MATHEMATICS QUESTION BANK

[Chapter-4]

1. Solve the given quadratic equation for x:
   $9x^2 - 9(a + b)x + (2a^2 + 5ab + 2b^2) = 0$

2. Find the values of k for which the quadratic equation $(k + 4)x^2 + (k + 1)x + 1 = 0$ has equal roots. Also find these roots.

3. A two-digit number is such that the product of its digits is 14. When 45 is added to the number, the digits interchange their places. Find the number.

4. Two water taps together can fill a tank in 9 hours 36 minutes. The tap of larger diameter takes 8 hours less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank.

5. The time taken by a person to cover 150 km was 2.5 hours more than the time taken in the return journey. If he returned at a speed of 10 km/hour more than the speed while going, find the speed per hour in each direction.

6. Three consecutive natural numbers are such that the square of the middle number exceeds the difference of the squares of the other two by 60. Find the numbers.

7. Two pipes running together can fill a cistern in $3\frac{1}{13}$ minutes. if one pipe takes 3 minutes more than the other to fill it, find the time in which each pipe would fill the cistern.

8. A swimming pool is filled with three pipes with uniform flow. The first two pipes operating simultaneously fill the pool in the same time during which the pool is the same time during which the pool is filled by the third pipe alone. The second pipe fills the pool five hours faster than the first pipe and four hours slower than the third pipe. Find the time required by each pipe to fill the pool separately.

9. A takes 6 days less than the time taken by B to finish a piece of work. If both A and B together can finish it in 4 days, find the time taken by B to finish the work.

10. Seven years ago Varun's age was five times the square of Swati's age. Three years hence, Swati's age will be two-fifth of Varun's age. Find their present ages.

[Chapter- 5]

1. For what value of k: 2k, k + 10 and 3k + 2 are in AP?

2. Find the 9th term from the end (towards the first term) of the AP 5, 9, 13, …, 185.

3. The first and the last terms of an AP are 5 and 45 respectively. If the sum of all its terms is 400, find its common difference.

4. Find the number of natural numbers between 101 and 999 which are divisible by both 2 and 5.

5. Find how many integers between 200 and 500 are divisible by 8.

6. The sum of the first n terms of an AP is $3n^2 + 6n$. Find the nth term of this AP.

7. The sum of the first n terms of an AP is given by $s_n = 3n^2 - 4n$. Determine the AP and the 12th term.

8. Divide 56 into four parts which are in AP such that the ratio of product of extremes to the product of means is 5 : 6.

9. In an AP of 50 terms, the sum of first 10 terms is 210 and the sum of its last 15 terms is 2565. Find the AP.

10. If the mth term of an AP is 1/n and nth term is 1/m, then show that its (mn)th term is 1.

11. If the sum of m terms of a_n AP is the same as the sum of its n terms, show that the sum of its (m + n) terms is zero.

12. The ratio of the sums of m and n terms of a_n AP is $m^2 : n^2$. show that the ratio of the mth and nth terms is (2m − 1): (2n − 1).

13. In a flower bed, there are 23 rose plants in the first row, 21 in the second, 19 in the third, and so on. There are 5 rose plants in the last row. How many rows are there in the flower bed?

14. The sum of the first n terms of an AP whose first term is 8 and the common difference is 20 is equal to the sum of first 2n terms of another AP whose first term is − 30 and the common difference is 8. Find n.

15. A manufacturer of TV sets produced 600 sets in the third year and 700 sets in the seventh year. Assuming that the production increases uniformly by a fixed number every year, find :
(i) the production in the 1st year
(ii) the production in the 10th year
(iii) the total production in first 7 years

CH_-9,Application of Trigonometry

1. A ladder leaning against a wall, makes an angle of 60° with the horizontal. If the foot of the ladder is 2.5m away from the wall, find the length of the ladder. (Ans.- 5m)
2. An observer, 1.7m tall is 20√3m away from a tower. The angle of elevation from the eye of observer to the top of the tower is 30°. Find the height of the tower. (Ans.- 21.7m)
3. The tops of two towers of height x and y, standing on level ground, subtend angles of 30° and 60° respectively at the centre of the line joining their feet, then find x : y. (Ans.- 1:3)
4. In fig, a tower AB is 20m high and BC, its shadow on the ground, is 20√3m long. Find its sun's altitude. (Ans.- 30°)
5. A pole casts a shadow of length 20√3m on the ground, when the sun's elevation is 60°. Find the height of the pole. (Ans.- 6m)

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6. The angles of depression of the top and bottom of a 50m high building from the top of a tower are 45° and 60° respectively. Find the height of the tower and the horizontal distance between the tower and the building. (use √3 = 1.73) (Ans. 68.25m)
7. Two men on either side of a 75m high building and in line with base of building observe the angles of elevation of the top of the building as 30° and 60°. Find the distance between the two men. (use √3 = 1.73) (Ans.- 155.7m)
8. An aeroplane when flying at a height of 4000m from the ground passes vertically above another aeroplane at an instant when the angles of elevation of the two planes from the same point on the ground are 60° and 45° respectively. Find the vertical distance between the aeroplanes at that instant. (use √3 = 1.73) (Ans.- 2920m)
9. From a window (9m above the ground) of a house in a street, the angles of elevation and depression of the top and foot of another house on the opposite side of the street are 30° and 60° respectively. Find the height of the opposite house and the width of the street. (use √3 = 1.73) (Ans.- 5.196m)
10. From the top of a tower of height 50m, the angles of the depression of the top and bottom of the pole are 30° and 45° respectively. Find :
    (I)   How far the pole is from the bottom of a tower.
    (II)   The height of the pole.   (use √3 = 1.73) (Ans.- 21.13m)

11. Two ships are approaching a lighthouse from opposite directions. The angle of depression of the two ships from the top of the lighthouse are 30° and 45°. If the distance between the two ships is 100m, find the height of the lighthouse. (use √3 = 1.73) (Ans.- 36.6m)

12. The horizontal distance between two poles is 15m. the angle of depression of the top of the first pole as seen from the top of the second pole is 30°. If the height of the second pole is 24m, find the height of the first pole. (use √3 = 1.73) (Ans.- 15.34m)

13. A bird is sitting on the top of a 80m high tree. From a point on the ground, the angle of elevation of the bird is 45°. The bird flies away horizontally in such a way that it remained at a constant height from the ground. After 2 seconds, the angle of elevation from the same point is 30°. Find the speed of flying of the bird. . (use √3 = 1.73) (Ans.- 29.28 m/s)

14. 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, 40m vertically above X, the angle of elevation of the top Q of a tower is 45°. Find the height of the tower PQ and the distance PX. (use √3 = 1.73) (Ans.- 54.6m)

15. At a point A, 20m above the level of the water in a lake, the angle of elevation of a cloud is 30°. The angle of depression of the reflection of the cloud in the lake, at A is 60°. Find the distance of the cloud from A. (use √3 = 1.73) (Ans.- 40m)

16. A round balloon of radius 'r' subtends an angle A at the eye of the observer while the angle of elevation of its centre is B . prove that the height of the centre of balloon,

h = r sin B cosec A/2.

17. The angle of elevation of the top of a tower from a point on the same level as the foot of the tower is A . on advancing 'p' metres towards the foot of the tower, the angle of elevation becomes B. Show that the height 'h' of the tower is given by-

$h = \dfrac{p \tan A \tan B}{\tan B - \tan A}$ metres.

CH-!0,Circles

1. If TP AND TQ are tangents drawn from an external point T to a circle with centre O with $\angle TQP=60^0$ then $\angle OPQ$ is -
   (a) 30^0 (b) 25^0 (c) 40^0 (d) 60^0.
2. The tangent AB touches a circle , with centre O ,at the point O .If the radius of the circle is 5cm,OB=10cm and OB=AB, then find AP .
3. AB is the diameter of a circle and AC is the chord such that $\angle$ BAC=30^0. If the tangent at C intersects AB extended at D, then prove that BC =BD.
4. In a right Δ ABC in which $\angle B = 90^0$,a circle is drawn with AB as diameter intersecting the hypotenuse AC at P . Prove that the tangent to the circle at P bisects BC.
5. In the given fig. , tangents PQ and PR are drawn to a circle such that $\angle RPQ = 30°$. A chord RS is drawn parallel to the tangent PQ. Find the $\angle RQS$.
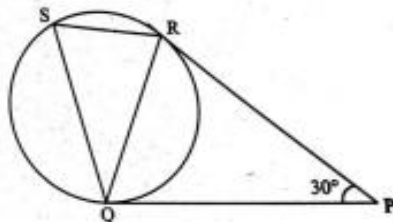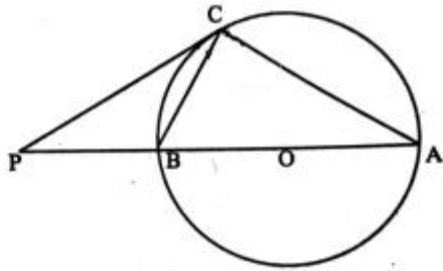

6. In the given figure O is the centre of the circle of radius 5 cm . T is a point such that OT = 13 cm and OT intersect the circle at E . If AB is the tangent to the circle at E , find the length of AB.
   [NCERT EXEMPLAR]
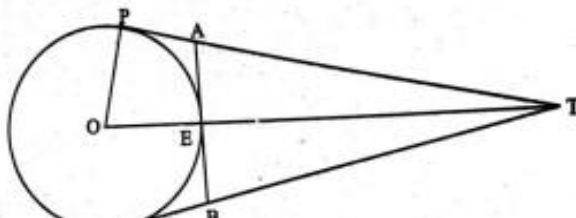
7. In the given figure , the tangent at a point C of the circle and a diameter AB when extended intersect at P. If $\angle PCA=110^0$ then find $\angle CBA$.
[NCERT EXEMPLAR]

8. Let s denotes the semi- perimeter of a $\triangle ABC$ in which $BC = a$, $CA = b$ and $AB = c$. If a circle touches the sides BC, CA, AB at D, E ,F respectively . Prove that $BD = s-b$.
9. Prove that opposites of quadrilateral circumscribing a circle subtend supplementary angles at the centre of the circle.   [*NCERT , CBSE 2012,14*]
10. In the given figure two tangents AB and AC are drawn to a circle with centre O such that $\angle BAC = 120°$. Prove that $AB = \frac{1}{2}OA$. [*CBSE 2016*]


Chapter – 11 Contructions

1. Draw a line segment AB of length 7 cm. Taking A as centre, draw a circle ofradius 3 cm and taking B as centre, draw another circle of radius 2 cm.Construct tangents to each circle from the centre of the other circle .

2. Construct a pair of tangents to a circle of radius 4 cm from a point which isat a distance of 6 cm from its centre.

3. Draw a line segment of length 8 cm and divide it internally in the ratio 4:5.

4. Draw two concentric circles of radii 3 cm and 5 cm. Construct a tangent tosmaller circle from a point on the larger circle. Also measure its length.

5. Draw a circle of radius 3 cm. From a point P, 7 cm away from its centredraw two tangents to the circle. Measure the length of each tangent.

6. Construct two tangents PT and PQ to a circle of radius 4 cm and centre O such that$\angle TOQ=120°$.

7. To a circle of radius 5 cm, draw two tangents which are inclined to eachother at an angle of 60°.

8. Draw a circle of radius 3·5 cm. Draw two tangents to the circle which areperpendicular to each other.

9. Draw a line segment of 6 cm and divide it in the ratio 3 : 2.

Chapter – 13 Surface Area and Volume

1. A farmer connects a pipe of internal diameter 20cm. from a canal into a cylindrical tank which is 10m in diameter and 2cm deep. If the water flows through the pipe at the rate of 4km per hour, in how much time will the Tank be filled completely?

2. From a cuboidal solid metallic block of dimensions 15cm X 10cm X 5cm a cylindrical hole of diameter 0.07m is drilled out. Find the surface area of the remaining block. (π=22 /7)

3. A hemispherical bowl of internal diameter 0.36 m contains liquid. This liquid is filled into 72 cylindrical bottles of diameter 6cm.Find the height of each bottle, if 10% liquid is wasted in this transfer.

4. A solid metallic object is shaped like a double cone as shown in figure. Radius of base of both cones is same but their heights are different. If this cone is immersed in water,find the quantity of water it will disperse.
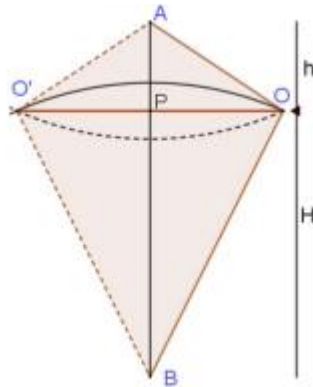
5. Two solid cones A and B are placed in a cylindrical tube as shown in the below figure. The ratio
of their capacities is 2:1. Find the heights and capacities of cones. Also, find the volume of the
remaining portion of the cylinder.
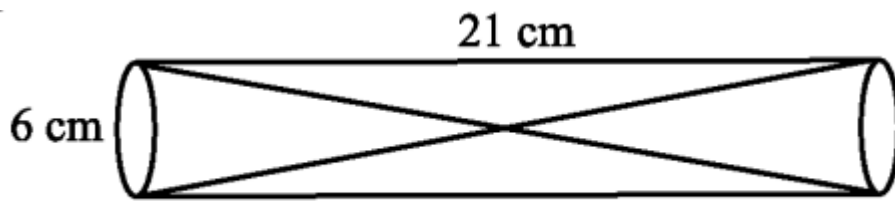
6. A solid iron cuboidal block of dimensions 4.4 m × 2.6 m × 1m is recast into a hollow cylindricalpipe of internal radius 30 cm and thickness 5 cm. Find the length of the pipe.

7. **A cone of radius 8 cm and height 12 cm is divided into two parts by a plane through the mid-point of its axis parallel to its base. Find the ratio of the volumes of two parts.**

8. Two cones with same base radius 8 cm and height 15 cm are joined together along their bases. Find the surface area of the shape so formed.

9. **The barrel of a fountain pen, cylindrical in shape, is 7 cm long and 5 mm in diameter. A full barrel of ink in the pen is used up on writing 3300 words on an average. How many words can be written in a bottle of ink containing one fifth of a litre?**

10. **Water flows at the rate of 10m/minute through a cylindrical pipe 5 mm in diameter. How long would it take to fill a conical vessel whose diameter at the base is 40 cm and depth 24 cm?**

11. A rectangular water tank of base 11 m × 6 m contains water upto a height of 5 m. If the water in the tank is transferred to a cylindrical tank of radius 3.5 m, find the height of the water level in the tank.

12. A hemispherical tank full of water is emptied by a pipe at the rate of 3 litres per second. How much time will it take to make the tank half empty, if the tank is 3m in diameter?

13. **A conical hole is drilled in a circular cylinder of height 12 cm and base radius 5 cm. The height and base radius of the cone are also the same. Find the whole surface and volume of the remaining Cylinder.**

14. Rain water, which falls on a flat rectangular surface of length 6 m and breadth 4 m is transferred into a cylindrical vessel of internal radius 20 cm .What will be the height of water in the cylindrical vessel if a rainfall of 1 cm has fallen?

15. **A path 2 m wide surrounds a circular pond of diameter 40 m. How many cubic meters of gravel are required to grave the path to a depth of 20 cm?**

1. Write the median class of the following distribution : **CBSE2009-1M**

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	4	4	8	10	12	8	4

2. The mean of the following frequency distribution is 62.8. Find the missing frequency x. **CBSE2007-2M**

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

3. The enrolment of a secondary school in different classes is given below: **CBSE2007-3M**

Class	VI	VII	VIII	IX	X
Enrolment	600	500	400	700	200

Draw a pie chart to represent the above data.

4. The table below shows the salaries of 280 persons : **CBSE2018-3M**

Salary (in Thousand Rs.)	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50
No. of Persons	49	133	63	15	6	7	4	2	1

Calculate the median salary of the data.

5. The following distribution gives the daily income of 50 workers of a factory :

Daily income (in Rs.)	100-120	120-140	140-160	160-180	180-200
No.of Workers	12	14	8	6	10

Find the mean and mode of the above data. **CBSE2018-3M**

6. By changing the following frequency distribution 'to less than type' distribution, draw its ogive. **CBSE2018-3M**

Class	0-15	15-30	30-45	45-60	60-75
Frequency	6	8	10	6	4

7. Find the median of the following distribution : **CBSE2018-3M**

Class	0-10	10-20	20-30	30-40	40-50
Frequency	8	12	10	11	9

8. 100 surnames were randomly picked up from a local telephone directory and the distribution of number of letters of the English alphabet in the surnames was obtained as follows: **CBSE2008-4M**

No.of Letters	1-4	4-7	7-10	10-13	13-16	16-19
No.of Surnames	6	30	40	16	4	4

Determine the median and mean number of letters in the surnames. Also find the modal size of surnames.

9. The following table gives the daily income of 50 workers of a factory : **CBSE2009-4M**

Daily income (in Rs.)	100-120	120-140	140-160	160-180	180-200
No.of Workers	12	14	8	6	10

Find the mean, median and mode of the data.

10. During the medical check-up of 35 students of a class their weights were recorded as follows : **CBSE2009-4M**

Weight (in kg)	38-40	40-42	42-44	44-46	46-48	48-50	50-52
No.of Students	3	2	4	5	14	4	3

Draw a less than type and a more than type ogive from the given data. Hence obtain the median weight from the graph.

11. Find the mean, median and mode of the data.: **CBSE2010-4M**

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	4	4	7	10	12	8	5

11. Find the mean, median and mode of the data.: **CBSE2010-4M**

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	4	4	7	10	12	8	5

12. If the mean of the following frequency distribution is 65.6. Find the missing frequencies f_1 and f_2. **CBSE2010-4M**

Class	10-30	30-50	50-70	70-90	90-110	110-130
Frequency	5	8	f_1	20	f_2	2

13. The mean of the following distribution is 18. Find the frequency f of the class 19 – 21.
CBSE2018-4M

Class	11-13	13-15	15-17	17-19	19-21	21-23	23-25
Frequency	3	6	9	13	f	5	4

14. The following distribution gives the daily income of 50 workers of a factory :

Daily income (in Rs.)	100-120	120-140	140-160	160-180	180-200
No.of Workers	12	14	8	6	10

Convert the distribution above to a less than type cumulative frequency distribution and draw its ogive. **CBSE2018-4M**

15. The median of the following data is 52.5. If the total frequency is 100, find the values of x and y. **CBSE2018-4M**

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Freq	2	5	x	12	17	20	y	9	7	4

16. Find the mean and mode for the following data : **CBSE2018-4M**

Class	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Freq	4	8	10	12	10	4	2