

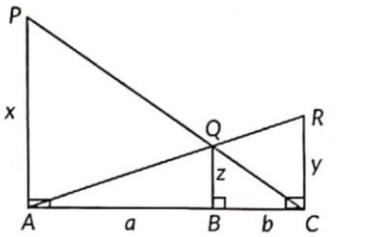
Class – X (2025-26)

Short / Long Most Important questions

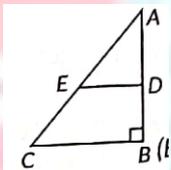
1. Prove that $\sqrt{3}$ is an irrational number.
2. Show that $\frac{3+\sqrt{7}}{5}$ is an irrational number, given that $\sqrt{7}$ is irrational.
3. The HCF of two numbers is 27 and their LCM is 162, if one of the number is 54, find the other number.
4. 3 bells ring at an interval of 4, 7 and 14 minutes. All three bells ring at 6 am, when the three bells will ring together next?
5. The LCM of two numbers is 9 times their HCF. The sum of LCM and HCF is 500. Find the HCF of the two numbers.
6. A sweet shopkeeper prepares 396 Gulab jamuns and 342 ras-gullas. He packs them into containers. Each container consists of either Gulab jamun or ras-gullas but have equal number of pieces. Find the number of pieces he should put in each box so that number of boxes are least.
7. If α and β are zeroes of the polynomial $x^2 - p(x + 1) + c$ such that $(\alpha + 1)(\beta + 1) = 0$, then find the value of c .
8. Find the zeroes of the quadratic polynomial $7y^2 - \frac{11}{3}y - \frac{2}{3}$ and verify the relationship between the zeroes and the coefficients.
9. If α and β are zeroes of $4x^2 + 3x + 7$, then find the value of $\frac{1}{\alpha} + \frac{1}{\beta}$.
10. If the zeroes of the polynomial $x^2 + px + q$ are double in value to the zeroes of the Polynomial $2x^2 - 5x - 3$, then find the values of p and q .
11. If one zero of the polynomial $p(x) = 6x^2 + 37x - (k - 2)$ is reciprocal of the other, then find the value of k .
12. Draw the graph of the equations $x - y + 1 = 0$ and $3x + 2y - 12 = 0$. Using this graph, find the values of x and y which satisfy both the equations.
13. Solve the following pair of linear equations graphically: $2x + y = 4$; $2x - y = 4$. Also, find the co-ordinates of the vertices of the triangle formed by the lines with y -axis and also find the area of triangle.
14. The sum of the numerator and the denominator of a fraction is 18. If the denominator is increased by 2, the fraction reduces to $\frac{1}{3}$. Find the fraction.
15. A father's age is three times the sum of the ages of his two children. After 5 years his age will be two times the sum of their ages. Find the present age of the father.
16. The ratio of income of two persons is 9 : 7 and the ratio of their expenditure is 4 : 3, if each of them manage to save Rs 2000/month. Find their monthly incomes.

17. Point A and B are 100 km apart on a highway. One car starts from A and another B at the same time. If they travel in same direction at different speeds, they meet in 5 hour. If they travel towards each other, they meet in 1 hour. What are the speeds of the two cars?
18. Find c if the system of the equations $cx + 3y + (3 - c) = 0$; $12x + cy - c = 0$ has infinitely many solution?
19. Solve for x : $\sqrt{2x + 9} + x = 13$
20. A plane left 30 minutes later than its scheduled time and in order to reach the destination 1500 km away in time, it had to increase its speed by 100 km/h from the usual speed. Find its usual speed.
21. The hypotenuse (in cm) of a right angled triangle is 6 cm more than twice the length of the shortest side. In the length of third side is 6 cm less than thrice the length of shortest side, then find the dimensions of the triangle.
22. A 2-digit number is such that the product of its digits is 24. If 18 is subtracted from the number, the digits interchange their places. Find the number.
23. A motor boat whose speed is 18 km/h in still water takes 1 hour more to go 24 km upstream than to return downstream to the same spot. Find the speed of the steam.
24. A train travels at a certain average speed for a distance of 63 km and then travels a distance of 72 km at an average speed of 6 km/hr more than its original speed. If it takes 3 hours to complete total journey, what is the original average speed?
25. Find the value of m for which the quadratic equation $(m - 1)x^2 + 2(m - 1)x + 1 = 0$ has two real and equal roots.
26. If the quadratic equation $(1 + a^2)x^2 + 2abx + (b^2 - c^2) = 0$ has equal and real roots, then prove that $b^2 = c^2(1 + a^2)$.
27. To fill a swimming pool two pipes are used. If the pipe of larger diameter used for 4 hours and the pipe of smaller diameter 9 hours, only half of the pool can be filled. Find, how long it would take for each pipe to fill the pool separately, if the pipe of smaller diameter takes 10 hours more than the pipe of larger diameter to fill the pool?
28. Which term of the A.P. 3, 15, 27, 39, will be 120 more than its 21st term.
29. Find how many integers between 200 and 500 are divisible by 8.
30. Find the middle term of the A.P. 6, 13, 20,, 216.
31. Which term of the A.P. : 65, 61, 57, 53, is the first negative term?
32. If the ratio of the sum of the sum of the first n terms of two A.P.'s is $(7n + 1) : (4n + 27)$, then find the ratio of their 9th terms.
33. Solve : $1 + 4 + 7 + 10 + \dots + x = 287$

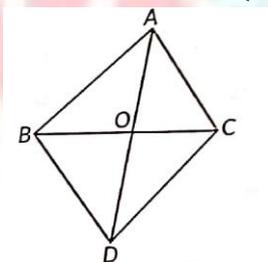
34. In an A.P., if the 12th term is -13 and the sum of its first four terms is 24 , find the sum of its first ten terms.
35. In an A.P. of 50 terms, the sum of first 10 terms is 210 and the sum of its last 15 terms is 2565 . Find the A.P.
36. PA, QB and RC are each perpendicular to AC. If $AP = x$, $QB = z$, $RC = y$, $AB = a$ and $BC = b$, then prove that $\frac{1}{x} + \frac{1}{y} = \frac{1}{z}$.



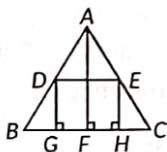
37. Sides AB, BC and median AD of a ΔABC are respectively proportional to sides PQ, QR and median PM of ΔPQR . show that $\Delta ABC \sim \Delta PQR$.
38. A girl of height 100 cm is walking away from the base of a lamp post at a speed of 1.9 m/s if the lamp is 5 m above the ground, find the length of her shadow after 4 seconds.
39. In ΔABC , $\angle ADE = \angle B$ then prove that $\Delta ADE \sim \Delta ABC$ also if $AD = 7.6$ cm, $BD = 4.2$ cm and $BC = 8.4$ cm, then find DE.



40. In the given figure, ΔABC and ΔDBC are on the same base BC. If AD intersect BC at O, Prove that $\frac{ar(\Delta ABC)}{ar(\Delta DBC)} = \frac{AO}{DO}$.



41. In the given figure, ABC is a triangle and GHED is a rectangle. $BC = 12$ cm, $HE = 6$ cm, $FC = BF$ and altitude $AF = 24$ cm, find the area of the rectangle.



42. Two poles of height ' p ' and ' q ' meters are standing vertically on a level ground, ' a ' meters apart. Prove that the height of the point of intersection of the lines joining the top of each pole to the foot of the opposite pole is given by $\frac{pq}{p+q}$.

43. The perimeters of two similar triangles are 25 cm and 15 cm respectively. If one side of the first triangle is 9 cm, find the length of the corresponding side of the second triangle.
44. If the distance of $P(x, y)$ from $A(5, 1)$ and $B(-1, 5)$ are equal, then prove that $3x = 2y$.
45. The center of a circle is $(2a, a - 7)$. Find the values of 'a' if the circle passes through the point $(11, -9)$. Radius of the circle is $5\sqrt{2}$ cm.
46. Points $A(-1, y)$ and $B(5, 7)$ lie on a circle with center $O(2, -3y)$. Find the value of y . Hence find the radius of the circle.
47. Find the coordinates of a point A , where AB is a diameter of the circle with center $(3, -1)$ and the point B is $(2, 6)$.
48. Find the ratio in which y -axis divides the line segment joining the points $A(5, -6)$ and $B(-1, -4)$. Also find the coordinates of the point of division.
49. Point P divides the line segment joining the points $A(2, 1)$ and $B(5, -8)$ such that $\frac{AP}{PB} = \frac{1}{3}$. If P lies on the line $2x - y + k = 0$, find the value of k .
50. If the point $C(-1, 2)$ divides internally the line-segment joining the points $A(2, 5)$ and $B(x, y)$ in the ratio $3 : 4$, find the value of $x^2 + y^2$.
51. In what ratio does the point $\left(\frac{24}{11}, y\right)$ divide the line segment joining the points $P(2, -2)$ and $Q(3, 7)$? Also find the value of y .
52. Prove that: $\sqrt{\frac{1+\cos A}{1-\cos A}} = \operatorname{cosec} A + \cot A$.
53. Prove that: $\frac{\sin A - 2\sin^3 A}{2\cos^3 A - \cos A} = \tan A$.
54. Prove that $\sec A(1 - \sin A)(\sec A + \tan A) = 1$.
55. Prove that $(\sin \theta + \operatorname{cosec} \theta)^2 + (\cos \theta + \sec \theta)^2 = 7 + \tan^2 \theta + \cot^2 \theta$.
56. If $\cos \theta + \sin \theta = \sqrt{2} \cos \theta$, show that $\cos \theta - \sin \theta = \sqrt{2} \sin \theta$.
57. If $4 \tan \theta = 3$, evaluate $\left(\frac{4 \sin \theta - \cos \theta + 1}{4 \sin \theta + \cos \theta - 1}\right)$.
58. If $\tan \theta + \sin \theta = m$ and $\tan \theta - \sin \theta = n$; prove that: $m^2 - n^2 = 4\sqrt{mn}$.
59. Prove that $\frac{\sin \theta - \cos \theta + 1}{\sin \theta + \cos \theta - 1} = \frac{1}{\sec \theta - \tan \theta}$.
60. If $x = p \sec \theta + q \tan \theta$ and $y = p \tan \theta + q \sec \theta$, then prove that $x^2 - y^2 = p^2 - q^2$.
61. The angle of elevation of an Aeroplane from a point A on the ground is 60° after a flight of 15 seconds, the angle of elevation changes to 30° . If the aeroplane is flying at a constant height of $1500\sqrt{3}$ m, find the speed of the plane.
62. A straight highway leads to the foot of a tower. A man standing on the top of the 75 m height observes two cars at angles of depression of 30° and 60° which are

approaching the foot of the tower. If one car is exactly behind the other on the same side of the tower, find the distance between the two cars.

63. The angle of elevation of the top Q of a vertical tower PQ from a point X on the ground is 60° . From a point Y, 40 m vertically above X, the angle of elevation of the top Q of tower is 45° , find the height of the tower PQ and the distance PX.
64. The straight highway leads to the foot of a tower. A man standing at the top of the tower observes a car at an angle of depression of 30° , which is approaching the foot of the tower with a uniform speed. Ten seconds later the angle of depression of the car is found to be 60° . Find the time taken by the car to reach the foot of the tower from this point.
65. A Statue 1.6 m tall, stands on the top of a pedestal. From a point on the ground the angle of elevation of the top of the statue is 60° and from the same point the angle of elevation of the top of the pedestal is 45° . Find the height of the pedestal.
66. A man in a boat rowing away from a light house 100 m height takes 2 minutes to change the angle of elevation of the top of the light house from 60° to 30° . Find the speed of the boat in meters per minute.
67. A piece of wire 22 cm long is bent into the form of an arc of a circle subtending an angle of 60° at its centre. Find the radius of the circle.
68. Find the area of the minor segment of a circle of radius 14 cm, when its central angle is 60° . Also find the area of the corresponding major segment.
69. The length of the minute hand of a clock is 6 cm, find the area swept by it when it moves from 7 : 05 p. m. to 7 : 40 p.m.
70. A toy is in the form of a cone of base radius 3.5 cm mounted on a hemisphere of base diameter 7 cm. If the total height of the toy is 15.5 cm, find the total surface area of the toy.
71. Due sudden floods, some welfare associations jointly requested the government to get 100 tents fixed immediately and offered to contribute 50% of the cost. If the lower part of each tent is of the form of a cylinder of diameter 4.2 m and height 4 m with the conical upper part of same diameter but of height 2.8 m, and the canvas to be used costs Rs 100 per sq. m, find the amount, the associations will have to pay. What values are shown by these associations?
72. From a solid cylinder of height 2.8 cm and diameter 4.2 cm, a conical cavity of the same height and same diameter is hollowed out. Find the total surface area of the remaining solid.

73. A room is in the form of cylinder surmounted by a hemi-spherical dome. The base radius of hemisphere is one-half the height of cylindrical part. Find total height of the room if it contains $\left(\frac{1408}{21}\right) m^3$ of air. (Take $\pi = \frac{22}{7}$)
74. An empty cone of radius 3 cm and height 12 cm. Ice-cream is filled in it so lower part of the cone which is $\left(\frac{1}{6}\right)^{th}$ of the volume of the cone is unfilled but hemisphere is formed on the top. Find volume of the ice-cream.
75. A solid wooden toy is in the form of a hemisphere surmounted by a cone of same radius. The radius of hemisphere is 3.5 cm and the total wood used in the making of toy is $166\frac{5}{6} cm^3$. Find the height of the toy. Also, find the cost of painting the hemispherical part of the toy at the rate of 10 per cm^2 .
76. A metallic cylinder has radius 3 cm and height 5 cm. To reduce its weight, a conical hole is drilled in the cylinder. The conical hole has a radius of $\frac{3}{2}$ cm and its depth is $\frac{8}{9}$ cm, calculate the ratio of the volume of metal left in the cylinder to the volume of metal taken out in conical shape.
77. A solid right-circular cone of height 60 cm and radius 30 cm is dropped in a right-circular cylinder full of water of height 180 cm and radius 60 cm. Find the volume of water left in the cylinder, in cubic metres.
78. Water is being pumped out through a circular pipe whose internal diameter is 8 cm. If the rate of flow of water is 80 cm/s, then how many liters of water is being pumped out through this pipe in one hour?

79. If the mean of the following frequency distribution is 10, 8, then find the value of p:

Class	0-4	4-8	8-12	12-16	16-20
Frequency	3	P	5	8	2

80. If the mean of the following frequency distribution is 62.8, then Find the missing frequency x:

Class	0-20	20-40	40-60	60-80	80-100	100-120
Frequency	5	8	x	12	7	8

81. If mode of the following frequency distribution is 55, then find the value of x.

Class	0-15	15-30	30-45	45-60	60-75	75-90
Frequency	10	7	x	15	10	12

82. Find the mode of the following distribution:

Class	0-15	15-20	20-25	25-30	30-35	35-40
Frequency	45	30	75	20	35	15

83. Find the median of the following data:

Class interval	0-10	10-20	20-30	30-40	40-50	Total
Frequency	8	16	36	34	6	100

84. If the median of the following distribution is 46, find the missing frequencies p and q .

Class interval	10-20	20-30	30-40	40-50	50-60	60-70	70-80	Total
Frequency	12	30	p	65	q	25	18	230

85. The probability of selecting a rotten apple randomly from a heap of 900 apples is 0.18. What is the number of rotten apples in the heap?

86. Cards marked with number 3, 4, 5, ..., 50 are placed in a box and mixed thoroughly. A card is drawn at random from the box. Find the probability that the selected card bears a perfect square number.

87. A dice is thrown twice. What is the probability that

- (i) 5 will come up at least once, and
- (ii) 5 will not come up either time?

88. If a number x is chosen at random from the numbers $-3, -2, -1, 0, 1, 2, 3$. What is the probability that $x^2 \leq 4$?

89. A box consists of 100 shirts of which 88 are good, 8 have minor defects and 4 have major defects. Ramesh, a shopkeeper will buy only those shirts which are good but 'Kewal' another shopkeeper will not buy shirts which have major defects. A shirt is taken out of the box at random. What is the probability that

- (i) Ramesh will buy the selected shirt?
- (ii) 'Kewal' will buy the selected shirt?

1. Three different coins are tossed together. Find the probability of getting

- (i) Exactly two heads
- (ii) At least two heads
- (iii) At least two tails.

90. A game consists of tossing a one-rupee coin 3 times and noting the outcome each time. Ramesh will win the game if all the tosses show the same result, (i.e. either all three heads or all three tails) and loses the game otherwise. Find the probability that Ramesh will lose the game.

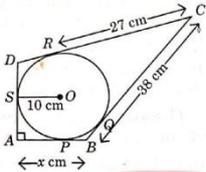
91. The probability of selecting a red ball at random from a jar that contains only red, blue and orange balls is $\frac{1}{4}$. The probability of selecting a blue ball at random from the same jar is $\frac{1}{3}$. If the jar contains 10 orange balls, find the total number of balls in the jar.

92. A bag contains white, black and red balls only. A ball is drawn at random from the bag. If the probability of getting a white ball is $\frac{3}{10}$ and that of a black ball is $\frac{2}{5}$, then find the probability of getting a red ball. If the bag contains 20 black balls, then find the total number of balls in the bag.

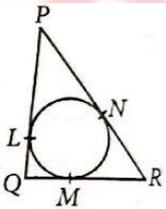
93. A bag contains 18 balls out of which x balls are red

- (i) If one ball is drawn at random from the bag, what is the probability that it is not red?
- (ii) If 2 more red balls are put in the bag, the probability of drawing a red ball will be $\frac{9}{8}$ times the probability of drawing a red ball in the first case. Find the value of x .

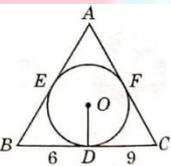
94. In the figure, quadrilateral ABCD is circumscribing a circle with centre O and $AD \perp AB$. If radius of incircle is 10 cm, then find the value of x .



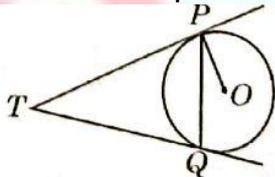
95. In the given figure, a circle is inscribed in a triangle PQR with $PQ = 10$ cm, $QR = 8$ cm and $PR = 12$ cm. Find the length QM , RN and PL .



96. In the given figure, a triangle ABC is drawn to circumscribe a circle of radius 3 cm such that the segments BD and DC into which BC is divided by the point of contact D are of length 6 cm and 9 cm respectively. If area of ΔABC is 54 cm^2 . then find the length of sides AB and AC.



97. In the given figure, two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that $\angle PTQ = 2 \angle OPQ$.



98. Two concentric circles are of radii 7 cm and r cm respectively, where $r > 7$. A chord of the larger circle, of length 48 cm, touches the smaller circle. Find the value of r .

99. Prove that a parallelogram circumscribing a circle is a rhombus.

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

