

No. of Printed Pages : 11

Set-A

Roll No.

PRE BOARD-II, 2023-24

MG-140

MATHEMATICS

Time : 3 hrs.]

Class X

[M.M. : 80

General Instructions—

- (i) This question paper contains five sections A, B, C, D and E.
- (ii) Section A has 18 MCQs and 02 Assertion-Reason based questions of 1 mark each.
- (iii) Section B has 5 Very Short Answer (VSA) type questions of 2 marks each.
- (iv) Section C has 6 Short Answer (SA) type questions of 3 marks each.
- (v) Section D has 4 Long Answer (LA) type questions of 5 marks each.
- (vi) 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.
- (vii) 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. An internal choice has been provided in the 2 marks questions of Section E.

SECTION-A

1. If α and β are the zeroes of the polynomial $f(x) = px^2 - 2x + 3p$ and $\alpha + \beta = \alpha\beta$, then the value of p is :

(a) $\frac{-2}{3}$

(b) $\frac{2}{3}$

(c) $\frac{1}{3}$

(d) $\frac{-1}{3}$

2. The value of l for which the system of equations $lx + y = l^2$ and $x + ly = 1$ has infinitely many solutions is :

(a) 1

(b) 2

(c) 3

(d) 4

P. T. O.

3. The sum of n terms of the series $\sqrt{3} + \sqrt{12} + \sqrt{27} + \sqrt{48} + \dots$ is

(a) $\frac{2n(n+1)}{\sqrt{3}}$

(b) $\frac{\sqrt{3}n(n-1)}{2}$

(c) $\frac{\sqrt{3}n(n+1)}{2}$

(d) $\frac{2n(n-1)}{\sqrt{3}}$

4. If in $\triangle ABC$ and $\triangle DEF$, $\frac{AB}{DE} = \frac{BC}{FD}$ then they will be similar, when :

(a) $\angle B = \angle E$

(b) $\angle A = \angle D$

(c) $\angle B = \angle D$

(d) $\angle A = \angle F$

5. The equation $(x^2+1)^2 - x^2 = 0$ has :

(a) four real roots

(b) two real roots

(c) no real roots

(d) one real roots

6. If $\tan \theta + \cot \theta = 2$, then $\tan^{2020}(\theta) + \cot^{2020}(\theta) =$

(a) 0

(b) 2

(c) 2020

(d) 2^{2020}

7. (x, y) is 5 units from the origin. How many such points lie in the third quadrant ?

(a) 0

(b) 1

(c) 2

(d) Infinitely many

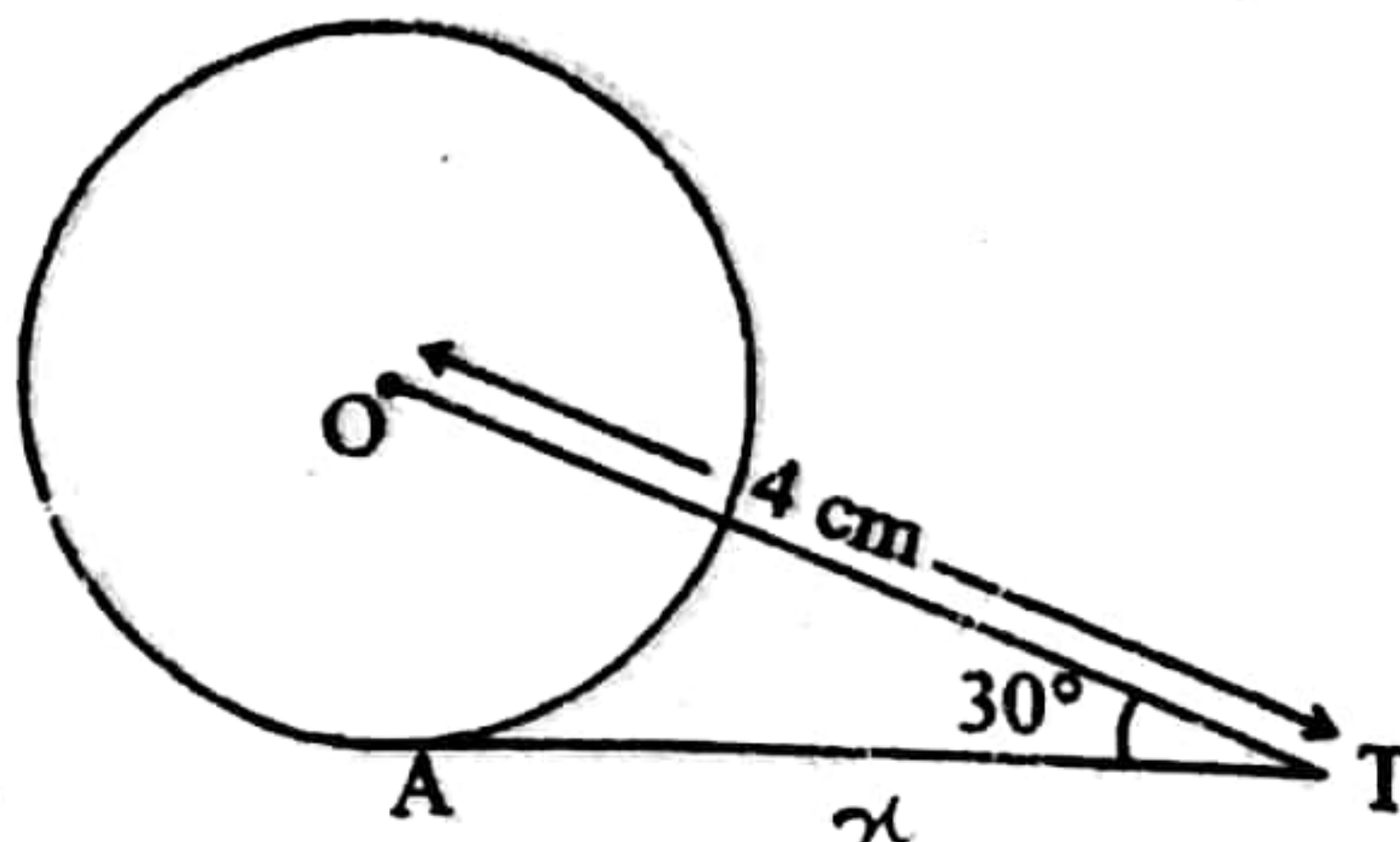
8. AT is a tangent to the circle with centre O such that $OT = 4$ cm and $\angle OTA = 30^\circ$ then the length of tangent AT is :

(a) 4 cm

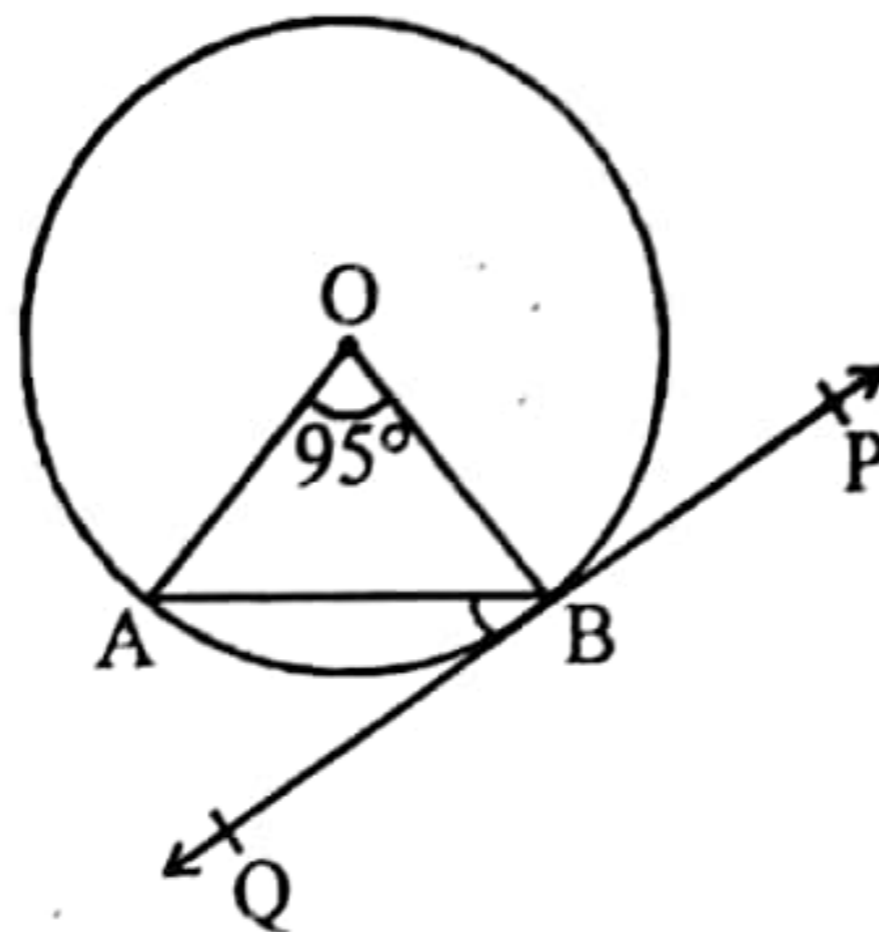
(b) 2 cm

(c) $2\sqrt{3}$ cm

(d) $4\sqrt{3}$ cm

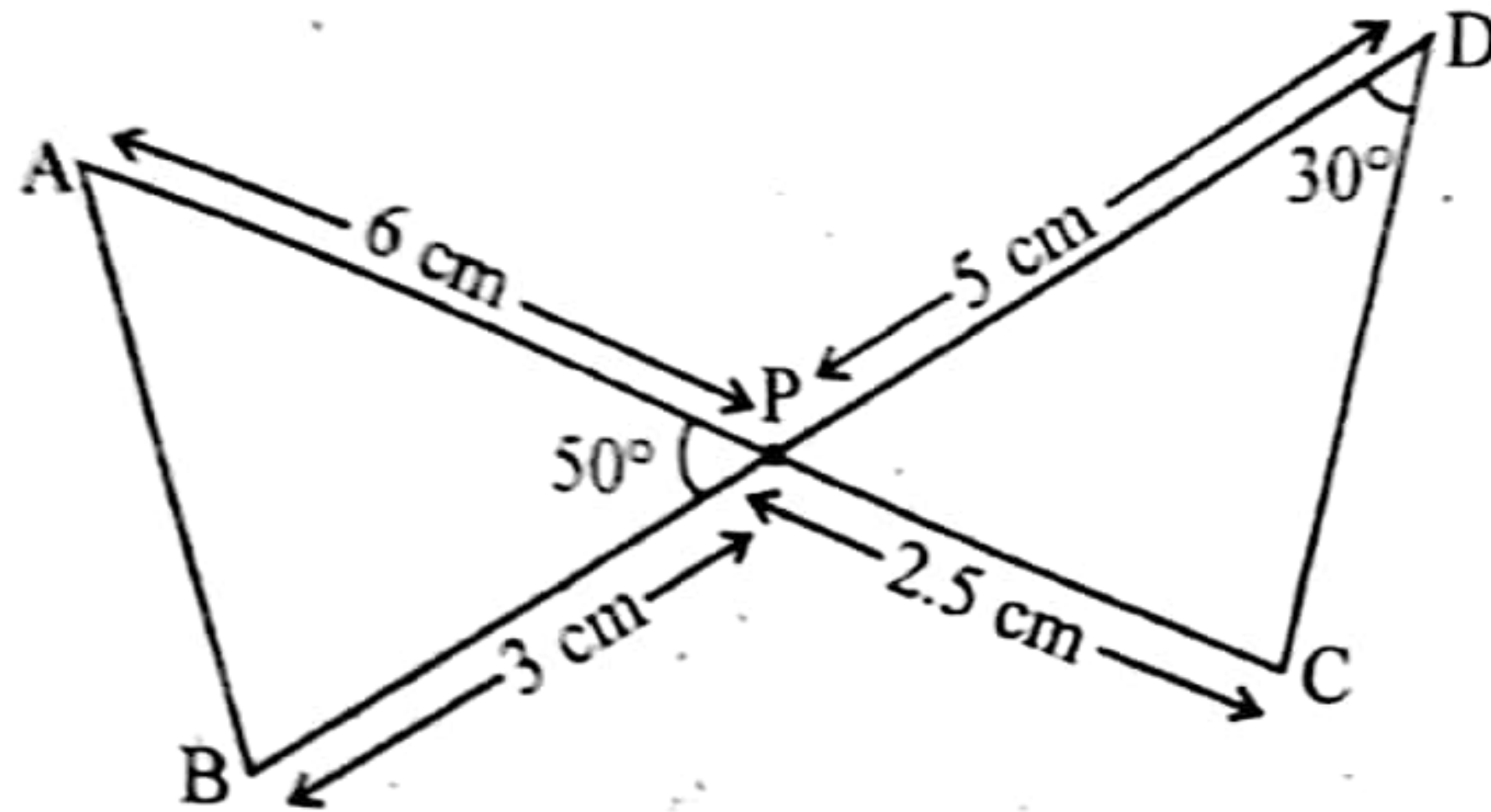


9. The radius of the base and height of a cone are 4 cm and 9 cm respectively. If its height is decreased and base radius is increased each by 2 cm, then the ratio of the volume of the new cone to that of the original cone is :
- (a) 5 : 2 (b) 7 : 4
 (c) 9 : 2 (d) 8 : 3
10. If for a data, Mean : Median = 9 : 8, then Median : Mode =
- (a) 8 : 9 (b) 4 : 3
 (c) 7 : 6 (d) 5 : 4
11. In the given figure, PQ is tangent to the circle centred at O. If $\angle AOB = 95^\circ$, then the measure of $\angle ABQ$ will be :

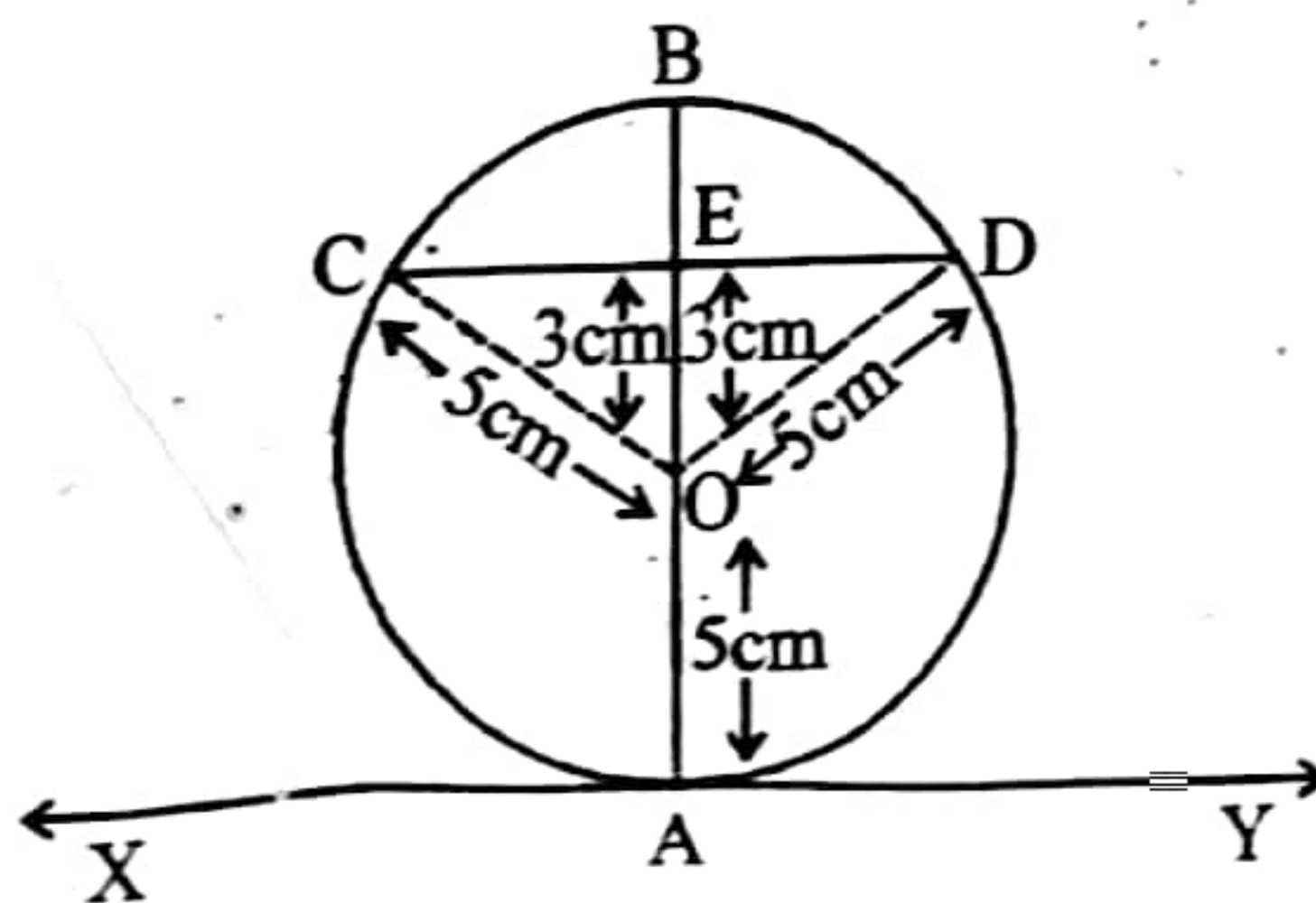


- (a) 47.5° (b) 42.5°
 (c) 85° (d) 95°
12. If $\sqrt{3} \cot^2 \theta - 4 \cot \theta + \sqrt{3} = 0$, then the value of $3(\cot^2 \theta + \tan^2 \theta)$ is :
- (a) 15 (b) 7
 (c) 10 (d) 4
13. In figure, two line segments AC and BD intersect each other at the point P such that PA = 6 cm, PB = 3 cm, PC = 2.5 cm, PD = 5 cm, $\angle APB = 50^\circ$ and $\angle CDP = 30^\circ$. Then $\angle PBA$ is equal to :
- (a) 50° (b) 30°
 (c) 60° (d) 100°

$\frac{3\cos^2 + 3\sin^2}{\sin^2 \cos^2}$
 $\frac{3}{\sin^2 \cos^2}$



14. The first three terms of an AP respectively are $3y-1$, $3y+5$ and $5y+1$. Then, y equals :
- (a) -3 (b) 4
 (c) 5 (d) 2
15. A card is drawn at random from a well shuffled pack of 52 cards. The probability that the card drawn is neither a red card nor a queen is :
- (a) $\frac{1}{13}$ (b) $\frac{12}{13}$
 (c) $\frac{1}{26}$ (d) $\frac{6}{13}$
16. At one end A of a diameter AB of a circle of radius 5 cm, tangent XAY is drawn to the circle. The length of the chord CD parallel to XY and at a distance 8 cm from A is :



- (a) 4 cm (b) 5 cm
 (c) 6 cm (d) 8 cm

17. A number is selected from numbers 1 to 25. The probability that it is prime is :

- (a) $\frac{2}{3}$ (b) $\frac{1}{6}$ (c) $\frac{9}{25}$ (d) $\frac{5}{6}$

18. What is the lower limit of the class just preceding the median class of the following data if median is 34 ?

Marks obt.	0-10	10-20	20-30	30-40	40-50
No. of students	12	15	18	55	10

- (a) 10 (b) 20
(c) 30 (d) 18

19. **Assertion (A)** : The point $(-1, 6)$ divides the line segment joining the points $(-3, 10)$ and $(6, -8)$ in the ratio $2 : 7$ internally.

Reason (R) : Three points A, B and C are collinear if $AB + BC = AC$.

- (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. **Assertion (A)** : A number N when divided by 15 gives the remainder 2. Then the remainder is same when N is divided by 5.

Reason (R) : $\sqrt{3}$ is an irrational number.

- (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.

SECTION-B

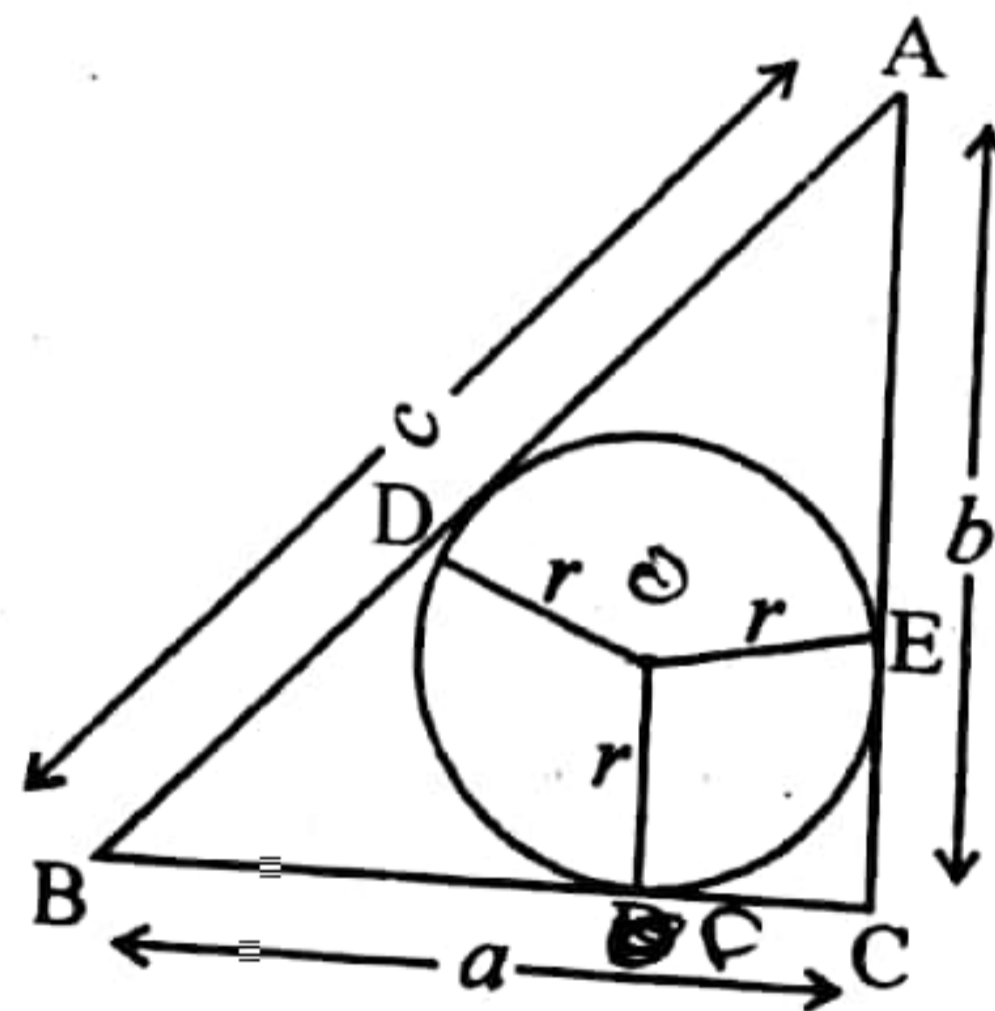
21. If the point $C(-1, 2)$ divides internally the line segment joining the points A and $B(x, y)$ in the ratio of $3 : 4$, find the value of $x^2 + y^2$.

OR

If the distances of $P(x, y)$ from $A(5, 1)$ and $B(-1, 5)$ are equal, then prove that $3x = 2y$.

22. If a, b, c are the sides of a right triangle where C is the hypotenuse, prove that the radius r of the circle which touches the sides of the triangle is given by

$$r = a + b - \frac{c}{2}$$



23. On a morning walk, three persons step out together and their steps measure 36 cm, 36 cm and 40 cm respectively. What is the minimum distance each should walk so that each can cover the same distance in complete steps.

24. Show that the points $(1, -1)$, $(5, 2)$ and $(9, 5)$ are collinear.

25. Show that—

$$2(\cos^4 60^\circ + \sin^4 30^\circ) - (\tan^2 60^\circ + \cot^2 45^\circ) + 3\sec^2 30^\circ = \frac{1}{4}$$

OR

$$\sqrt{\sec^2 \theta + \operatorname{cosec}^2 \theta} = \tan \theta + \cot \theta$$

SECTION-C

26. The length, breadth and height of a room are 8 m 50 cm, 6 m 25 cm and 4 m 75 cm respectively. Find the length of the longest rod that can measure the dimensions of the room exactly.

OR

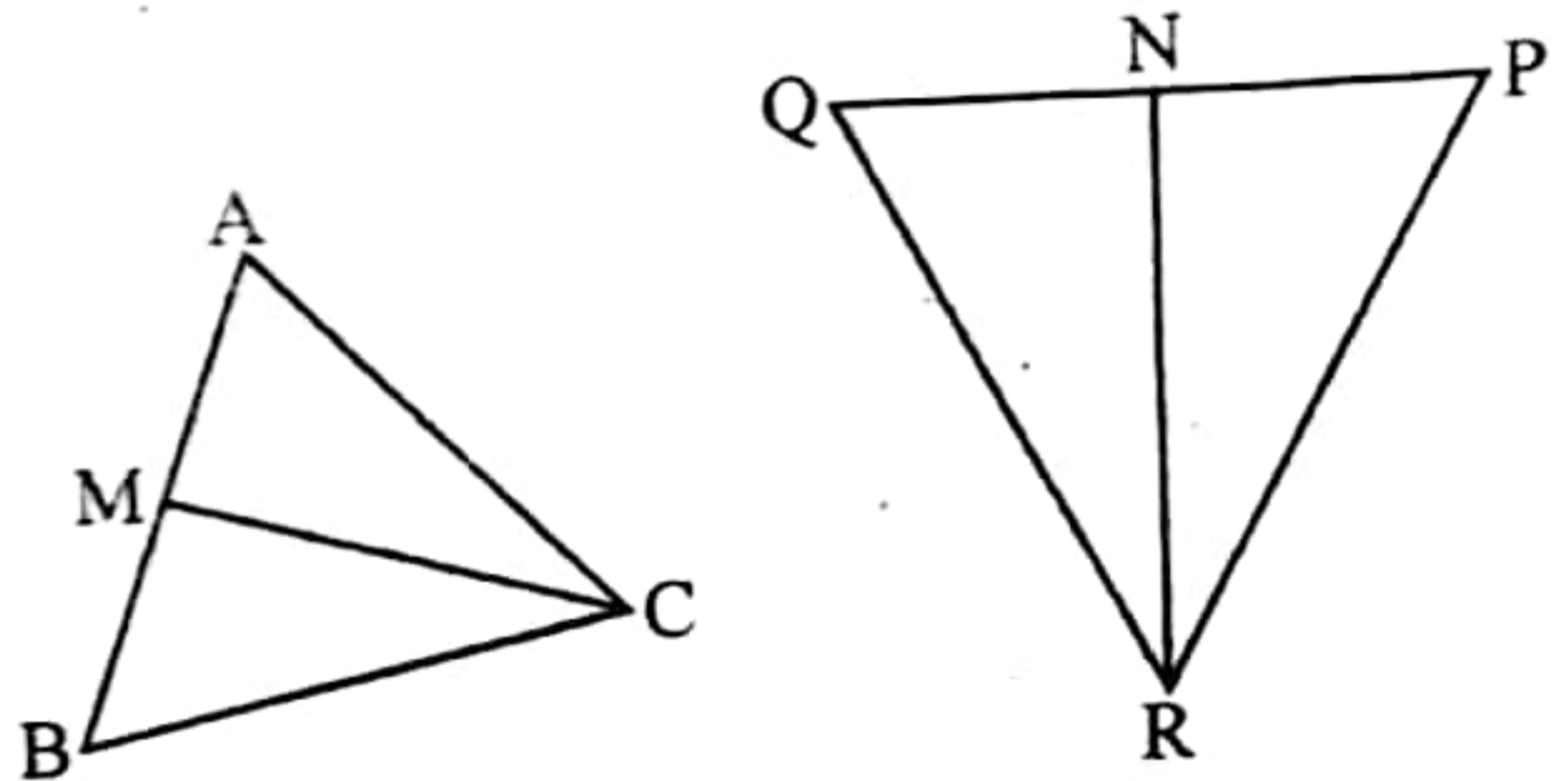
- Show that there is no positive integer n for which $\sqrt{n-1} + \sqrt{n+1}$ is rational.
27. A thief runs with a uniform speed of 100 m/minute. After one minute a policeman runs after the thief to catch him. He goes with a speed of 100 m/minute in the first minute and increases his speed by 10 m/minute every succeeding minute. After how many minutes the policeman will catch the thief?
28. In figure, CM and RN are respectively the medians of $\triangle ABC$ and $\triangle PQR$.

If $\triangle ABC \sim \triangle PQR$, prove that :

(i) $\triangle AMC \sim \triangle PNR$

(ii) $\frac{CM}{RN} = \frac{AB}{PQ}$

(iii) $\triangle CMB \sim \triangle RNQ$



OR

Prove that, if a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct point, the other two sides are divided in the same ratio.

29. The ratio of incomes of two persons is 9 : 7 and the ratio of their expenditures is 4 : 3. If each of them manages to save ₹ 2000 per month, find their monthly incomes.
30. Prove the following identity :

$$\frac{\cos A}{1 - \sin A} + \frac{\sin A}{1 - \cos A} + 1 = \frac{\sin A \cos A}{(1 - \sin A)(1 - \cos A)}$$

31. The weekly pocket money of the students of class X of a school is given in the following table :

Pocket money (in ₹)

Number of students

0-40

4

40-80

7

80-120

15

120-160

10

160-200

5

200-240

8

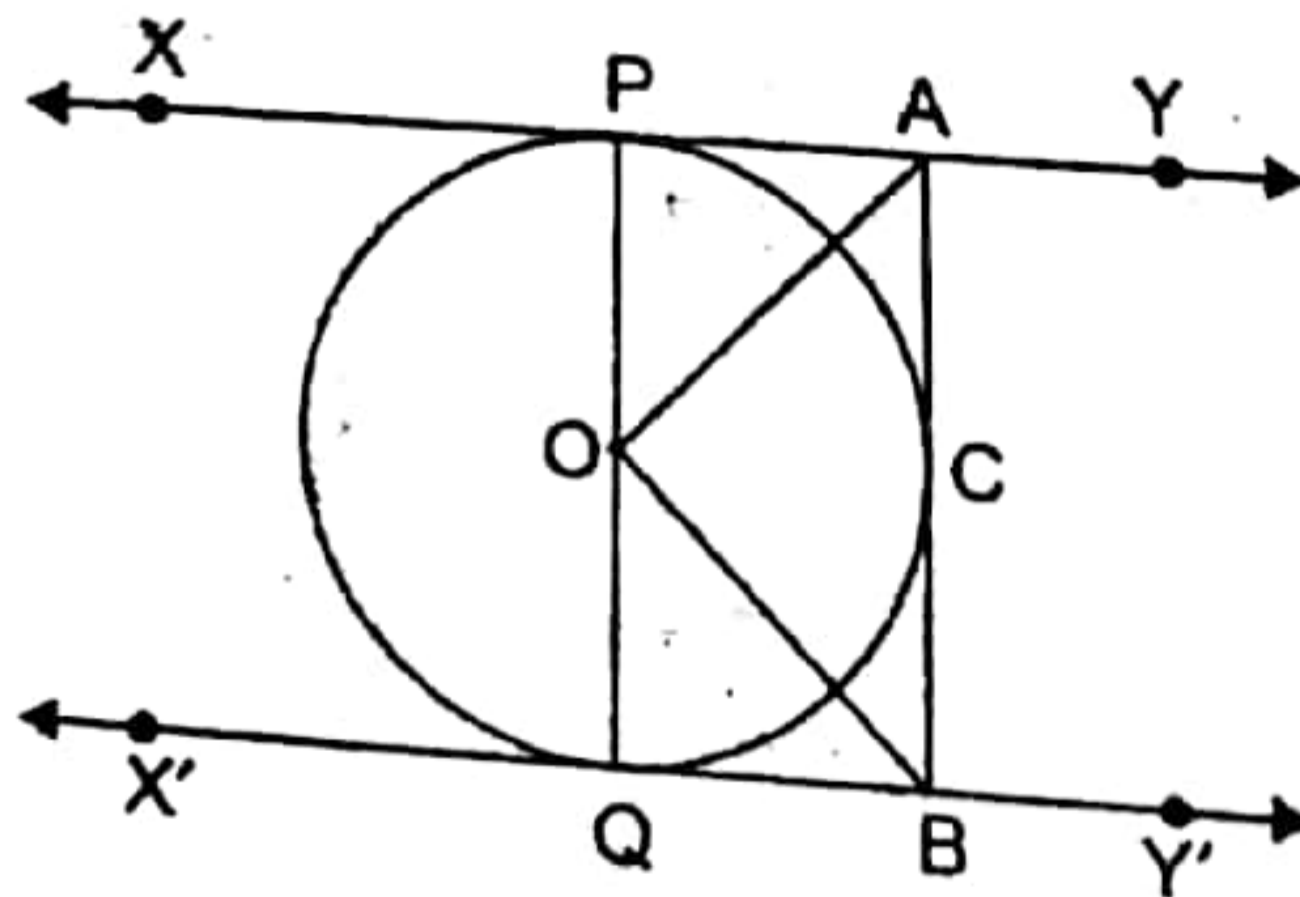
Find the median for the above data.

SECTION-D

32. The angles of depression of the top and the bottom of an 8m tall building from the top of a multi-storeyed building are 30° and 45° , respectively. Find the height of the multi-storeyed building and the distance between the two buildings.
33. PQ is a chord of length 8 cm of a circle of radius 5 cm. The tangents at P and Q intersect at a point T. Find the length TP.

OR

In figure, XY and X'Y' are two parallel tangents to a circle with centre O and another tangent AB with point of contact C intersecting XY at A and X'Y' at B. Prove that $\angle AOB = 90^\circ$.

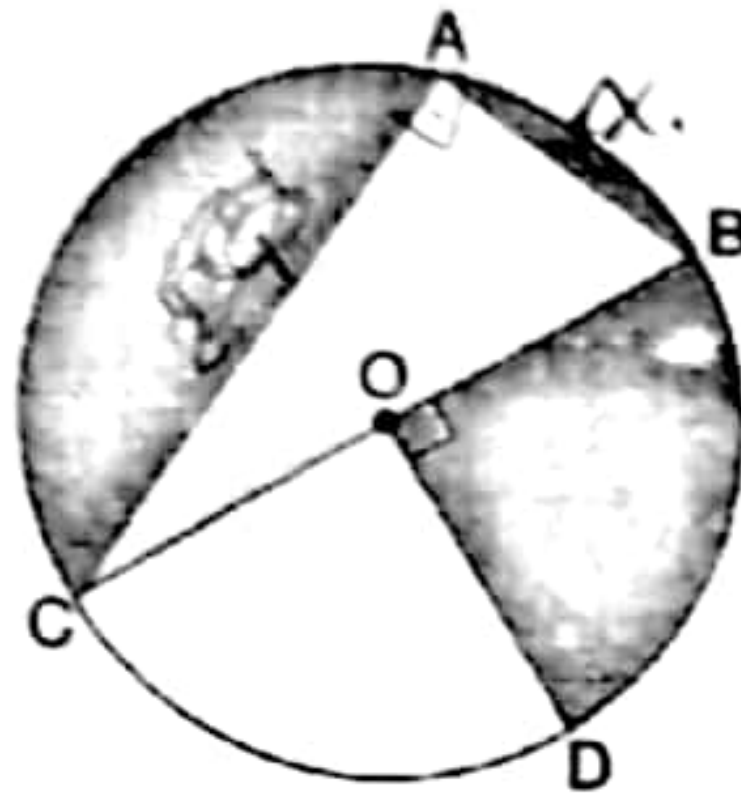


34. Solve for x:

$$\frac{1}{2a + b + 2x} = \frac{1}{2a} + \frac{1}{b} + \frac{1}{2x}; x \neq 0, x \neq \frac{-2a - b}{2}, a, b \neq 0$$

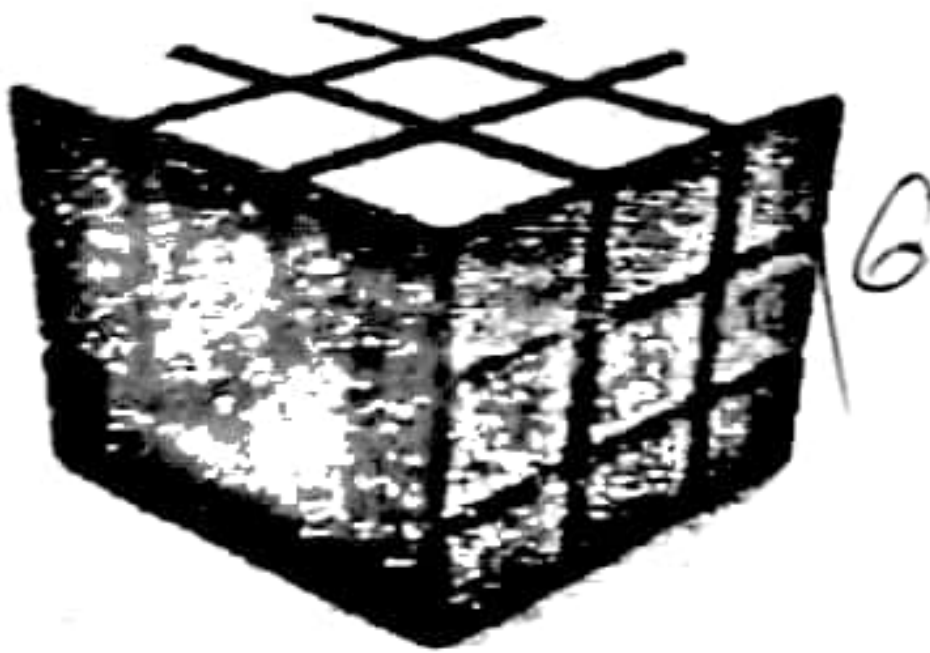
OR

- ₹ 9,000 were divided equally among a certain number of persons. Had there been 20 more persons, each would have got ₹ 160 less. Find the original number of persons.
35. In the given figure, O is the centre of the circle with $AC = 24$ cm, $AB = 7$ cm and $\angle BOD = 90^\circ$. Find the area of the shaded region.

SECTION-E

36. Read the following and answer the questions given below :

On a Sunday, your Parents took you to a fair. You could see lot of toys displayed, and you wanted them to buy a RUBIK's cube and strawberry ice-cream for you. Observe the figures and answer the questions:



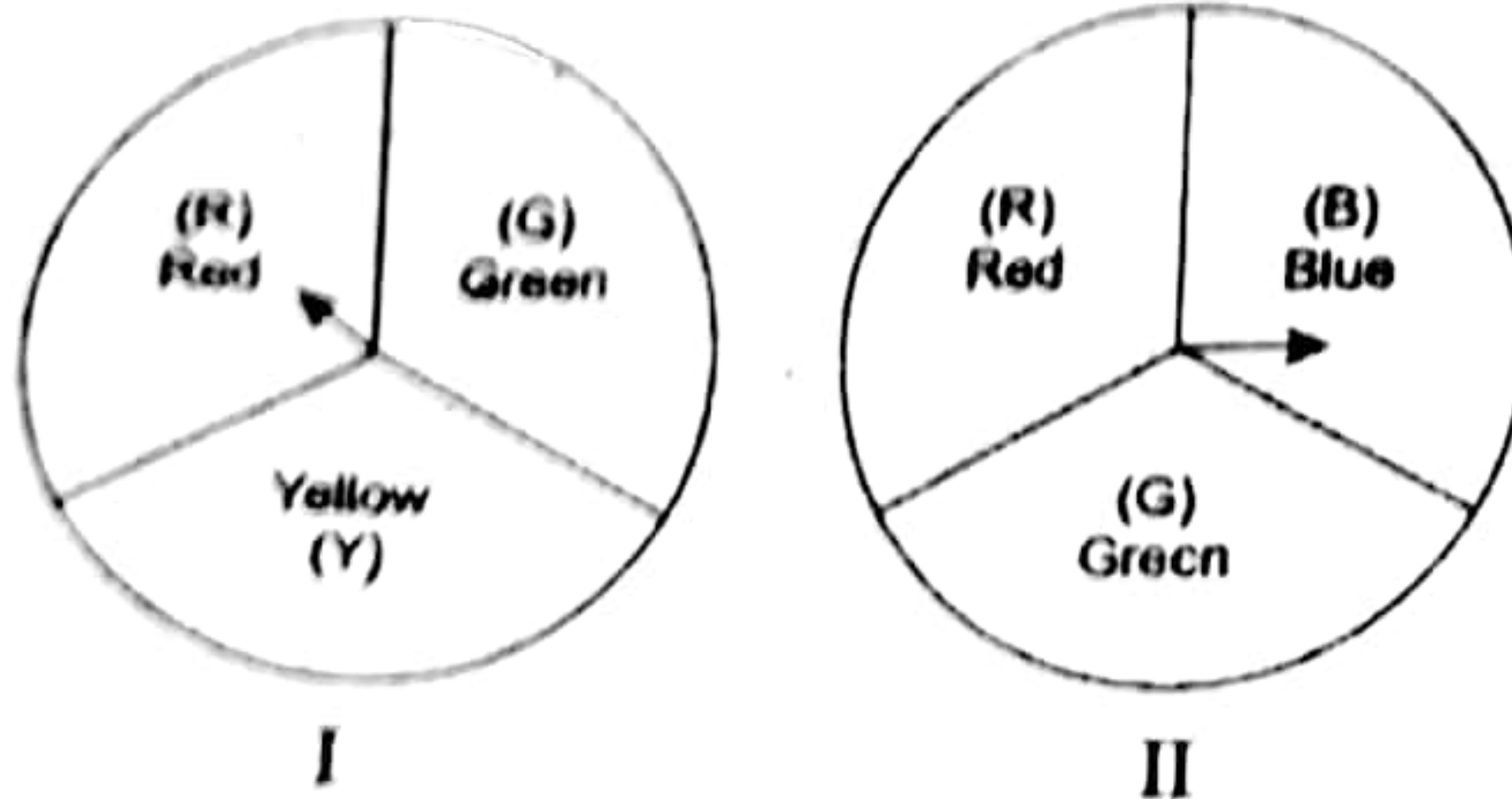
- (i) Find the length of the diagonal if each edge of Rubik's cube measures 6 cm. 1
- (ii) The shopkeeper filled cone with ice-cream and also put a hemispherical scoop over it. How much ice-cream is used in 3 ice-cream cones if shopkeeper uses 7 cm high cones with base radius 3 cm? 2

OR

What is the total surface area of cone with hemispherical ice-cream?

(iii) If the shopkeeper wrapped Rubik cube with fancy paper (Assume overlapping negligible), how much paper was used for wrapping? 1

37 A middle school decided to run the following spinner game as a fund-raiser on Christmas Carnival.



Making Purple : Spin each spinner once. Blue and red make purple. So, if one spinner shows Red (R) and another Blue (B), then you 'win'. One such outcome is written as 'RB'.

Based on the above, answer the following questions:

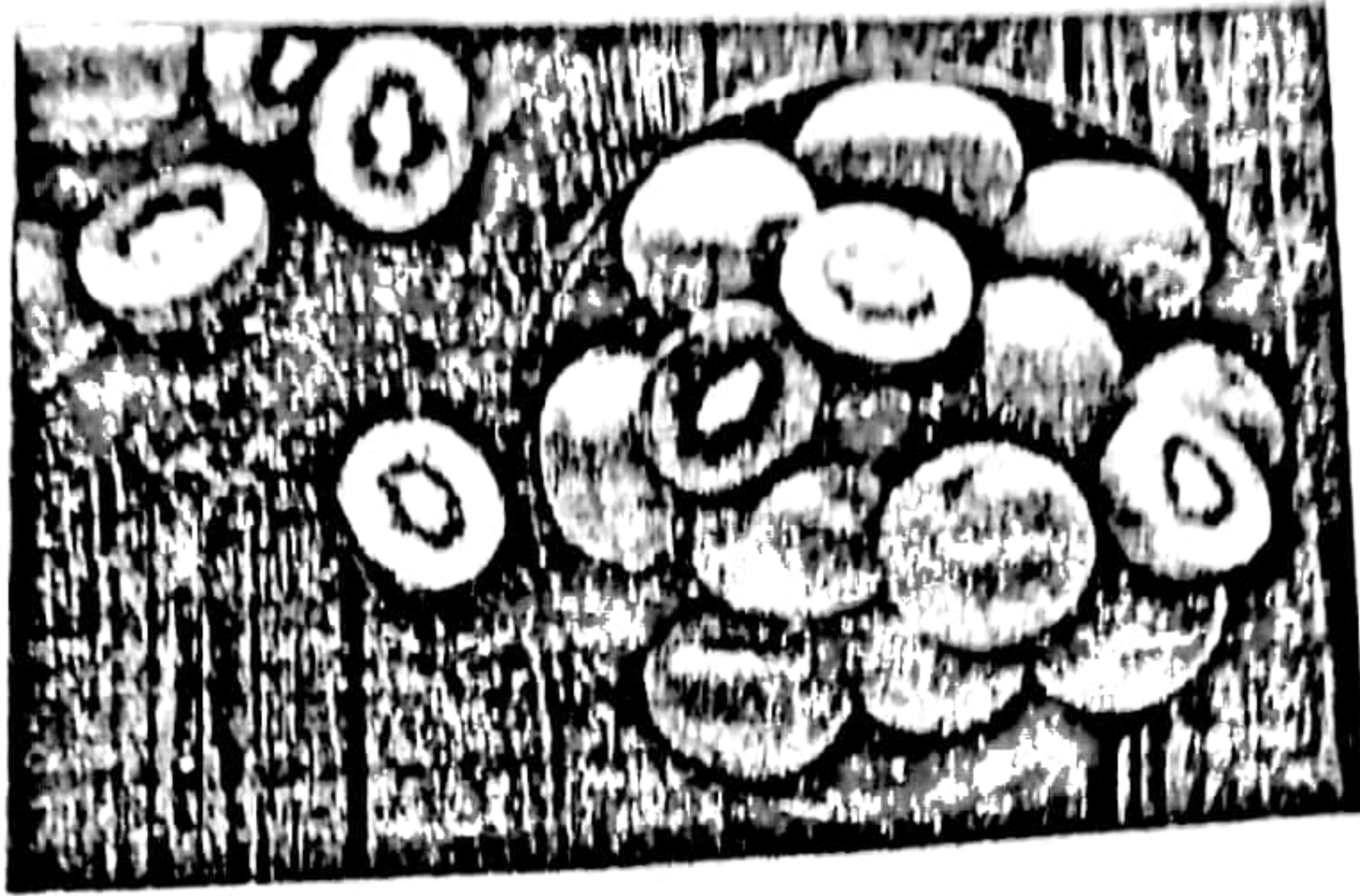
- (i) List all possible outcomes of the game. 1
- (ii) Find the probability of 'Making Purple'. 1
- (iii) For each win, a participant gets ₹ 10, but if he/she loses, he/she has to pay ₹ 5 to the school. If 99 participants played, calculate how much fund could the school have collected. 2

OR

If the same amount of ₹ 5 has been decided for winning or losing the game, then how much fund had been collected by school? (Number of participants = 99)

Read the following and answer the questions given below:

Shruti's father gave him some money to buy kiwi from the market for rupees $p(x) = x^2 - 28x + 160$. Where α, β are the zeroes of $p(x)$.



- (i) Find the value of α and β where $\alpha < \beta$. 1
- (ii) If sum of zeroes of $q(x) = kx^2 + 2x + 3k$ is equal to their product, then what is the value of k ? 2

OR

Write the polynomial whose zeroes are $(3 + \sqrt{2})$ and $(3 - \sqrt{2})$.

- (iii) Find a quadratic polynomial, whose zeroes are $\frac{1}{4}$ and -1 . 1