

MATHEMATICS -X

Time allowed: 3 hours

Maximum marks: 100

General Instructions:

- (i) All questions are compulsory.
- (ii) The question paper consists of 25 questions divided into three sections A, B and C. Section A contains 10 questions of 3 marks each. Section B is of 10 questions of 4 marks each and Section C is of 5 questions of 6 marks each.
- (iii) Internal choices have been provided in some questions. You have to attempt only one of the choices in such questions.
- (iv) In questions on construction, the drawing should be neat and exactly as per the given measurements.
- (v) Use of calculators is not permitted. However, you may ask for Mathematical tables.

SECTION [A]

1. Find the sum of all three digit numbers which are multiples of 7.
2. If $m = \frac{x+1}{x-1}$ and $n = \frac{x-1}{x+1}$, find $m^2 + n^2 - mn$
3. Solve the following using cross product method:
 $(a+c)x - (a-c)y = 2ab$
 $(a+b)x - (a-b)y = 2ab$
4. An oven is available for Rs 8000 cash or Rs 2000 as cash down payment ,followed by 4 monthly instalments.if the rate of interest is $33\frac{1}{3}\%$,find the instalment.
5. A loan of Rs. 9100 is to be paid back in three equal yearly instalments. If the interest is compounded yearly at 20% p.a., find the amount of each instalment.
6. A field is 120 m long and 30 m broad .a tank 20 m x 12 m x 5 m is dug in the field .The earth taken out of the tank is evenly spread on the field .How much is the level of field raised.
7. A coin and die are thrown .Find the probability of getting (i) a head (ii) a head and even number
(iii) a tail or a prime
8. Find the mean of the following data:

Classes	0-10	10-20	20-30	30-40	40-50
Frequency	7	8	12	13	10

9. Angle A of an isosceles $\triangle ABC$ is acute in which $AB = AC$ and $BD \perp AC$. Prove that $BC^2 = 2AC \cdot CD$.
10. Three circles are drawn from three vertices of a $\triangle ABC$,taken in order as to touch each other externally .If the sides of the triangle are 4,6 and 8 cm. Find the radii of circles.

SECTION [B]

11. Show graphically that the given equations have unique solution. $2x+3y=4$ and $3x - y = -5$ and hence find the solution.
12. A man starts his job with a certain monthly salary and earns a fixed increment every year. If his salary after 4 years of service was Rs 1900 and after 8 years of service ,it was Rs 2300.find his starting salary and the annual increment .
13. Solve the quadratic equation for x : $ax^2 + (b^2 -ac)x -bc = 0$
14. If (3,2) ,(4,4) and (1,3) are the mid-points of the sides of a triangle ,find the coordinates of the vertices of the triangle.
15. In what ratio does the point (3, 12) divide the line segment joining the points (1, 4) and (4, 16) ?

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16. If $2\cos\theta - \sin\theta = x$ and $\cos\theta - 3\sin\theta = y$, prove that $2x^2 + y^2 - 2xy = 5$

OR

$$\frac{\sec^2 10^\circ - \tan^2 10^\circ}{\sin^2 17^\circ + \sin^2 73^\circ} + \frac{\sin 59^\circ}{\cos 31^\circ} - \tan 10^\circ \tan 45^\circ \tan 80^\circ \frac{\cos(90^\circ - \theta)}{\sin \theta}$$

17. The 8th term of an A. P. is 37 and 12th term is 57. Find the A. P.

18. 300 hundred apples are distributed equally among a certain number of students. If there has been 10 more students each would have received one apple less. Find the number of students.

19. Draw a triangle ABC having $BC = 6.2\text{cm}$, $\angle A = 50^\circ$ and altitude $AD = 4\text{cm}$. Also find the length of the median from the vertex A.

20. The following data shows the expenditure incurred in the construction of the House

Items	Bricks	Cement	Steel	Labour	Miscellaneous
Expences (In Rs.)	15%	20%	10%	25%	30%

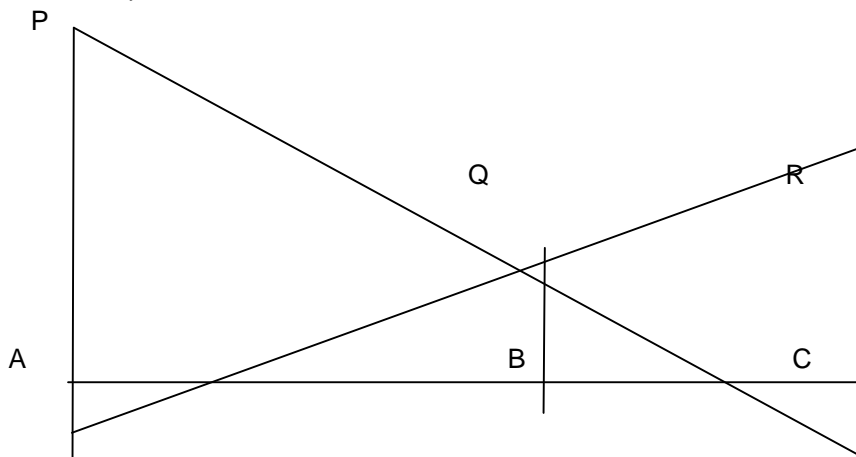
Draw the pie-chart to show the above data.

SECTION [C]

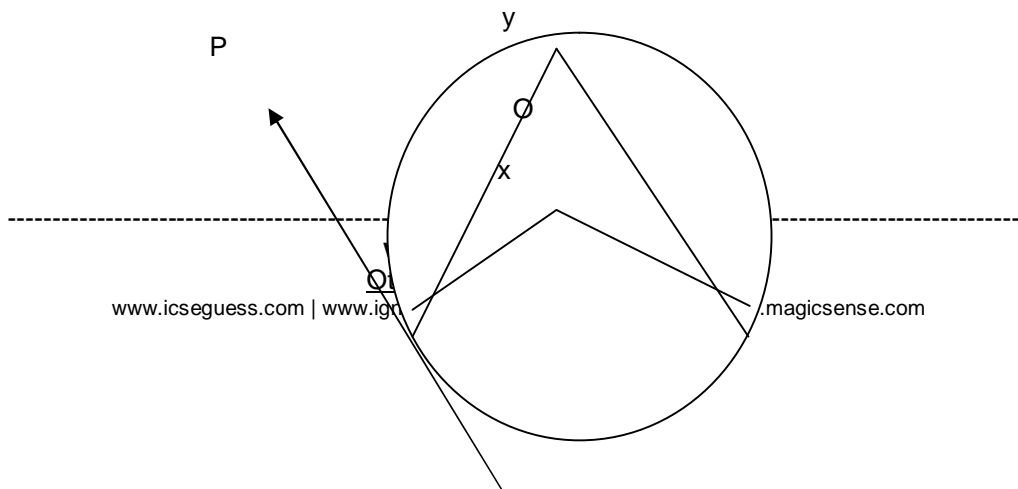
21. From an aeroplane 1000 m high, a man observes the angles of depression of two ships to be 60° and 45° . If the ships are on the opposite sides of the observer, find the distance between the ships.

22. If a line is drawn parallel to any side of a triangle, it divides the other two sides proportionally. Prove it. In the given fig. PA, QB and RC is perpendicular to AC and $AP = x$, $QB = z$, $RC = y$, $AB = a$, $BC = b$,

then prove that $\frac{1}{x} + \frac{1}{y} = \frac{1}{z}$



23. Prove that "the angle made by the chord with tangent is equal to the angle made by the chord in alternate segment of the circle."



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- (viii) Internal choices have been provided in some questions. You have to attempt only one of the choices in such questions.
- (ix) In questions on construction, the drawing should be neat and exactly as per the given measurements.
- (x) Use of calculators is not permitted. However, you may ask for Mathematical tables.

SECTION [A]

23. Find the sum of all three digit numbers which are multiples of 7.
24. If $m = \frac{x+1}{x-1}$ and $n = \frac{x-1}{x+1}$, find $m^2 + n^2 - mn$
25. Solve the following using cross product method: $(a+c)x - (a-c)y = 2ab$
 $(a+b)x - (a-b)y = 2ab$
26. An oven is available for Rs 8000 cash or Rs 2000 as cash down payment ,followed by 4 monthly instalments.if the rate of interest is $33\frac{1}{3}\%$,find the instalment.
27. A loan of Rs. 9100 is to be paid back in three equal yearly instalments. If the interest is compounded yearly at 20% p.a., find the amount of each instalment.
28. A field is 120 m long and 30 m broad .a tank 20 m x 12 m x 5 m is dug in the field .The earth taken out of the tank is evenly spread on the field .How much is the level of field raised.
29. A coin and die are thrown .Find the probability of getting (i) a head (ii) a head and even number
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30. Find the mean of the following data:

Classes	0-10	10-20	20-30	30-40	40-50
Frequency	7	8	12	13	10

31. Angle A of an isosceles $\triangle ABC$ is acute in which $AB = AC$ and $BD \perp AC$. Prove that $BC^2 = 2AC \cdot CD$.
32. Three circles are drawn from three vertices of a $\triangle ABC$,taken in order as to touch each other externally .If the sides of the triangle are 4,6 and 8 cm. Find the radii of circles.
33. Show graphically that the given equations have unique solution. $2x+3y=4$ and $3x - y = -5$ and hence find the solution.
34. A man starts his job with a certain monthly salary and earns a fixed increment every year. If his salary after 4 years of service was Rs 1900 and after 8 years of service ,it was Rs 2300.find his starting salary and the annual increment .
35. Solve the quadratic equation for x : $ax^2 + (b^2 - ac)x - bc = 0$
36. If (3,2) ,(4,4) and (1,3) are the mid-points of the sides of a triangle ,find the coordinates of the vertices of the triangle.
37. In what ratio does the point (3, 12) divide the line segment joining the points (1, 4) and (4, 16) ?

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38. If $2\cos\theta - \sin\theta = x$ and $\cos\theta - 3\sin\theta = y$, prove that $2x^2 + y^2 - 2xy = 5$

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39. The 8th term of an A. P. is 37 and 12th term is 57. Find the A. P.

40. 300 hundred apples are distributed equally among a certain number of students. If there has been 10 more students each would have received one apple less. Find the number of students.

41. Draw a triangle ABC having $BC = 6.2\text{cm}$, $\angle A = 50^\circ$ and altitude $AD = 4\text{cm}$. Also find the length of the median from the vertex A.

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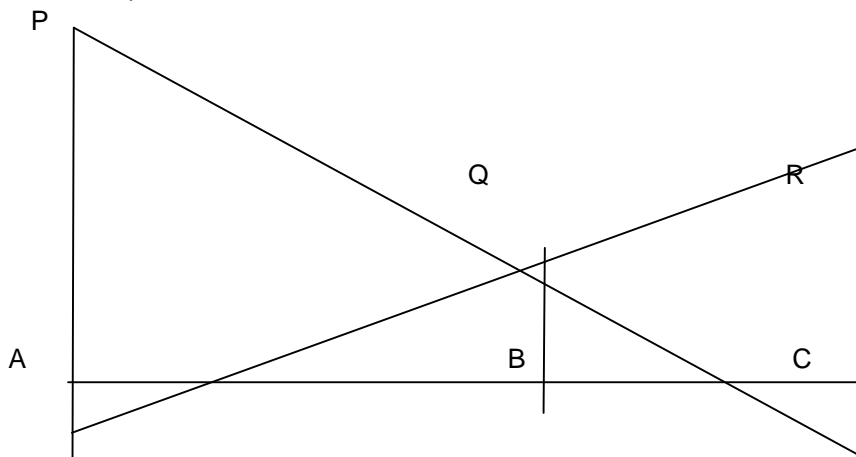
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SECTION [C]

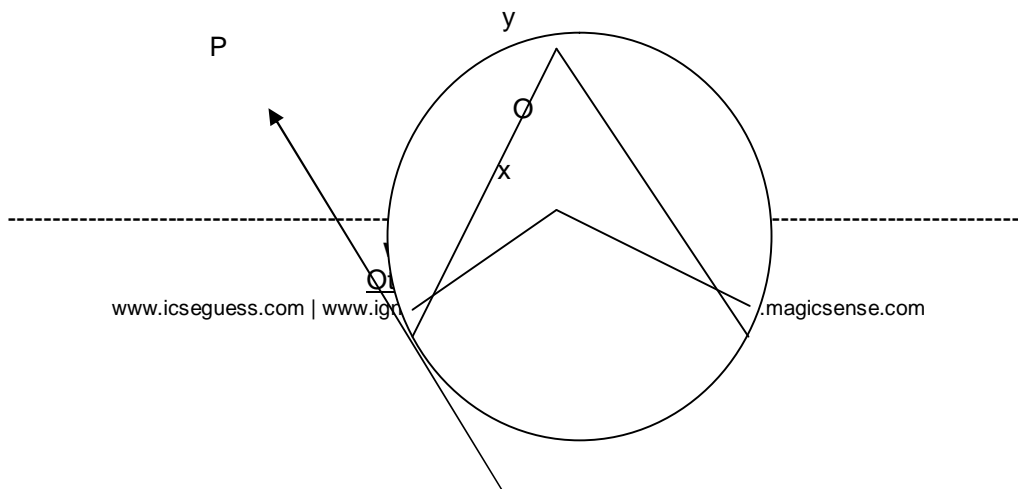
43. From an aeroplane 1000 m high, a man observes the angles of depression of two ships to be 60° and 45° . If the ships are on the opposite sides of the observer, find the distance between the ships.

44. If a line is drawn parallel to any side of a triangle, it divides the other two sides proportionally. Prove it. In the given fig. PA, QB and RC is perpendicular to AC and $AP = x$, $QB = z$, $RC = y$, $AB = a$, $BC = b$,

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SECTION [A]

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