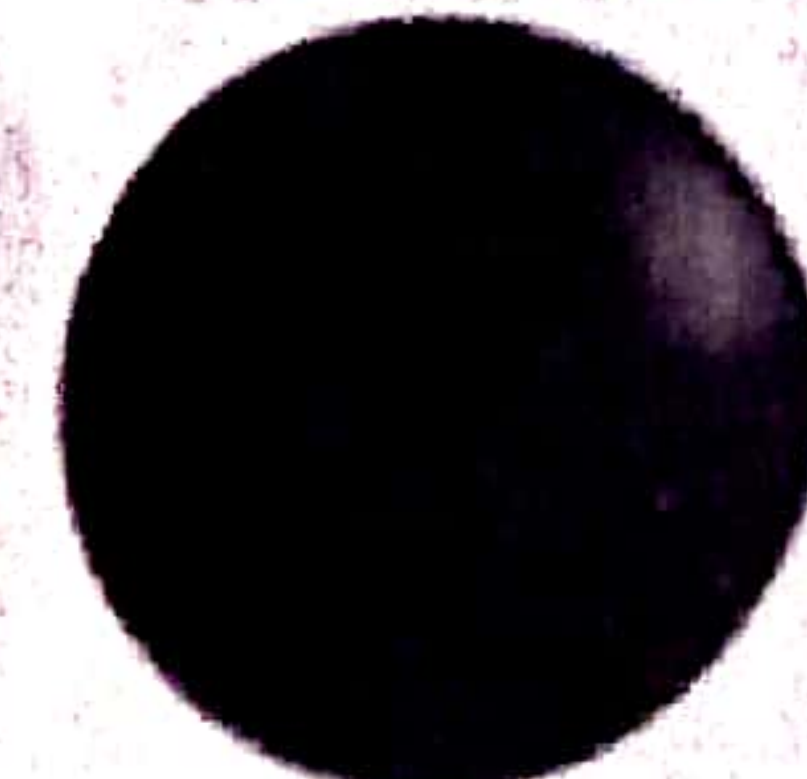
(i) What is the volume of a ball of radius 3.5mm? (1)
(ii) Find the volume of a ball of radius 7mm? (1)
(iii) How much steel was kept for future use ? (2)

OR

(iii) Find the total surface area of 10 balls of 7 mm radius and
20 balls of 3.5 mm radius.

37. In an effort to provide high-quality and safe playgrounds for kids, reputable manufacturers adhere to the playground safety guidelines set forth by the Indian Consumer Product Safety Commission (CPSC) and the Indian Society for Advancement of Materials And Processing Engineering (ISAMPE).

These organizations set the guidelines for determining the types of playground equipment that is appropriate for kids within specific age groups: 1-2 years, 2-3 years, 3-5 years, 5-7 years, 7-10 years, 10-15 years, and 15-17 years.

A random survey of the number of children of various age groups playing in a park was found as follows:

Age (in years)	$1-2$	$2-3$	$3-5$	$5-7$	$7-10$	$10-15$	$15-17$
No. of Children	5	3	6	12	9	10	4

(i) What is the difference between the maximum and minimum class size in the above distribution? (1)

(ii) How many children playing in the park are below the age of 3 years? (1)

(iii) What is the sum of the class marks of the third and seventh Class Interval? (2)

OR

(iii) To draw the histogram for the above distribution, what is the adjusted frequency for the class $7-10$?

38. Under Swachh Bharat Mission, a school management suggested teachers as well as students to organize Marathon Running on 2nd October in memory of Mahatma Gandhi. Both teachers and students of the school made a gathering for the spotlessness drive. They walked throughout the following paths in two groups. First group walked through the paths PQ, QR and RP whereas the second group went through PR, RS and SP (As shown in figure). Then they ran over the area enclosed within their paths.

If PQ = 7m, QR = 24m, RS =18m, SP = 13m and $\angle Q = 90°$.
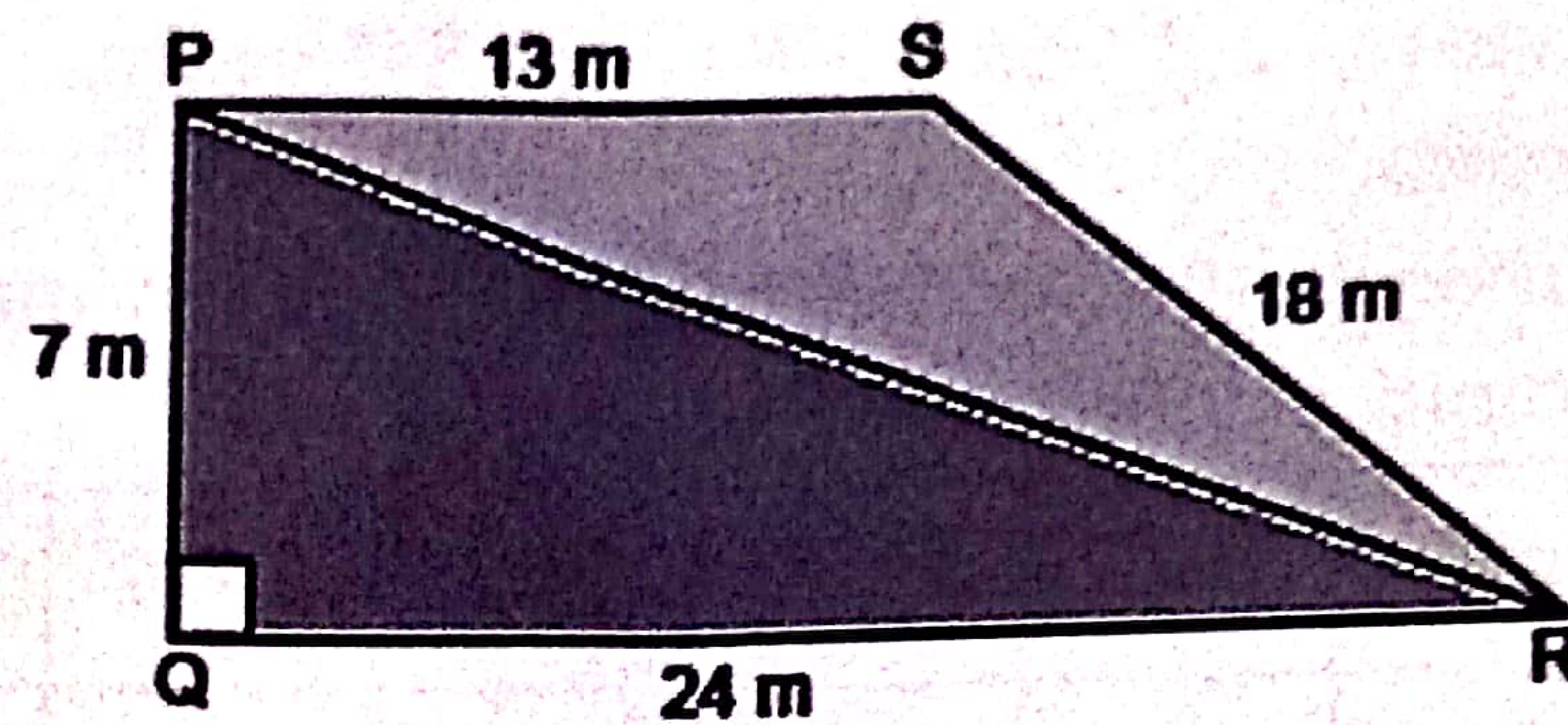
Analyze the above information and answer the following questions:

(i) What is the perimeter of triangle PRS? (1)

(ii) Find the area of triangle PQR in which the first group is running Marathon? (1)

(iii) How much area is covered by the second Group triangle PRS?

(Use $\sqrt{14} = 3.74$) (2)

OR

(iii) Find the cost of fencing the path PRS of group 2 with barbed wire at the rate of ₹19 per metre leaving a space 3m wide for a gate on one side.