CHAPTER-WISE PREVIOUS YEARS' QUESTIONS

MATHEMATICS

Class X (CBSE)

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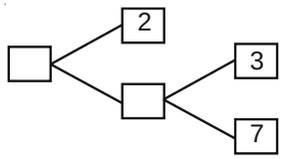
Chapter - 1 : Real Numbers

1. Complete the missing entries in the following factor tree: [2008] ...[1M]



2. Find the (HCF × LCM) for the numbers 100 and 190. [2009] ...[1M]

3. Has the rational number $\frac{441}{2^5 5^7 7^2}$ a terminating or a non-terminating decimal representation? [2010] ...[1M]

4. What is the HCF of smallest prime number and the smallest composite number? [2018] ...[1M]

5. Find a rational number between $\sqrt{2}$ and $\sqrt{3}$. [2019] ...[1M]

6. Given that $\sqrt{2}$ is irrational, prove that $(5 + 3\sqrt{2})$ is an irrational number. [2018] ...[2M]

7. Find the HCF of 1260 and 7344 using Euclid's algorithm. [2019] ...[2M]

8. Show that every positive odd integer is of the form $(4q + 1)$ or $(4q + 3)$, where q is some integer. [2019] ...[2M]

9. Use Euclid's Division Lemma to show that the square of any positive integer is either of the form $3m$ or $(3m + 1)$ for some integer m. [2008] ...[3M]

10. Prove that $3 + \sqrt{2}$ is an irrational number. [2009] ...[3M]

11. Prove that $2 - 3\sqrt{5}$ is an irrational number. [2010] ...[3M]

12. Find HCF and LCM of 404 and 96 and verify that HCF × LCM = Product of the two given numbers. [2018] ...[3M]

13. Prove that $\sqrt{2}$ is an irrational number. [2019] ...[3M]

Chapter - 2 : Polynomials

1. If $(x + a)$ is a factor of $2x^2 + 2ax + 5x + 10$, find a. [2008] ...[1M]

2. If 1 is a zero of the polynomial $p(x) = ax^2 - 3(a - 1)x - 1$, then find the value of a. [2009]...[1M]

3. If α, β are the zeroes of a polynomial, such that $\alpha + \beta = 6$ and $\alpha\beta = 4$, then write the polynomial. [2010] ...[1M]

4. Find all the zeros of the polynomial $x^4 + x^3 - 34x^2 - 4x + 120$, if two of its zeros are 2 and –2. [2008] ...[2M]

5. Find all the zeroes of the polynomial $x^3 + 3x^2 - 2x - 6$, if two of its zeroes are $-\sqrt{2}$ and $\sqrt{2}$. [2009] ...[2M]

6. If two zeroes of the polynomial $x^3 - 4x^2 - 3x + 12$ are $\sqrt{3}$ and $-3\sqrt{}$ then find its third zero. [2010] ...[2M]

7. Find all zeroes of the polynomial $(2x^4 - 9x^3 + 5x^2 + 3x - 1)$ if two of its zeroes are $(2 + \sqrt{3})$ and $(2 - 3\sqrt{})$. [2018] ...[3M]

8. Find the value of k such that the polynomial $x^2 - (k + 6)x + 2(2k - 1)$ has sum of its zeros equal to half of their product. [2019] ...[3M]

Chapter - 3 : Pair of Linear Equations in Two Variables

1. Find the number of solutions of the following pair of linear equations :

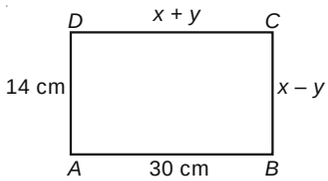
   $x + 2y - 8 = 0$

   $2x + 4y = 16$ [2009] ...[1M]

2. Find the value of k for which the following pair of linear equations have infinitely many solutions $2x + 3y = 7$; $(k - 1)x + (k + 2)y = 3k$.

   [2010] ...[2M]

3. In figure, $ABCD$ is a rectangle. Find the values of x and y. [2018] ...[2M]



4. Find c if the system of equations $cx + 3y + (3 - c) = 0$; $12x + cy - c = 0$ has infinitely many solutions? [2019] ...[2M]

5. Represent the following pair of equations graphically and write the coordinate of points where the lines intersect y-axis.

   $x + 3y = 6$

   $2x - 3y = 12$ [2008] ...[3M]

6. Solve for x and y

   $\frac{ax}{b} - \frac{by}{a} = a + b$

   $ax - by = 2ab$ [2009] ...[3M]

7. The sum of numerator and denominator of a fraction is 3 less than twice the denominator. If each of the numerator and denominator is decreased by 1, the fraction becomes $\frac{1}{2}$. Find the fraction. [2010] ...[3M]

8. Solve the following pair of equations

   $\frac{4}{x} + 3y = 8, \frac{6}{x} - 4y = -5.$ [2010] ...[3M]

9. 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. [2019] ...[3M]

10. A fraction becomes $\frac{1}{3}$ when 2 is subtracted from the numerator and it becomes $\frac{1}{2}$ when 1 is subtracted from the denominator. Find the fraction. [2019] ...[3M]

11. A peacock is sitting on the top of a pillar, which is 9 m high. From a point 27 in away from the bottom of the pillar, a snake is coming to its hole at the base of the pillar. Seeing the snake the peacock pounces on it. If their speeds are equal, at what distance from the hole is the snake caught ? [2008] ...[6M]

Chapter - 4 : Quadratic Equations

1. Show that $x = -3$ is a solution of $x^2 + 6x + 9 = 0$. [2008] ...[1M]

2. Find the discriminant of the quadratic equation $3\sqrt{3}x^2 + 10x + 3\sqrt{} = 0$. [2009] ...[1M]

3. The root of the equation $x^2 - 3x - m(m + 3) = 0$, where m is a constant, are [2011] ...[1M]

   (A) $m, m + 3$

   (B) $-m, m + 3$

   (C) $m, -(m + 3)$

   (D) $-m, -(m + 3)$

4. If 1 is a root of the equations $ay^2 + ay + 3 = 0$ and $y^2 + y + b = 0$, then ab equals [2012]...[1M]

   (A) 3 (B) $-\frac{7}{2}$

   (C) 6 (D) –3

5. If the quadratic equation $px^2 - 2\sqrt{5}px + 15 = 0$ has two equal roots, then find the value of p.

   [2015] ...[1M]

6. If $x = 3$ is one root of the quadratic equation $x^2 - 2kx - 6 = 0$, then find the value of k.

   [2018] ...[1M]

7. For what values of k, the roots of the equation $x^2 + 4x + k = 0$ are real? [2019] ...[1M]

8. Find the value of k for which the roots of the equation $3x^2 - 10x + k = 0$ are reciprocal of each other. [2019] ...[1M]

9. Find the value of m so that the quadratic equation $mx(x - 7) + 49 = 0$ has two equal roots. [2011] ...[2M]

10. Find the value(s) of k so that the quadratic equation $3x^2 - 2kx + 12 = 0$ has equal roots.

[2012] ...[2M]

11. Solve the following quadratic equation for x : $4\sqrt{3}x^2 + 5x - 2\sqrt{3} = 0$. [2013] ...[2M]

12. Solve the quadratic equation $2x^2 + ax - a^2 = 0$ for x. [2014] ...[2M]

13. Solve the following quadratic equation for x :

$4x^2 + 4bx - (a^2 - b^2) = 0$ [2015] ...[2M]

14. If -5 is a root of the quadratic equation $2x^2 + px - 15 = 0$ and the quadratic equation $p(x^2 + x) + k = 0$ has equal roots, find the value of k.

[2016] ...[2M]

15. Find the value of p, for which one root of the quadratic equation $px^2 - 14x + 8 = 0$ is 6 times the other. [2017] ...[2M]

16. The sum of two numbers is 8. Determine the numbers if the sum of their reciprocals is $\frac{8}{15}$

[2009] ...[3M]

17. Find the roots of the following quadratic equation : $x^2 - 3\sqrt{5}x + 10 = 0$. [2011] ...[3M]

18. Solve for x : $4x^2 - 4ax + (a^2 - b^2) = 0$.

[2012] ...[3M]

19. Solve for x : $3x^2 - 2\sqrt{6}x + 2 = 0$. [2012] ...[3M]

20. For what value(s) of k, the roots of the quadratic equation $(k + 4)x^2 + (k + 1)x + 1 = 0$ are equal? [2013] ...[3M]

21. Solve the equation $\frac{4}{x} - 3 = \frac{5}{2x + 3}; x \neq 0, -\frac{3}{2}$, for x. [2014]....[3M]

22. Solve of x :

$\sqrt{3}x^2 - 2\sqrt{2}x - 2\sqrt{3} = 0$ [2015]....[3M]

23. Solve for x

$$\frac{1}{(x-1)(x-2)} + \frac{1}{(x-2)(x-3)} = \frac{2}{3}, x \neq 1, 2, 3$$

[2016] ...[3M]

24. If $ad \neq bc$, then prove that the equation $(a^2 + b^2)x^2 + 2(ac + bd)x + (c^2 + d^2) = 0$ has no real roots. [2017] ...[3M]

25. A plane left 30 minutes late 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. [2018] ...[3M]

26. Sum of the areas of two squares is 400 cm^2. If the difference of their perimeters is 16 cm, find the sides of the two squares. [2013] ...[4M]

27. Solve the following for x :

$$\frac{1}{2a + b + 2x} = \frac{1}{2a} + \frac{1}{b} + \frac{1}{2x}$$ [2013] ...[4M]

28. The difference of two natural numbers is 5 and the difference of their reciprocals is $\frac{1}{10}$. Find the numbers. [2014] ...[4M]

29. Find the values of k for which the quadratic equation $(k + 4)x^2 + (k + 1)x + 1 = 0$ has equal roots. Also, find the roots. [2014] ...[4M]

30. The diagonal of a rectangular field is 16 metres more than the shorter side. If the longer side is 14 metres more than the shorter side, then find the lengths of the sides of the field. [2015]...[4M]

31. A train travels at a certain average speed for a distance of 54 km and then travels a distance of 63 km at an average speed of 6 km/h more than the first speed. If it takes 3 hours to complete the total journey, what is its first speed?

[2015] ...[4M]

32. Solve for x :

$$\frac{1}{x+1} + \frac{2}{x+2} = \frac{4}{x+4}; x \neq -1, -2, -4$$

[2016] ...[4M]

33. A motor-boat whose speed is 24 km/h in still water takes 1 hour more to go 32 km upstream than to return downstream to the same spot. Find the speed of the stream. [2016] ...[4M]

34. Solve of x :

$$\frac{1}{x+1}+\frac{3}{5}=\frac{5}{x+1}, x \neq -1, \frac{-1}{x+4}-4 \quad 5,$$

[2017] ...[4M]

35. Two taps running together can fill a tank in $3\frac{1}{13}$ hours. If one tap takes 3 hours more than the other to fill the tank, then how much time will each tap take to fill the tank? [2017] ...[4M]

36. A motor-boat whose speed is 18 km/hr in still water take 1 hr more to go 24 km upstream than to return downstream to the same spot. Find the speed of the stream. [2018] ...[4M]

37. 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. It takes 3 hours to complete total journey, what is the original average speed? [2018] ...[4M]

38. Two water taps together can fill a tank in $1\frac{7}{8}$ hours. The tap with longer diameter takes 2 hours less than the tap with smaller one to fill the tank separately. Find the time in which each tap can fill the tank separately. [2019] ...[4M]

39. The difference of two numbers is 4. If the difference of their reciprocals is $\frac{4}{21}$, find the two numbers. [2008] ...[6M]

40. Solve the following equation for x:

$9x^2 - 9(a + b)x + (2a^2 + 5ab + 2b^2) = 0$

[2009] ...[6M]

41. If (–5) is a root of the quadratic equation $2x^2 + px - 15 = 0$ and the quadratic equation $p(x^2 + x) + k = 0$ has equal roots, then find the values of p and k. [2009] ...[6M]

42. Three consecutive positive integers are such that the sum of the square of the first and the product of the other two is 46, find the integers. [2010] ...[6M]

43. The difference of squares of two numbers is 88. If the larger number is 5 less than twice the smaller number, then find the two numbers. [2010] ...[6M]

44. A train travels 180 km at a uniform speed. If the speed had been 9 km/hour more, it would have taken 1 hour less for the same journey. Find the speed of the train. [2011] ...[6M]

45. Find the roots of the equation

$$\frac{1}{2x-3}+\frac{1}{x-5}=1, x \neq \frac{3}{2}, 5.$$ [2011] ...[6M]

46. A shopkeeper buys books of the `80. If he had bought 4 more books for the same amount, each book would have cost `1 less. Find the number of books he bought. [2012] ...[6M]

47. The sum of two numbers is 9 and the sum of their reciprocals is $\frac{1}{2}$. Find the numbers. [2012] ...[6M]

Chapter - 5 : Arithmetic Progressions

1. The first term of an AP is p and its common difference is q. Find its 10^{th} term. [2008] ...[1M]

2. If $\frac{4}{5}$, a, 2 are three consecutive terms of an AP, then find the value of a. [2009] ...[1M]

3. If the sum of first p terms of an AP, is $ap^2 + bp$, find its common difference. [2010] ...[1M]

4. If the common difference of an AP is 3, then $a_{20} - a_{15}$ is [2011] ...[1M]

(A) 5

(B) 3

(C) 15

(D) 20

5. The sum of first 20 odd natural number is [2012] ...[1M]

(A) 100

(B) 210

(C) 400

(D) 420

6. The common difference of AP

$\frac{1}{3q}, \frac{1-6q}{3q}, \frac{1-12q}{3q}, \ldots$ is [2013] ...[1M]

(A) q (B) $-q$

(C) –2 (D) 2

7. The first three terms of an AP respectively are $3y - 1$, $3y + 5$ and $5y + 1$. The y equals

[2014] ...[1M]

(A) –3 (B) 4

(C) 5 (D) 2

8. For what value of k will $k + 9$, $2k - 1$ and $2k + 7$ are the consecutive terms of an AP?

[2016] ...[1M]

9. What is the common difference of an AP in which $a_{21} - a_7 = 84$? [2017] ...[1M]

10. In an AP, if the common difference (d) = – 4, and the seventh term (a_7) is 4, then find the first term. [2018] ...[1M]

11. How many two digit numbers are divisible by 3? [2019] ...[1M]

12. Which term of the AP 3, 15, 27, 39, ... will be 120 more than its 21st term? [2009, 2019]...[2M]

13. In an AP, the first term is 2, the last term is 29 and sum of the terms is 155. Find the common difference of the AP [2010] ...[2M]

14. Find how many two-digit numbers are divisible by 6. [2011] ...[2M]

15. Find the sum of all three digit natural numbers, which are multiples of 7. [2012] ...[2M]

OR

How many three-digit natural numbers are divisible by 7? [2013] ...[2M]

16. The first and the last term of an AP are 5 and 45 respectively. If the sum of all its terms is 400, find its common difference. [2014, 2017] ...[2M]

17. In an AP, if $S_5 + S_7 = 167$ and $S_{10} = 235$, then find the AP, where S_n denotes the sum of its first n terms. [2015] ...[2M]

18. The 4th term of an AP is zero. Prove that the 25th term of the AP is three times its 11th term.

[2016] ...[2M]

19. Which term of the progression 20, $19\frac{1}{4}, 18\frac{1}{2}, 17\frac{3}{4}, \ldots\ldots$ is the first negative term?

[2017] ...[2M]

20. Find the sum of first 8 multiples of 3. [2018]. [2M]

21. If S_n, the sum of first n terms of an AP is given by $S_n = 3n^2 - 4n$, find the n^{th} term. [2019]...[2M]

22. For what value of n are the n^{th} terms of two AP's 63, 65, 67, ... and 3, 10, 17, ... equal?

[2008] ...[3M]

23. If m times the m^{th} term of an AP is equal to n times its n^{th} term, find the $(m + n)^{th}$ term of the AP. [2008] ...[3M]

24. In an AP, the first term is 8, n^{th} term is 33 and sum to first n terms is 123. Find n and d, the common difference. [2008] ...[3M]

25. The sum of first six terms of an arithmetic progression is 42. The ratio of its 10th term to its 30th term is 1 : 3. Calculate the first and the thirteenth term of the AP.? [2009] ...[3M]

26. In an AP, the sum of first ten terms is –150 and the sum of its next ten terms is –550. Find the AP [2010] ...[3M]

27. Find an AP whose fourth term is 9 and the sum of its sixth term and thirteenth term is 40.

[2011] ...[3M]

28. The 16th term of an AP is 1 more than twice its 8th term. If the 12th term of the AP is 47, then find its n^{th} term. [2012] ...[3M]

29. The sum of first n terms of an AP is $3n^2 + 4n$. Find the 25th term of this AP. [2013] ...[3M]

30. If the seventh term of an AP is $\frac{1}{9}$ and its ninth term is $\frac{1}{7}$, find its 63rd term. [2014] ...[3M]

31. The 14th term of an AP is twice its 8th term. If its 6th term is –8, then find the sum of its first 20 terms. [2015] ...[3M]

32. If the ratio of the sum of first n terms of two AP's is $(7n + 1) : (4n + 27)$, find the ratio of their m^{th} terms. [2016] ...[3M]

OR

If the ratio of the sum of the first n terms of two AP's is $(7n + 1) : (4n + 27)$, then find the ratio of their 9th terms. [2017] ...[4M]

33. The first and the last terms of an A.P. are 8 and 350 respectively. If its common difference is 9, how many terms are there and what is their sum? [2011] ...[4M]

34. How many multiples of 4 lie between 10 and 250? Also find their sum. [2011] ...[4M]

35. Sum of the first 20 terms of an AP is –240 and its first term is 7. Find its 24^{th} term. [2012] ...[4M]

36. Find the number of terms of the AP –12, –9, –6, ... 12. If 1 is added to each term of this AP, then find the sum of terms of the AP thus obtained. [2013]....[4M]

37. 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. [2014] [4M]

38. Find the 60^{th} term of the AP 8, 10, 12....., if it has a total of 60 terms and hence find the sum of its last 10 terms. [2015]....[4M]

39. The houses in a row numbered consecutively from 1 to 49. Show that there exists a value of X such that sum of numbers of houses preceding the house numbered X is equal to sum of the numbers of houses following X.
[2016] ...[4M]

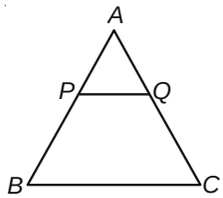
40. The sum of four consecutive numbers in an AP is 32 and the ratio of the product of the first and the last term to the product of two middle terms is 7 : 15. Find the numbers. [2018] ...[4M]

41. If the sum of first four terms of an AP is 40 and that of first 14 terms is 280. Find the sum of its first n terms. [2019] ...[4M]

Chapter - 6 : Triangles

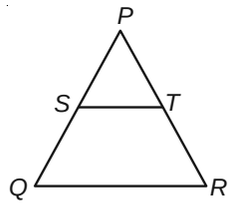
1. The lengths of the diagonals of a rhombus are 30 cm and 40 cm. Find the side of the rhombus. [2008]...[1M]

2. In figure, $PQ \parallel BC$ and $AP : PB = 1 : 2$. Find $\frac{ar(\Delta APQ)}{ar(\Delta ABC)}$. [2008]...[1M]

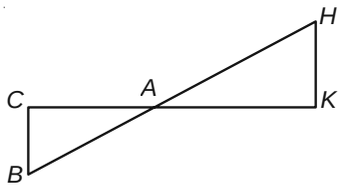


3. In ΔLMN, $\angle L = 50°$ and $\angle N = 60°$. If $\Delta LMN \sim \Delta PQR$, then find $\angle Q$. [2009]...[1M]

4. In below figure, S and T are points on the sides PQ and PR respectively of ΔPQR, such that $PT = 2$ cm, $TR = 4$ cm and ST is parallel to QR. Find the ratio of the areas of ΔPST and ΔPQR. [2010] ...[1M]

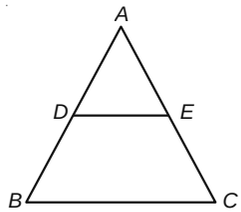


5. In below figure, ΔAHK is similar to ΔABC. If $AK = 10$ cm, $BC = 3.5$ cm and $HK = 7$ cm, find AC. [2010]...[1M]



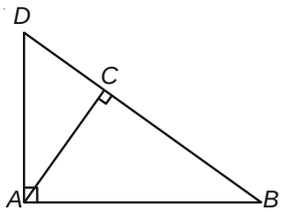
6. Given $\Delta ABC \sim \Delta PQR$, if $\frac{AB}{PQ} = \frac{1}{3}$, then find $\frac{ar(\Delta ABC)}{ar(\Delta PQR)}$. [2018]...[1M]

7. In figure, $DE \parallel BC$, $AD = 1$ cm and $BD = 2$ cm. What is the ratio of the ar(ΔABC) to the ar(ΔADE)? [2019]...[1M]

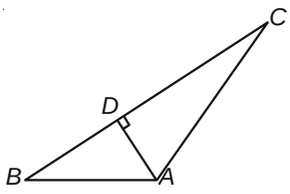


8. E is a point on the side AD produced of parallelogram $ABCD$ and BE intersects CD at F. Show that $\Delta ABE \sim \Delta CFB$. [2008]...[2M]

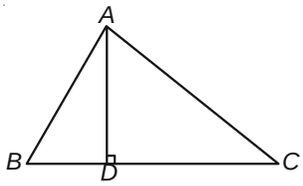
9. In figure, ΔABD is a right triangle, right-angled at A and $AC \perp BD$. Prove that $AB^2 = BC.BD$.
[2009] ...[2M]



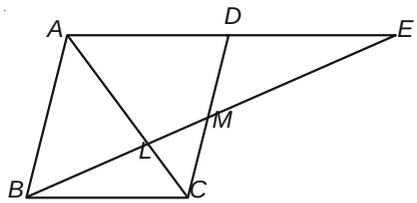
10. In figure, $AD \perp BC$. Prove that $AB^2 + CD^2 = BD^2 + AC^2$. [2008]...[3M]



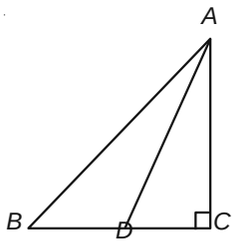
11. In figure, $AD \perp BC$ and $BD = \frac{1}{3} CD$. Prove that $2CA^2 = 2AB^2 + BC^2$ [2009] ...[3M]



12. In figure, M is mid-point of side CD of a parallelogram $ABCD$. The line BM is drawn intersecting AC at L and AD produced at E. Prove that $EL = 2BL$. [2009] ...[3M]



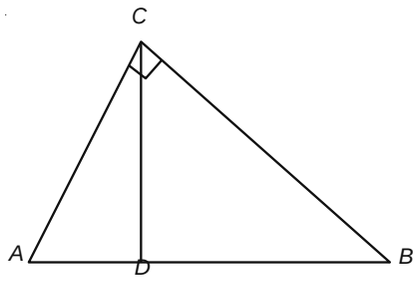
13. In below figure, ABC is a right triangle, right angled at C, and D is the midpoint of BC. Prove that $AB^2 = 4AD^2 - 3AC^2$. [2010] ...[3M]



14. Prove that the area of an equilateral triangle described on one side of the square is equal to half the area of the equilateral triangle described on one of its diagonal. [2018] ...[3M]

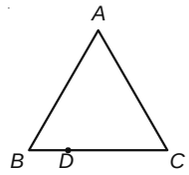
15. If the area of two similar triangles are equal, prove that they are congruent. [2018] ...[3M]

16. In figure, $\angle ACB = 90°$ and $CD \perp AB$, prove that $CD^2 = BD \times AD$. [2019] ...[3M]



17. If P and Q are the points on side CA and CB respectively of ΔABC, right angled at C, prove that $(AQ^2 + BP^2) = (AB^2 + PQ^2)$ [2019] ...[3M]

18. In an equilateral ΔABC, D is a point on side BC such that $BD = \frac{1}{3} BC$. Prove that $9(AD)^2 = 7(AB)^2$. [2018] ...[4M]

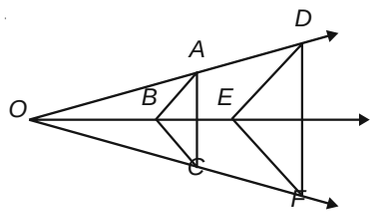


19. Prove that, in a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides. [2018, 2019] ...[4M]

20. If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, prove that the other two sides are divided in the same ratio.

Using the above, prove the following :

In figure, $AB \parallel DE$ and $BC \parallel EF$. Prove that $AC \parallel DF$. [2008] ...[6M]



21. Prove that the ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides.

Using the above, prove the following :

If the areas of two similar triangles are equal, then prove that the triangles are congruent.

[2010] ...[6M]

Chapter - 7 : Coordinate Geometry

1. If $P(2, p)$ is the mid-point of the line segment joining the points $A(6, -5)$ and $B(-2, 11)$, find the value of p. [2010] ...[1M]

2. If $A(1, 2)$, $B(4, 3)$ and $C(6, 6)$ are the three vertices of a parallelogram $ABCD$, find the coordinates of the fourth vertex D.[2010] ...[1M]

3. If $P\left(\frac{a}{2}, 4\right)$ is the midpoint of the line-segment joining the points $A(-6, 5)$ and $B(-2, 3)$, then the value of a is [2011] ...[1M]

   (A) –8 (B) 3

   (C) –4 (D) 4

4. If A and B are the points $(-6, 7)$ and $(-1, -5)$ respectively, then the distance $2AB$ is equal to [2011] ...[1M]

   (A) 13 (B) 26

   (C) 169 (D) 238

5. The coordinates of the point P dividing the line segment joining the points $A(1, 3)$ and $B(4, 6)$ in the ratio 2 : 1 are [2012] ...[1M]

   (A) (2, 4) (B) (3, 5)

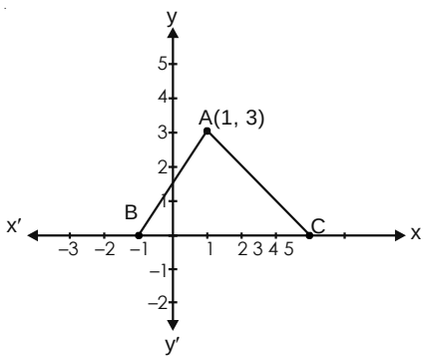
   (C) (4, 2) (D) (5, 3)

6. If the coordinates of the one end of a diameter of a circle are (2, 3) and the coordinates of its centre are (–2, 5), then the coordinates of the other end of the diameter are [2012] ...[1M]

   (A) (–6, 7) (B) (6, –7)

   (C) (6, 7) (D) (–6, –7)

7. In below figure, the area of the triangle ABC (in sq. units) is [2013] ...[1M]



   (A) 15 (B) 10

   (C) 7.5 (D) 2.5

8. If the points $A(x, 2)$, $B(-3, -4)$ and $C(7, -5)$ are collinear, then the value of x is [2014] ...[1M]

   (A) –63 (B) 63

   (C) 60 (D) –60

9. Find the distance of a point $P(x, y)$ from the origin. [2018] ...[1M]

10. Find the coordinates of a point A, where AB is diameter of a circle whose centre is (2, –3) and B is the point (1, 4). [2019] ...[1M]

11. Find the value of k if the points $(k, 3)$, $(6, -2)$ and $(-3, 4)$ are collinear. [2008] ...[2M]

12. If the points $A(4, 3)$ and $B(x, 5)$ are on the circle with the centre $O(2, 3)$, find the value of x. [2009] ...[2M]

13. Find the value of y for which the distance between the points $A(3, -1)$ and $B(11, y)$ is 10 units. [2011] ...[2M]

14. If a point $A(0, 2)$ is equidistant from the points $B(3, p)$ and $C(p, 5)$ then find the value of p. [2012] ...[2M]

15. The points $A(4, 7)$, $B(p, 3)$ and $C(7, 3)$ are the vertices of a right triangle, right-angled at B, find the values of P. [2015] ...[2M]

16. Find the relation between x and y if the points $A(x, y)$, $B(-5, 7)$ and $C(-4, 5)$ are collinear. [2015] ...[2M]

17. Let P and Q be the points of trisection of the line segment joining the points $A(2, -2)$, and $B(-7, 4)$ such that P is nearer to A. Find the coordinates of P and Q. [2016] ...[2M]

18. Prove that the points (3, 0), (6, 4) and (–1, 3) are the vertices of a right angled isosceles triangle. [2016] ...[2M]

19. A line intersects the y-axis and x-axis at the points P and Q respectively. If (2, –5) is the mid-point of PQ, then find the coordinates of P and Q. [2017] ...[2M]

20. If the distances of $P(x, y)$ from $A(5, 1)$ and $B(-1, 5)$ are equal, then prove that $3x = 2y$. [2017] ...[2M]

21. Find the ratio in which $P(4, m)$ divides the line segment joining the points $A(2, 3)$ and $B(6, -3)$. Hence find m. [2018] ...[2M]

22. Find the ratio in which the segment joining the points (1, –3) and (4, 5) is divided by *x*-axis? Also find the coordinates of this point on *x*-axis.

[2019] ...[2M]

23. If *P* divides the joining of *A*(–2, –2) and *B*(2, –4) such that $\frac{AP}{AB}=\frac{3}{7}$, find the coordinates of *P*.

[2008] ...[3M]

24. The mid-points of the sides of a triangle are (3, 4), (4, 6) and (5, 7). Find the coordinates of the vertices of the triangle. [2008] ...[3M]

25. Find the ratio in which the point (2, *y*) divides the line segment joining the points *A*(–2, 2) and *B*(3, 7). Also find the value of *y*. [2009] ...[3M]

26. Find the area of the quadrilateral *ABCD* whose vertices are *A*(–4, –2), *B*(–3, –6), *C*(3, –2) and *D*(2, 3) [2009] ...[3M]

27. Point *P* divides the line segment joining the points *A*(2, 1) and *B*(5, –8) such that $\frac{AP}{AB}=\frac{1}{3}$. If *P* lies on the line $2x - y + k = 0$, find the value of *k*. [2010] ...[3M]

28. If *R*(*x*, *y*) is a point on the line segment joining the points *P*(*a*, *b*) and *Q*(*b*, *a*), then prove that $x + y = a + b$. [2010] ...[3M]

29. Point *P*(*x*, 4) lies on the line segment joining the points *A*(–5, 8) and *B*(4, –10). Find the ratio in which point *P* divides the line segment *AB*. Also find the value of *x*. [2011] ...[3M]

30. Find the area of quadrilateral *ABCD*, whose vertices are *A*(–3, –1), *B*(–2, –4), *C*(4, –1) and *D*(3, 4). [2011] ...[3M]

31. Find the area of the triangle formed by joining the midpoints of the sides of the triangle whose vertices are *A*(2, 1), *B*(4, 3) and *C*(2, 5).

[2011] ...[3M]

32. A point *P* divides the line segment joining the points *A*(3, –5) and *B*(–4, 8) such that $\frac{AP}{PB}=\frac{K}{1}$. If *P* lies on the line $x + y = 0$, then find the value of *K*. [2012] ...[3M]

33. If the vertices of triangle are (1, –3), (4, *p*) and (–9, 7) and its area is 15 sq. units, find the value(s) of *p*. [2012] ...[3M]

34. Find the ratio in which the *y*-axis divides the line segment joining the points (–4, –6) and (10, 12). Also, find the coordinates of the point of division.

[2013] ...[3M]

35. Show that the points (–2, 3), (8, 3) and (6, 7) are the vertices of a right triangle. [2013] ...[3M]

36. If the point *A*(0, 2) is equidistant from the points *B*(3, *p*) and *C*(*p*, 5), find *P*, also find the length of *AB*. [2014] ...[3M]

37. If the points *A*(–2, 1), *B*(*a*, *b*) and *C*(4, –1) are collinear and $a - b = 1$, find the values of *a* and *b*. [2014] ...[3M]

38. If the coordinates of points *A* and *B* are (–2, –2) and (2, –4) respectively, find the coordinates of *P* such that $AP=\frac{3}{7}AB$, where *P* lies on the line segment *AB*. [2015] ...[3M]

39. If the point P(*x*, *y*) is equidistant from the points *A*(*a* + *b*, *b* – *a*) and *B*(*a* – *b*, *a* + *b*). Prove that $bx = ay$. [2016] ...[3M]

40. 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*. [2017] ...[3M]

41. If *A*(–2, 1), *B*(*a*, 0), *C*(4, *b*) and *D*(1, 2) are the vertices of a parallelogram *ABCD*, find the values of *a* and *b*. Hence find the lengths of its sides.

[2018]...[3M]

42. If *A*(–5, 7), *B*(–4, –5), *C*(–1, –6) and *D*(4, 5) are the vertices of quadrilateral, find the area of the quadrilateral *ABCD*. [2018] ...[3M]

43. Find the point on *y*-axis which is equidistant from the points (5, –2) and (–3, 2).[2019]...[3M]

44. The line segment joining the points *A*(2, 1) and *B*(5, –8) is trisected at the points *P* and *Q* such that *P* is nearer to *A*. If *P* also lies on the line given by $2x - y + k = 0$, find the value of *k*.

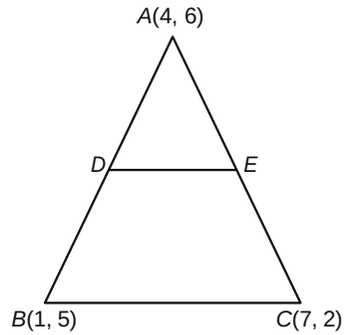
[2019] ...[3M]

45. If the area of triangles *ABC* formed by *A*(*x*, *y*), *B*(1, 2) and *C*(2, 1) is 6 square units, then prove that $x + y = 15$. [2013] ...[4M]

46. Find the ratio in which the point $P(x, 2)$ divides the line segment joining the points $A(12, 5)$ and $B(4, -3)$. Also find the value of x. [2014] ...[4M]

47. Find the values of k so that the area of the triangle with vertices $(1, -1)$, $(-4, 2k)$ and $(-k, -5)$ is 24 sq. units. [2015] ...[4M]

48. In figure, the vertices of ΔABC are $A(4, 6)$, $B(1, 5)$ and $C(7, 2)$. A line-segment DE is drawn to intersect the sides AB and AC at D and E respectively such that $\frac{AD}{AB} = \frac{AE}{AC} = \frac{1}{3}$. Calculate the area of ΔADE and compare it with area of ΔABC. [2016] ...[4M]



49. If the points $A(k + 1, 2k)$, $B(3k, 2k + 3)$ and $C(5k - 1, 5k)$ are collinear, then find the value of k. [2017] ...[4M]

Chapter - 8 : Introduction to Trigonometry

1. If $\tan A = \frac{5}{12}$, find the value of $(\sin A + \cos A)\sec A$. [2008] ...[1M]

2. If $\sec^2\theta(1 + \sin\theta)(1 - \sin\theta) = k$, then find the value of k. [2009] ...[1M]

3. If $3x = \text{cosec}\,\theta$ and $\frac{3}{x} = \cot\theta$, find the value of $3\left(x^2 - \frac{1}{x^2}\right)$. [2010] ...[1M]

4. What is the value of $(\cos^2 67° - \sin^2 23°)$? [2018] ...[1M]

5. Find A if $\tan 2A = \cot(A - 24°)$ [2019] ...[1M]

6. Find the value of $(\sin^2 33° + \sin^2 57°)$ [2019] ...[1M]

7. If $\sec 4A = \text{cosec}(A - 20°)$, where $4A$ is an acute angle, find the value of A. [2008] ...[2M]

8. In a ΔABC, right-angled at C, if $\tan A = \frac{1}{\sqrt{3}}$, find the value of $\sin A \cos B + \cos A \sin B$. [2008] ...[2M]

9. If $\cot\theta = \frac{15}{8}$, then evaluate $\frac{(2 + 2\sin\theta)(1 - \sin\theta)}{(1 + \cos\theta)(2 - 2\cos\theta)}$. [2009] ...[2M]

10. Find the value of $\tan 60°$, geometrically. [2009] ...[2M]

11. Without using trigonometric tables, find the value of the following expression

$$\frac{\sec(90° - \theta).\text{cosec}\,\theta - \tan\theta(90° - \theta)\cot\theta + \cos^2 25° + \cos^2 65°}{3\tan 27°\cdot\tan 63°}$$

[2010] ...[2M]

12. Find the value of cosec 30° geometrically. [2010] ...[2M]

13. Prove that : $(1 + \cot A + \tan A)(\sin A - \cos A) = \sin A \tan A - \cot A \cos A$. [2008] ...[3M]

14. Without using trigonometric tables, evaluate the following :

$$2\left(\frac{\cos 58°}{\sin 32°}\right) - \sqrt{3}\left(\frac{\cos 38°\,\text{cosec}\,52°}{\tan 15°\tan 60°\tan 75°}\right)$$

[2008] ...[3M]

15. Evaluate :

$$\frac{2}{3}\text{cosec}^2 58° - \frac{2}{3}\cot 58°\tan 32° - \frac{5}{3}\tan 13°$$

$\tan 37°\ \tan 45°\ \tan 53°\ \tan 77°$ [2009] ...[3M]

16. Prove the following :

$$\frac{\tan A}{1 - \cot A} + \frac{\cot A}{1 - \tan A} = 1 + \tan A + \cot A.$$

[2010] ...[3M]

17. Prove the following :

$$(\text{cosec}\,A - \sin A)(\sec A - \cos A) = \frac{1}{\tan A + \cot A}.$$

[2010] ...[3M]

18. If $4\tan\theta = 3$, evaluate $\left(\frac{4\sin\theta - \cos\theta + 1}{4\sin\theta + \cos\theta - 1}\right)$ [2018] ...[3M]

19. If $\tan 2A = \cot(A - 18°)$, where $2A$ is an angle, find the value of A. [2018] ...[3M]

20. Prove that : $(\sin\theta + \operatorname{cosec}\theta)^2 + (\cos\theta + \sec\theta)^2 = 7 + \tan^2\theta + \cot^2\theta$. [2019] ...[3M]

21. Prove that : $(1 + \cot A - \operatorname{cosec} A)(1 + \tan A + \sec A) = 2$. [2019] ...[3M]

22. Prove that $\frac{\sin A - 2\sin^3 A}{2\cos^3 A - \cos A} = \tan A$ [2018] ...[4M]

23. Prove that $\frac{\sin A - \cos A + 1}{\sin A + \cos A - 1} = \frac{1}{\sec A - \tan A}$ [2019] .. [4M]

Chapter - 9 : Some Applications of Trigonometry

1. A tower stands vertically on the ground. From a point on the ground which is 25 m away from the foot of the tower, the angle of elevation of the top of the tower is found to be 45°. Then the height (in meters) of the tower is [2011] ...[1M]

   (A) $25\sqrt{2}$ (B) $25\sqrt{3}$

   (C) 25 (D) 12.5

2. The length of shadow of a tower on the plane ground is $\sqrt{3}$ times the height of the tower. The angle of elevation of Sun is [2012] ...[1M]

   (A) 45° (B) 30°

   (C) 60° (D) 90°

3. The angle of depression of a car, standing on the ground, from the top of a 75 m high tower, is 30°. The distance of the car from the base of the tower (in metre) is [2013] ...[1M]

   (A) $25\sqrt{3}$ (B) $50\sqrt{3}$

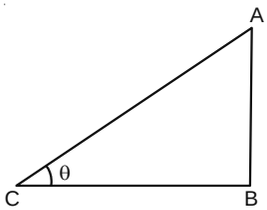
   (C) $75\sqrt{3}$ (D) 150

4. A ladder makes an angle of 60º with the ground when placed against a wall. If the foot of the ladder is 2 m away from the wall, then the length (in meters) is [2014] ...[1M]

   (A) $\frac{4}{\sqrt{3}}$ (B) $4\sqrt{3}$

   (C) $2\sqrt{2}$ (D) 4

5. In the following figure, a tower AB is 20 m high and BC, its shadow on the ground is $20\sqrt{3}$ m long. Find the Sun's altitude. [2015] ...[1M]



6. A ladder leaning against a wall makes an angle of 60º with the horizontal. If the foot of the ladder is 2.5 m away from the wall, find the length of the ladder. [2016] ...[1M]

7. If a tower 30 m high, casts a shadow $10\sqrt{3}$ m long on the ground, then what is the angle of elevation of the sun? [2017] ...[1M]

8. From the top of a vertical tower, the angles of depression of two cars, in the same straight line with the base of the tower, at an instant are found to be 45° and 60°. If the cars are 100 m in apart and are on the same side of the tower, find the height of the tower. ($\sqrt{3} = 1.73$)

   [2011] ...[3M]

9. A kite is flying at a height of 45 m above the ground. The string attached to the kite is temporarily tied to a point on the ground. The inclination of the string with the ground is 60°. Find the length of the string assuming that there is no slack in the string. [2012] ...[3M]

10. The horizontal distance between two poles is 15 m. The angle of depression of the top of first pole as seen from the top of second pole is 30°. If the height of the second pole is 24 m, find the height of the first pole. [Use $\sqrt{3} = 1.732$]

    [2013] ...[3M]

11. Two ships are there in the sea on either side of a light house in such a way that the ships and the light house are in the same straight line. The angles of depression of two ships as observed from the top of the light house are 60º and 45º. If the height of the light house is 200 m, find the distance between the two ships. (Use $\sqrt{3} = 1.73$) [2014] ...[3M]

12. The angle of elevation of an aeroplane from point A on the ground is 60º. After flight of 15 seconds, the angle of elevation changes to 30º. If the aeroplane is flying at a constant height of $1500\sqrt{3}$ m, find the speed of the plane in km/hr. [2015] ...[3M]

13. A man standing on the deck of a ship, which is 10 m above water level, observes the angle of elevation of the top of a hill as 60º and the angle of depression of the base of the hill as 30º. Find the distance of the hill from the ship and the height of the hill. [2016] ...[3M]

14. On a straight line passing through the foot of a tower, two points *C* and *D* are at distances of 4 m and 16 m from the foot respectively. If the angles of elevation from *C* and *D* of the top of the tower are complementary, then find the height of the tower. [2017] ...[3M]

15. Two poles of equal heights are standing opposite to each other on either side of the roads, which is 80 m wide. From a point between them on the road, the angles of elevation of the top of the poles are 60º and 30º respectively. Find the height of the poles and the distances of the point from the poles. [2013] ...[4M]

16. The angles of elevation and depression of the top and the bottom of a tower from the top of a building, 60 m high, are 30° and 60° respectively. Find the difference between the heights of the building and the tower and the distance between them. [2014] ...[4M]

17. At a point *A*, 20 metres above the level of water in a lake, the angle of elevation of a cloud is 30º. The angle of depression of the reflection of the cloud in the lake, at *A* is 60º. Find the distance of the cloud from *A*. [2015] ...[4M]

18. The angle of elevation of the top *Q* of a vertical tower *PQ* from a point *X* on the ground is 60º. From a point *Y*, 40 m vertically above *X*, the angle of elevation of the top *Q* of tower is 45º. Find the height of the tower *PQ* and the distance *PX*. $(\text{Use } 3\sqrt{=}1.73)$ [2016] ...[4M]

19. An aeroplane is flying at a height of 300 m above the ground. Flying at this height, the angles of depression from the aeroplane of two points on both banks of a river in opposite directions are 45° and 30° respectively. Find the width of the river. $[\text{Use } \sqrt{3} = 1.732]$ [2017] ...[4M]

20. As observed from the top of a 100 m high light house from the sea-level, the angles of depression of two ships are 30° and 45°. If one ship is exactly being the other on the same side of the light house, find the distance between the two ships. $[\text{Use } \sqrt{3} = 1.732]$ [2018] ...[4M]

21. A man in a boat rowing away from a light house 100 m high 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 metres per minute. $[\text{Use}\sqrt{3} = 1.732]$ [2019] ...[4M]

22. The angle of elevation of an aeroplane from a point *A* on the ground is 60°. After a flight of 30 seconds, the angle of elevation changes to 30°. If the plane is flying at a constant height of $3600\sqrt{3}$ m, then find the speed (in km/hour) of the plane. [2008] ...[6M]

23. An aeroplane when flying at a height 3125 m from the ground passes vertically below another plane at that instant when the angles of elevation of the two planes from the same point on the ground are 30° and 60° respectively. Find the distance between the two planes at that instant. [2009] ...[6M]

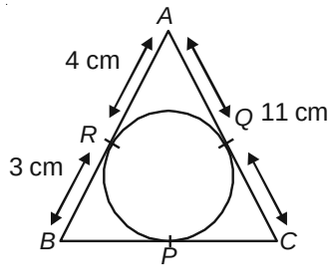
24. From the top of a 7 m high building, the angle of elevation of the top of a tower is 60° and the angle of depression of the foot of the tower is 45°. Find the height of the tower. [2010] ...[6M]

25. The angle of elevation of the top of a vertical tower from a point on the ground is 60°. From another point 10 m vertically above the first, its angle of elevation is 30°. Find the height of the tower. [2011] ...[6M]

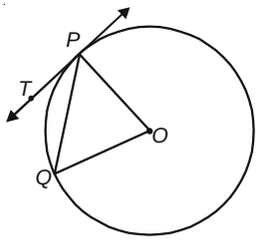
26. The angle of elevation of the top of a hill from the foot of a tower is 60° and the angle of depression from the top of the tower to the foot of the hill is 30°. If the tower is 50 m high, find the height of the hill. [2012] ...[6M]

Chapter - 10 : Circles

1. In figure, ΔABC is circumscribing a circle. Find the length of BC. [2009, 2012] ...[1M]



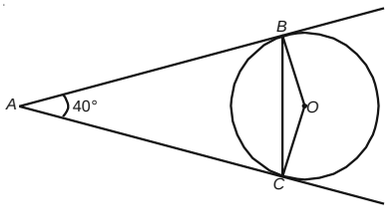
2. If figure, O is the centre of a circle, PQ is a chord and PT is the tangent at P. If $\angle POQ = 70°$, then $\angle TPQ$ is equal to [2011] ...[1M]



(A) 55° (B) 70°

(C) 45° (D) 35°

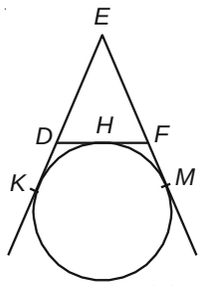
3. In figure, AB and AC are tangents to the circle with center O such that $\angle BAC = 40°$. Then $\angle BOC$ is equal to [2011] ...[1M]



(A) 40° (B) 50°

(C) 140° (D) 160°

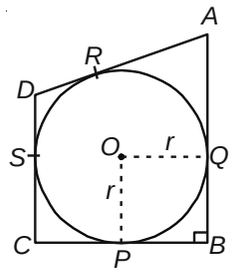
4. In figure, a circle touches the side DF of ΔEDF at H and touches ED and EF produced at K and M respectively. If $EK = 9$ cm, then the perimeter of ΔEDF (in cm) is [2012] ...[1M]



(A) 18 (B) 13.5

(C) 12 (D) 9

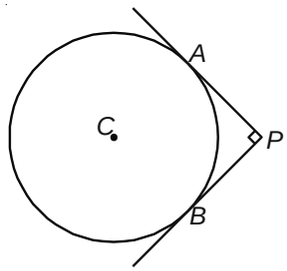
5. In below figure, a circle with centre O is inscribed in a quadrilateral $ABCD$ such that, it touches the sides BC, AB, AD and CD at point P, Q, R and S respectively. If $AB = 29$ cm, $AD = 23$ cm, $\angle B = 90°$ and $DS = 5$ cm, then the radius of the circle (in cm) is [2013] ...[1M]



(A) 11 (B) 18

(C) 6 (D) 15

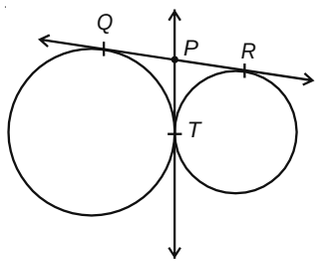
6. In below figure, PA and PB are two tangents drawn from an external point P to a circle with centre C and radius 4 cm. If $PA \perp PB$, then the length of each tangent is [2013] ...[1M]



(A) 3 cm (B) 4 cm

(C) 5 cm (D) 6 cm

7. In figure, QR is a common tangent to the given circles, touching externally at the point T. The tangent at T meets QR at P. If $PT = 3.8$ cm, then the length of QR (in cm) is [2014] ...[1M]

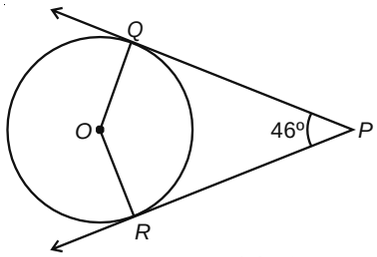


(A) 3.8 (B) 7.6

(C) 5.7 (D) 1.9

8. In figure, PQ and PR two tangents to a circle with centre O. If $\angle QPR = 46°$, $\angle QOR$ equals:

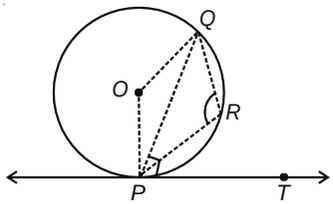
[2014] ...[1M]



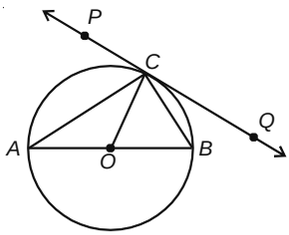
(A) 67° (B) 134°

(C) 44° (D) 46°

9. In the following figure, PQ is a chord of a circle with centre O and PT is a tangent. If $\angle QPT = 60°$, find $\angle PRQ$ [2015] ...[1M]



10. In the figure, PQ is a tangent at a point C to a circle with centre O. If AB is a diameter and $\angle CAB = 30°$, find $\angle PCA$. [2016] ...[1M]



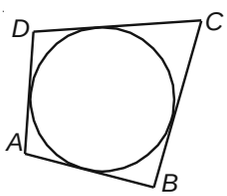
11. If the angle between two tangents drawn from an external point P to a circle of radius a and centre of O, is 60°, then find the length of OP.

[2017]...[1M]

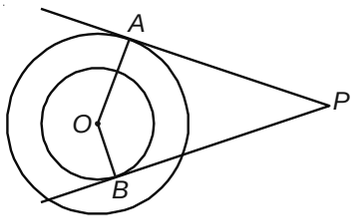
12. If all the sides of a parallelogram touch a circle, show that the parallelogram is a rhombus.

[2008, 2010, 2012] ...[3M], [2013, 2014] ...[2M]

13. In figure, a circle touches all the four sides of a quadrilateral $ABCD$ whose sides are $AB = 6$ cm, $BC = 9$ cm and $CD = 8$cm, find the length of side AD. [2011] ...[2M]

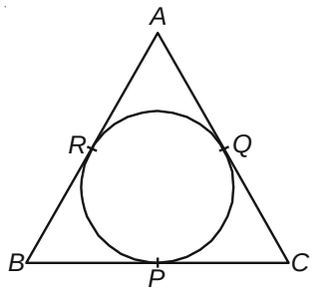


14. Tangents PA and PB are drawn from an external point P to two concentric circle with centre O and radii 8 cm and 5 cm respectively, as shown in figure, if $AP = 15$ cm, then find the length of BP. [2012] ...[2M]



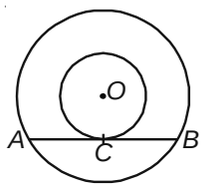
15. In figure, an isosceles triangle ABC, with $AB = AC$, circumscribes a circle. Prove that the point of contact P bisects the base BC.

[2012] ...[2M]

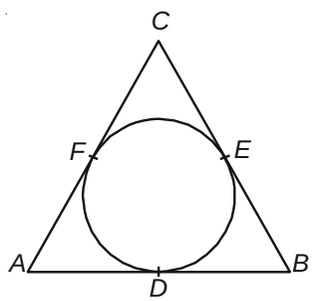


16. In figure, the chord AB of the larger of the two concentric circles, with centre O, touches the smaller circle at C. Prove that $AC = CB$.

[2012] ...[2M]



17. In below figure, a circle is inscribed in triangle ABC touches its sides AB, BC and AC at points D, E and F respectively. If $AB = 12$ cm, $BC = 8$ cm and $AC = 10$ cm, then find the length of AD, BE and CF. [2013] ...[2M]

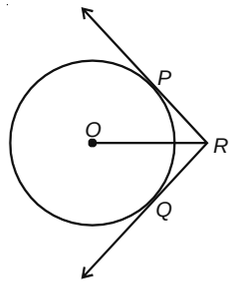


18. Prove that the line segment joining the point of contact of two parallel tangents of a circle passes through its centre. [2014] ...[2M]

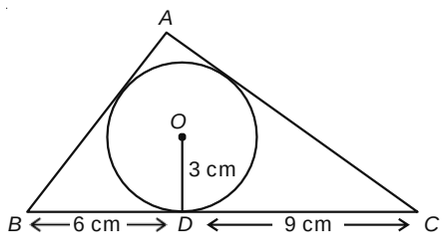
19. If from an external point P of a circle with centre O, two tangents PQ and PR are drawn such that $\angle QPR = 120^\circ$, prove that $2PQ = PO$.

[2014] ...[2M]

20. In the following figure, two tangents RQ and RP are drawn from an external point R to the circle with centre O, if $\angle PRQ = 120^\circ$, then prove that $OR = PR + RQ$. [2015] ...[2M]

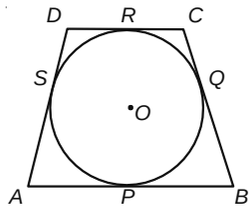


21. In figure, a ΔABC is drawn to circumscribe a circle of radius 3 cm, such that the segments BD and DC are respectively of lengths 6 cm and 9 cm. If the area of ΔABC is 54 cm^2, then find the lengths of sides AB and AC. [2015] ...[2M]

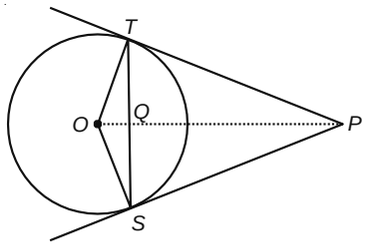


22. In figure, a quadrilateral $ABCD$ is drawn to circumscribe a circle, with centre O, in such a way that the sides AB, BC, CD and DA touch the circle at the points P, Q, R and S respectively. Prove that $AB + CD = BC + DA$.

[2012[4], 2016] ...[2M]



23. In figure, from an external point P, two tangents PT and PS are drawn to a circle with centre O and radius r. If $OP = 2r$, show that $\angle OTS = \angle OST = 30^\circ$ [2016] ...[2M]

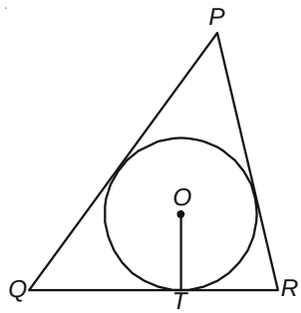


24. Prove that the tangents drawn at the end points of a chord of a circle make equal angles with the chord. [2017] ...[2M]

25. A circle touches all the four sides of a quadrilateral $ABCD$. Prove that $AB + CD = BC + DA$.

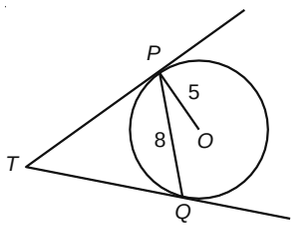
[2017] ...[2M]

26. In given figure, a triangle PQR is drawn to circumscribe a circle of radius 6 cm such that the segments QT and TR into which QR is divided by the point of contact T, are of lengths 12 cm and 9 cm respectively. If the area of $\Delta PQR = 189$ cm^2, then find the lengths of sides PQ and PR. [2011] ...[3M]



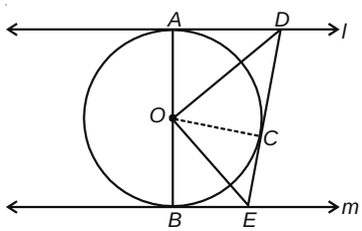
27. Prove that opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the centre of the circle. [2012] ...[3M]

28. In Figure, PQ is a chord of length 8 cm of a circle of radius 5 cm and centre O. The tangents at P and Q intersect at point T. Find the length of TP. [2019] ...[3M]



29. Prove that the tangent at any point of a circle is perpendicular to the radius through the point of contact. [2011, 2012, 2013] ...[4M]

30. In figure, l and m are two parallel tangents to a circle with centre O, touching the circle at A and B respectively. Another tangent at C intersects the line l at D and m at E. Prove that $\angle DOE = 90^o$ [2013] ...[4M]



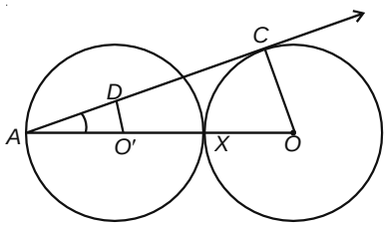
31. Prove that the length of the tangents drawn from an external point to a circle are equal.

[2014, 2015, 2016, 2017] ...[4M]

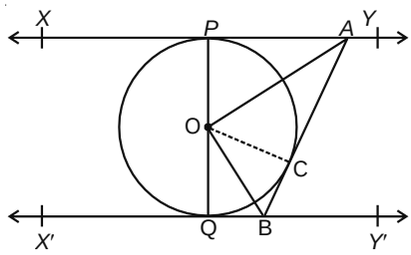
32. Prove that the tangent drawn at the midpoint of an arc of a circle is parallel to the chord joining the end points of the arc. [2015] ...[4M]

33. In figure, two equal circles, with centres O and O', touch each other at X. OO' produced meets the circle with centre O' at A. AC is tangent to the circle with centre O, at the point C. $O'D$ is perpendicular to AC. Find the value of $\frac{DO'}{CO}$.

[2016] ...[4M]

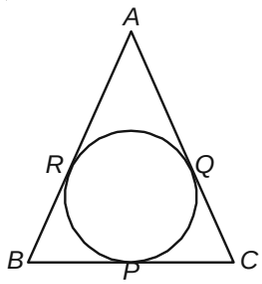


34. In the given figure, XY and $X'Y'$ are two parallel tangents to a circle with centre O and another tangent AB with point of contact C, is intersecting XY at A and $X'Y'$ at B. Prove that $\angle AOB = 90°$. [2017] ...[4M]



35. Prove that the lengths of tangents drawn from an external point to a circle are equal. Using the above, prove the following :

ABC is an isosceles triangle in which $AB = AC$, circumscribed about a circle, as shown in figure, Prove that the base is bisected by the point of contact. [2008] ...[6M]



36. Prove that the lengths of the tangents drawn from an external point to a circle are equal.

Using the above theorem prove that:

If quadrilateral $ABCD$ is circumscribing a circle, then $AB + CD = AD + BC$. [2009] ...[6M]

Chapter - 11 : Constructions

1. Draw a line-segment AB of length 7 cm. Using ruler and compasses, find a point P on AB such that $\frac{AP}{AB} = \frac{3}{5}$ [2011] ...[2M]

2. Draw a right triangle in which the sides containing the right angle are 5 cm and 4 cm. Construct a similar triangle whose sides are $\frac{5}{3}$ times the sides of the given triangle. [2008] ...[3M]

3. Draw a right triangle in which sides (other than hypotenuse) are of length 8 cm and 6 cm. The construct another triangle whose sides are $\frac{3}{4}$ times the corresponding sides of the first triangle. [2009] ...[3M]

4. Construct a triangle ABC in which $BC = 8$ cm, $\angle B = 45°$ and $\angle C = 30°$. Construct another triangle similar to ΔABC such that its sides are $\frac{3}{4}$ of the corresponding sides of ΔABC.

[2010] ...[3M]

5. Draw a pair of tangents to a circle of radius 3 cm, which are inclined to each other at an angle of 60°. [2011] ...[3M]

6. Draw a right triangle in which the sides (other than hypotenuse) are of lengths 4 cm and 3 cm. Then construct another triangle whose sides are $\frac{3}{5}$ times the corresponding sides of the given triangle. [2011] ...[3M]

7. Draw a triangle *ABC* with side *BC* = 6 cm, $\angle C = 30°$ and $\angle A = 105°$. Then construct another triangle whose sides are $\frac{2}{3}$ times the corresponding sides of ΔABC. [2012] ...[3M]

8. Construct a tangent of a circle of radius 4 cm from a point on the concentric circle of radius 6 cm. [2013] ...[3M]

9. Draw a right triangle *ABC* in which *AB* = 6 cm, *BC* = 8 cm and $\angle B = 90°$. Draw *BD* perpendicular from *B* on *AC* and draw a circle passing through the points *B*, *C* and *D*. Construct tangents from *A* to this circle. [2014] ...[3M]

10. Construct a ΔABC in which *AB* = 6 cm, $\angle A = 30°$ and $\angle B = 60°$, construct another $\Delta AB'C'$ similar to ΔABC with base $AB' = 8$ cm. [2015] ...[4M]

11. Draw a circle of radius 4 cm. Draw two tangents to the circle inclined at an angle of 60° to each other. [2016] ...[4M]

12. Construct a triangle *ABC* with side *BC* = 7 cm, $\angle B = 45°$, $\angle A = 105°$. Then construct another triangle whose sides are $\frac{3}{4}$ times the corresponding sides of the ΔABC. [2017]...[4M]

13. Draw a triangle *ABC* with *BC* = 6 cm, *AB* = 5 cm and $\angle ABC = 60°$. Then construct a triangle whose sides are $\frac{3}{4}$ of the corresponding sides of the ΔABC. [2018] ...[4M]

14. Construct a ΔABC in which *CA* = 6 cm, *AB* = 5 cm and $\angle BAC = 45°$. Then construct a triangle whose sides are $\frac{3}{5}$ of the corresponding sides of ΔABC. [2019] ...[4M]

Chapter - 12 : Areas Related to Circles

1. If the diameter of a semicircular protractor is 14 cm, then find its perimeter. [2009] ...[1M]

2. The perimeter (in cm) of a square circumscribing a circle of radius *a* cm, is [2011] ...[1M]

   (A) 8*a* (B) 4*a*

   (C) 2*a* (D) 16*a*

3. If the area of a circle is equal to sum of the areas of two circles of diameters 10 cm and 24 cm, then the diameter of the larger circle (in cm) is [2012] ...[1M]

   (A) 34 (B) 26

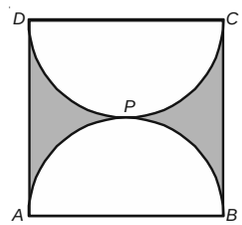
   (C) 17 (D) 14

4. If the difference between the circumference and the radius of a circle is 37 cm, then using $\pi = \frac{22}{7}$, the circumference of the circle is (in cm) [2013] ...[1M]

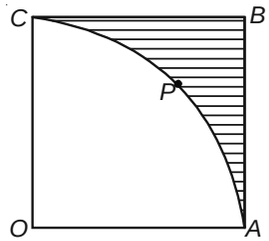
   (A) 154 (B) 44

   (C) 14 (D) 7

5. Find the perimeter of the shaded region in figure, if *ABCD* is a square of side 14 cm and *APB* and *CPD* are semicircles. Use $\pi = \frac{22}{7}$ [2011]...[2M]



6. In figure, *OABC* is a square of side 7 cm. If *OAPC* is a quadrant of a circle with centre *O*, then find the area of the shaded region. Use $\pi = \frac{22}{7}$ [2012] ...[2M]

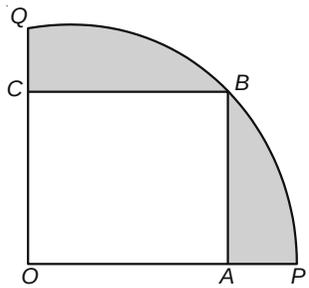


7. Two circular pieces of equal radii and maximum area, touching each other are cut out from a rectangular card board of dimensions 14 cm × 7 cm. Find the area of the remaining card board.

Use $\pi = \frac{22}{7}$ [2013] ...[2M]

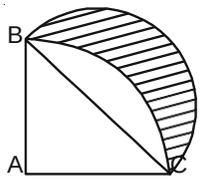
8. In figure, a square *OABC* is inscribed in a quadrant *OPBQ* of a circle. If *OA* = 20 cm, find the area of the shaded region (Use $\pi = 3.14$).

[2014] ...[2M]



9. In figure, *ABC* is a quadrant of a circle of radius 14 cm and a semicircle is drawn with *BC* as diameter. Find the area of the shaded region.

[2008] ...[3M]

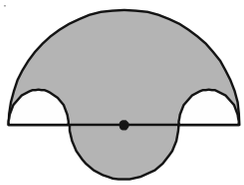


10. The area of an equilateral triangle is $49\sqrt{3}$ cm². Taking each angular point as centre, circles are drawn with radius equal to half the length of the side of the triangle. Find the area of triangle not included in the circle. Take $\sqrt{3} = 1.73$

[2009] ...[3M]

11. In below figure, the boundary of shaded region consists of four semicircular arcs, two smallest being equal. If diameter of the largest is 14 cm and that of the smallest is 3.5 cm, calculate the area of the shaded region. Use $\pi = \frac{22}{7}$

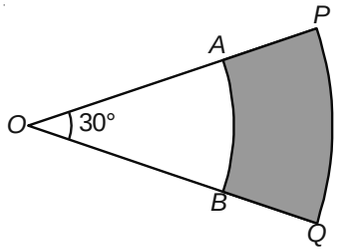
[2010] ...[3M]



12. A chord of a circle of radius 14 cm subtends an angle of 120° at the centre. Find the area of the corresponding minor segment of the circle.

Use $\pi = \frac{22}{7}$ and $\sqrt{3} = 1.73$ [2011] ...[3M]

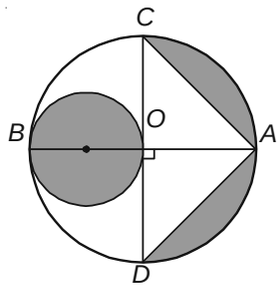
13. In figure, *PQ* and *AB* are respectively the arcs of two concentric circles of radii 7 cm and 3.5 cm and centre *O*. If $\angle POQ = 30°$, then find the area of the shaded region. Use $\pi = \frac{22}{7}$ [2012]...[3M]



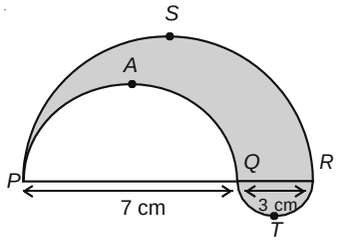
14. In a circle of radius 21 cm, an arc subtends an angle of 60° at the centre. Find (i) the length of the arc (ii) area of the sector formed by the arc.

Use $\pi = \frac{22}{7}$ [2013] ...[3M]

15. In below figure, *AB* and *CD* are two diameters of a circle with centre *O*, which are perpendicular to each other. *OB* is the diameter of the smaller circle. If *OA* = 7 cm, find the area of the shaded region. Use $\pi = \frac{22}{7}$ [2013] ...[3M]

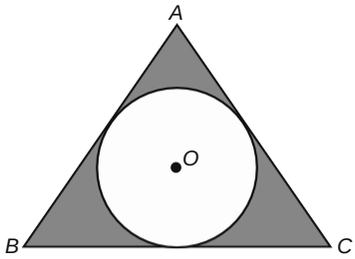


16. In figure, *PSR*, *RTQ* and *PAQ* are three semicircles of diameters 10 cm, 3 cm and 7 cm respectively. Find the perimeter of the shaded region. [Use $\pi = 3.14$] [2014] ...[3M]



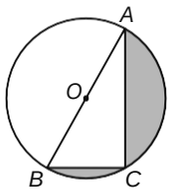
17. If a circle is inscribed in an equilateral triangle *ABC* of side 12 cm. Find the radius of inscribed circle and the area of the shaded region.

[Use $\pi = 3.14$ and $\sqrt{3} = 1.73$] [2014]...[3M]

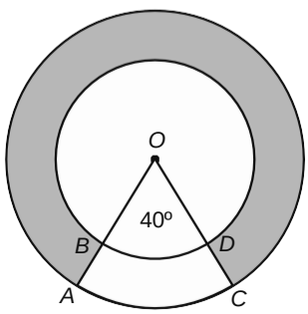


18. Find the area of the minor segment of a circle of radius 14 cm, when its central angle is 60º. Also find the area of the corresponding major segment. [Use $\pi = \frac{22}{7}$] [2015] ...[3M]

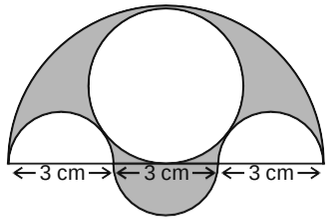
19. In figure, *O* is the centre of a circle such that diameter *AB* = 13 cm and *AC* = 12 cm. *BC* is joined. Find the area of the shaded region. (Take π = 3.14) [2016] ...[3M]



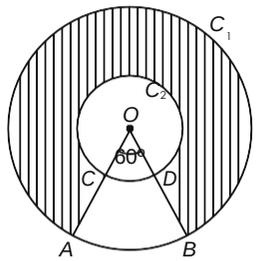
20. In figure, find the area of the shaded region, enclosed between two concentric circles of radii 7 cm and 14 cm where $\angle AOC = 40°$. [Use $\pi = \frac{22}{7}$] [2016] ...[3M]



21. Three semicircles each of diameter 3 cm, a circle of diameter 4.5 cm and a semicircle of radius 4.5 cm are drawn in the given figure. Find the area of the shaded region. [2017] ...[3M]

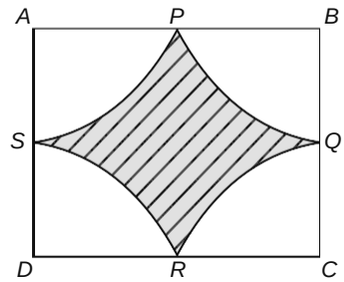


22. In the given figure, two concentric circles with centre *O* have radii 21 cm and 42 cm. If $\angle AOB = 60°$, find the area of the shaded region. [Use $\pi = \frac{22}{7}$] [2017] ...[3M]



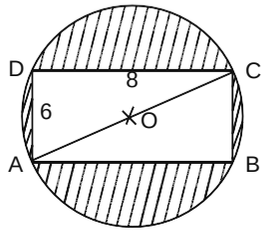
23. Find the area of the shaded region in figure, where arcs drawn with centres *A*, *B*, *C* and *D* intersect in pairs at midpoints *P*, *Q*, *R* and *S* of the sides *AB*, *BC*, *CD* and *DA* respectively of a square of side 12 cm. [Use π = 3.14]

[2018] ...[3M]

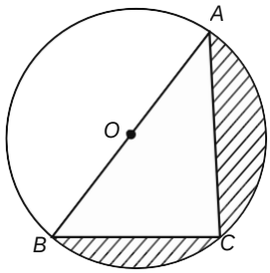


24. Find the area of the shaded region in given figure 4, if *ABCD* is a rectangle with sides 8 cm and 6 cm and *O* is the centre of circle. (Take π = 3.14)

[2019] ...[3M]

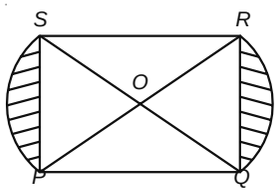


25. Find the area of the shaded region in figure, if *AC* = 24 cm, *BC* = 10 cm and *O* is the centre of the circle. [Use π = 3.14] [2010] ...[4M]

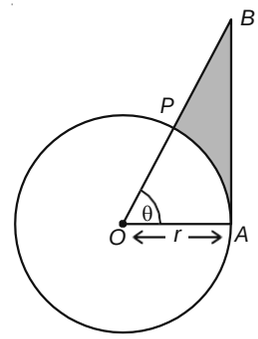


26. In the following figure, *PQRS* is square lawn with side *PQ* = 42 metres. Two circular flower beds are there on the sides *PS* and *QR* with centre at *O*, the intersections of its diagonals. Find the total area of the two flower beds (shaded parts).

[2015] ...[4M]

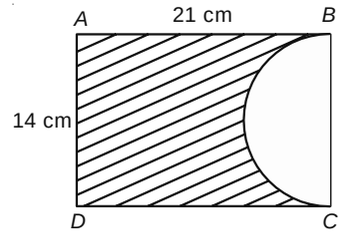


27. In figure, is shown a sector *OAP* of a circle with centre *O*, containing $\angle\theta$. *AB* is perpendicular to the radius *OA* and meets *OP* produced at *B*. Prove that the perimeter of shaded region is $r\left[\tan\theta + \sec\theta + \frac{\pi\theta}{180°} - 1\right]$. [2016] ...[4M]



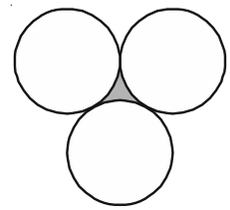
28. In the given figure, *ABCD* is a rectangle of dimensions 21 cm × 14 cm. A semicircle is drawn with *BC* as diameter. Find the area and the perimeter of the shaded region in the figure.

[2017] ...[4M]



29. In below figure, three circles each of radius 3.5 cm are drawn in such a way each of them touches the other two. Find the area enclosed between these three circles (shaded region).

Use $\pi = \frac{22}{7}$ [2011] ...[6M]



Chapter - 13 : Surface Areas and Volumes

1. The surface area of a sphere is 616 cm^2. Find its radius. [2008] ...[1M]

2. The slant height of a frustum of a cone is 4 cm and the perimeters (circumferences) of its circular ends are 18 cm and 6 cm. Find the curved surface area of the frustum.
(Use $\pi = \frac{22}{7}$) [2010]...[1M], 2017...[3M]

3. The radius (in cm) of the largest right circular cone that can be cut out from a cube of edge 4.2 cm is [2011] ...[1M]

(A) 4.2 (B) 2.1

(C) 8.4 (D) 1.05

4. If the radius of the base of a right circular cylinder is halved, keeping the height same, then the ratio of the volume of the cylinder thus obtained to the volume of original cylinder is

[2012] ...[1M]

(A) 1 : 2 (B) 2 : 1

(C) 1 : 4 (D) 4 : 1

5. The number of solid spheres, each of diameter 6 cm that can be made by melting a solid metal cylinder of height 45 cm and diameter 4 cm is

[2014] ...[1M]

(A) 3 (B) 5

(C) 4 (D) 6

6. Two cubes each of volume 27 cm^3 are joined end to end to form a solid. Find the surface area of the resulting cuboid. [2011] ...[2M]

7. A cone of height 20 cm and radius of base 5 cm is made up of modelling clay. A child reshapes it in the form of a sphere. Find the diameter of the sphere. [2011] ...[2M]

8. The volume of a hemisphere is $2425\frac{1}{2}$ cm^3. Find its curved surface area. $\left[\text{Use } \pi = \frac{22}{7}\right]$

[2012] ...[2M]

9. An open metal bucket is in the shape of a frustum of a cone of height 21 cm with radii of its lower and upper ends as 10 cm and 20 cm respectively. Find the cost of milk which can completely fill the bucket at ` 30 per litre. $\left[\text{Use } \pi = \frac{22}{7}\right]$ [2011] ...[3M]

10. From a solid cylinder of height 7 cm and base diameter 12 cm, a conical cavity of same height and same base diameter is hollowed out. Find the total surface area of the remaining solid. $\left[\text{Use } \pi = \frac{22}{7}\right]$ [2012] ...[3M]

11. A cylindrical bucket, 32 cm high and with radius of base 18 cm, is filled with sand. This bucket is emptied on the ground and a conical heap of sand is formed. If the height of the conical heap is 24 cm, then find the radius and slant height of the heap. [2012] ...[3M]

12. A vessel is in the form of hemispherical bowl surmounted by a hollow cylinder of same diameter. The diameter of the hemispherical bowl is 14 cm and the total height of the vessel is 13 cm. Find the total surface area of the vessel. $\left[\text{Use } \pi = \frac{22}{7}\right]$ [2013] ...[3M]

13. A wooden toy was made by scooping out a hemisphere of same radius from each end of a solid cylinder. If the height of the cylinder is 10 cm, and its base is of radius 3.5 cm, find the volume of wood in the toy. $\left[\text{Use } \pi = \frac{22}{7}\right]$

[2013] ...[3M]

14. A farmer connects a pipe of internal diameter 20 cm from a canal into cylindrical tank which is 10 m in diameter and 2 m deep. If the water flows through the pipe at the rate of 4 km per hour, in how much time will the tank be filled completely? [2014] ...[3M]

15. A solid metallic right circular cone 20 cm high and whose vertical angle is 60°, is cut into two parts at the middle of its height by a plane parallel to its base. If the frustum so obtained be drawn into a wire of diameter $\frac{1}{12}$ cm, find the length of the wire. [2014] ...[3M]

16. Due to 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 height 2.8 m, and the canvas to be used costs ` 100 per sq. m, find the amount, the association will have to pay. What values are shown by these association? $\left[\text{Use } \pi = \frac{22}{7}\right]$ [2015] ...[3M]

17. A hemispherical bowl of internal diameter 36 cm contains liquid. This liquid is filled into 72 cylindrical bottles of diameter 6 cm. Find the height of each bottle, if 10% liquid is wasted in this transfer. [2015] ...[3M]

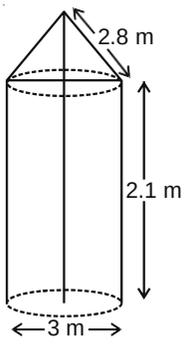
18. A cubical block of side 10 cm is surmounted by a hemisphere. What is the largest diameter that the hemisphere can have? Find the cost of painting the total surface area of the solid so formed, at the rate of ` 5 per sq. cm. [Use π = 3.14] [2015] ...[3M]

19. 504 cones, each of diameter 3.5 cm and height 3 cm, are melted and recast into a metallic sphere, find the diameter of the sphere and hence find its surface area. $\left[\text{Use } \pi = \frac{22}{7}\right]$

[2015] ...[3M]

20. In figure, a tent is in the shape of a cylinder surmounted by a conical top of same diameter. If the height and diameter of cylindrical part are 2.1 m and 3 m respectively and the slant height of conical part is 2.8 m, find the cost of canvas needed to make the tent if the canvas is available at the rate of ` 500/sq. metre.

Use $\pi = \frac{22}{7}$ [2016] ...[3M]



21. A conical vessel, with base radius 5 cm and height 24 cm, is full of water. This water is emptied into a cylindrical vessel of base radius 10 cm. Find the height to which the water will rise in the cylindrical vessel. Use $\pi = \frac{22}{7}$

[2016] ...[3M]

22. A sphere of diameter 12 cm, is dropped in a right circular cylindrical vessel, partly filled with water. If the sphere is completely submerged in water, the water level in the cylindrical vessel rises by $3\frac{5}{9}$ cm. Find the diameter of the cylindrical vessel. [2016] ...[3M]

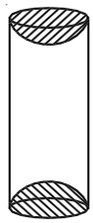
23. In a canal, 5.4 m wide and 1.8 m deep, water is flowing with a speed of 25 km/hr. How much area can it irrigate in 40 minutes, if 10 cm of standing water is required for irrigation?

[2017]...[3M]

24. The dimensions of a solid iron cuboid are 4.4 m × 2.6 m × 1.0 m. It is melted and recast into a hollow cylindrical pipe of 30 cm inner radius and thickness 5 cm. Find the length of the pipe.

[2017]...[3M]

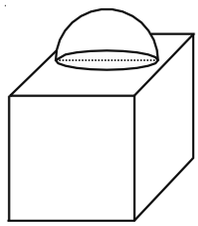
25. A wooden article was made by scooping out a hemisphere from each end of a solid cylinder, as shown in figure. If the height of the cylinder is 10 cm and its base is of radius 3.5 cm. Find the total surface area of the article. [2018] ...[3M]



26. A heap of rice is in the form of a cone of base diameter 24 m and height 3.5 m. Find the volume of the rice. How much canvas cloth is required to just cover the heap? [2018] ...[3M]

27. Water in a canal, 6 m wide and 1.5 m deep, is flowing with a speed of 10 km/hour. How much area will it irrigate in 30 minutes; if 8 cm standing water is needed? [2019] ...[3M]

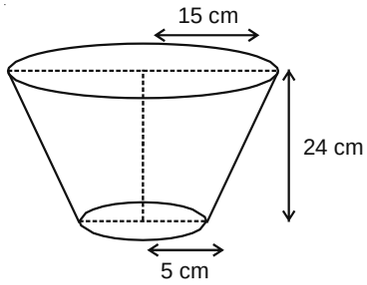
28. Figure shows a decorative block which is made of two solids – a cube and a hemisphere. The base of the block is a cube with edge 5 cm and the hemisphere, fixed on the top, has a diameter of 4.2 cm. Find the total 2 surface area of the block. Take $\pi = \frac{22}{7}$ [2009] ...[4M]



29. Water is flowing through a cylindrical pipe, of internal diameter 2 cm, into a cylindrical tank of base radius 40 cm, at the rate of 0.4 m/s. Determine the rise in level of water in the tank in half an hour. [2013] ...[4M]

30. A bucket open at the top, and made up of a metal sheet is in the form of a frustum of a cone. The depth of the bucket is 24 cm and the diameters of its upper and lower circular ends are 30 cm and 10 cm respectively. Find the cost

of metal sheet used in it at the rate of ` 10 per 100 cm^2. [Use π = 3.14] [2013] ...[4M]



31. Sushant has a vessel, of the form of an inverted cone, open at the top, of height 11 cm and radius of top as 2.5 cm and is full of water. Metallic spherical balls each of diameter 0.5 cm are put in the vessel due to which $\frac{2}{5}$ th of the water in the vessel flows out. Find how many balls were put in the vessel. Sushant made the arrangement so that the water that flows out irrigates the flower beds. What value has been shown by Sushant? [2014] ...[4M]

32. 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. [Take π = 22/7] [2014] ...[4M]

33. From each end of a solid metal cylinder, metal was scooped out in hemispherical form of same diameter. The height of the cylinder is 10 cm and its base is of radius 4.2 cm. The rest of the cylinder is melted and converted into a cylindrical wire of 1.4 cm thickness. Find the length of the wire. $\left[\text{Use } \pi = \frac{22}{7}\right]$ [2015] ...[4M]

34. Due to heavy floods in a state, thousands were rendered homeless. 50 schools collectively offered to the state government to provide place and the canvas for 1500 tents to be fixed by the governments and decided to share the whole expenditure equally. The lower part of each tent is cylindrical of base radius 2.8 cm and height 3.5 m, with conical upper part of same base radius but of height 2.1 m. If the canvas used to make the tents costs ` 120 per sq. m, find the amount shared by each school to set up the tents. What value is generated by the above problem? $\left[\text{Use } \pi = \frac{22}{7}\right]$ [2016] ...[4M]

35. In a rainwater harvesting system, the rainwater from a roof of 22 m × 20 m drains into a cylindrical tank having diameter of base 2 m and height 3.5 m. If the tank is full, find the rainfall in cm. [2017] ...[4M]

36. The diameters of the lower and upper ends of a bucket in the form of a frustum of a cone are 10 cm and 30 cm respectively. If its height is 24 cm, find : [2018] ...[4M]

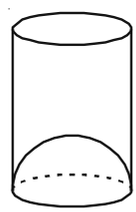
    (i) The area of the metal sheet used to make the bucket.

    (ii) Why we should avoid the bucket made by ordinary plastic? [Use π = 3.14]

37. A bucket open at the top is in the form of a frustum of a cone with a capacity of 12308.8 cm^3. The radii of the top and bottom of circular ends of the bucket are 20 cm and 12 cm respectively. Find the height of the bucket and also the area of the metal sheet used in making it. (Use π = 3.14) [2019] ...[4M]

38. If the radii of the circular ends of a conical bucket, which is 16 cm high, are 20 cm and 8 cm, find the capacity and total surface area of the bucket. $\left[\text{Use } \pi = \frac{22}{7}\right]$ [2008] ...[6M]

39. A juice seller serves his customers using a glass as shown in figure. The inner diameter of the cylindrical glass is 5 cm, but the bottom of the glass has a hemispherical portion raised which reduces the capacity of the glass. If the height of the glass is 10 cm, find the apparent capacity of the glass and its actual capacity. (Use π = 3.14) [2009] ...[6M]



40. A cylindrical vessel with internal diameter 10 cm and height 10.5 cm is full of water. A solid cone of base diameter 7 cm and height 6 cm is completely immersed in water. Find the volume of

    (i) Water displaced out of the cylindrical vessel.

    (ii) Water left in the cylindrical vessel.

    [2009] ...[6M]

41. A milk container is made of metal sheet in the shape of frustum of a cone whose volume is $10459\frac{3}{7}$ cm^3. The radii of its lower and upper circular ends are 8 cm and 20 cm respectively. Find the cost of metal sheet used in making the container at the rate of ` 1.40 per square centimeter. Use $\pi = \frac{22}{7}$ [2010] ...[6M]

42. A toy is in the form of a hemisphere surmounted by a right circular cone of the same base radius as that of the hemisphere. If the radius of base of the cone is 21 cm and its volume is $\frac{2}{3}$ of the volume of the hemisphere, calculate the height of the cone and the surface area of the toy. [2010] ...[6M]

43. Water is flowing at the rate of 15 km/hour through a pipe of diameter 14 cm into a cuboidal pond which is 50 m long and 44 m wide. In what time will the level of water in the pond rise by 21 cm? [2011] ...[6M]

44. A bucket is in the form of a frustum of a cone and it can hold 28.49 litres of water. If the radii of its circular ends are 28 cm and 21 cm, find the height of the bucket. Use $\pi = \frac{22}{7}$ [2012] ...[6M]

45. A solid is in the shape of a cone standing on a hemisphere with both their radii being equal to 7 cm and the height of the cone is equal to its diameter. Find the volume of the solid. Use $\pi = \frac{22}{7}$ [2012] ...[6M]

Chapter - 14 : Statistics

1. Find the class marks of classes 10 – 25 and 35 – 55. [2008] ...[1M]

2. The table below shown the salaries of 280 persons : [2018] ...[3M]

Salary (In thousand)	No. of Person
5 – 10	49
10 – 15	133
15 – 20	63
20 – 25	15
25 – 30	6
30 – 35	7
35 – 40	4
40 – 45	2
45 – 50	1

Calculate the median salary of the data.

3. Find the mode of the following frequency distribution. [2019] ...[3M]

Class	Frequency
0 - 10	8
10 - 20	10
20 - 30	10
30 - 40	16
40 - 50	12
50 - 60	6
60 - 70	7

4. The mean of the following distribution is 18. Find the frequency *f* of the class 19 – 21.[2018]...[4M]

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

5. The following distribution gives the daily income of 50 workers of a factory : [2018] ...[4M]

Daily income (In)	Number of workers
100 – 120	12
120 – 140	14
140 – 160	8
160 – 180	6
180 – 200	10

Convert the distribution above to a less than type cumulative frequency distribution and draw its ogive.

6. If the median of the following frequency distribution is 32.5. Find the values of f_1 and f_2.

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70	Total
Frequency	f_1	5	9	12	f_2	3	2	40

[2019] ...[4M]

7. The marks obtained by 100 students of a class in an examination are given below.

Marks	No. of students
0 – 5	2
5 – 10	5
10 – 15	6
15 – 20	8
20 – 25	10
25 – 30	25
30 – 35	20
35 – 40	18
40 – 45	4
45 – 50	2

Draw '*a* less than' type cumulative frequency curves (ogive). Hence find median.[2019] ...[4M]

8. Find mean, median and mode of the following data: [2008] ...[6M]

Classes	Frequency
0 – 20	6
20 – 40	8
40 – 60	10
60 – 80	12
80 – 100	6
100 – 120	5
120 – 140	3

9. During the medical check-up of 35 students of a class their weights were recorded as follows:

Weight (in kg)	Number of students
38 – 40	3
40 – 42	2
42 – 44	4
44 – 46	5
46 – 48	14
48 – 50	4
50 – 52	3

Draw a less than type and a more than type ogive from the given data. Hence obtain the median weight from the graph. [2009] ...[6M]

10. Find the mean, mode and median of the following frequency distribution: [2010] ...[6M]

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

Chapter - 15 : Probability

1. A die is thrown once. Find the probability of getting a number less than 3. [2008] ...[1M]

2. Two coins are tossed simultaneously. Find the probability of getting exactly one head. [2009] ...[1M]

3. A card is drawn at random from a well shuffled pack of 52 playing cards. Find the probability of getting a red face card. [2010] ...[1M]

4. A card is drawn from a well-shuffled deck of 52 playing cards. The probability that the card will not be an ace is [2011] ...[1M]

(A) $\frac{1}{13}$

(B) $\frac{1}{4}$

(C) $\frac{12}{13}$

(D) $\frac{3}{4}$

5. Two dice are thrown together. The probability of getting the same number on both dice is [2012] ...[1M]

(A) $\frac{1}{2}$ (B) $\frac{1}{3}$

(C) $\frac{1}{6}$ (D) $\frac{1}{12}$

OR

A pair of dice is thrown once. Find the probability of getting the same number on each dice. [2008] ...[2M]

6. The probability of getting an even number, when a die is thrown once, is [2013] ...[1M]

(A) $\frac{1}{2}$ (B) $\frac{1}{3}$

(C) $\frac{1}{6}$ (D) $\frac{5}{6}$

7. A box contains 90 discs, numbered from 1 to 90. If one disc is drawn at random from the box, the probability that it bears a prime-number less than 23, is [2013] ...[1M]

(A) $\frac{7}{90}$ (B) $\frac{10}{90}$

(C) $\frac{4}{45}$ (D) $\frac{9}{89}$

8. If two different dice are rolled together, the probability of getting an even number on both dice, is : [2014] ...[1M]

(A) $\frac{1}{36}$ (B) $\frac{1}{2}$

(C) $\frac{1}{6}$ (D) $\frac{1}{4}$

9. A number is selected at random from the numbers 1 to 30. The probability that it is a prime number. [2014] ...[1M]

(A) $\frac{2}{3}$ (B) $\frac{1}{6}$

(C) $\frac{1}{3}$ (D) $\frac{11}{30}$

10. Two different dice are tossed together. Find the probability that the product of the two numbers on the top of the dice is 6. [2015] ...[1M]

11. A card is drawn at random from a well shuffled pack of 52 playing cards. Find the probability of getting neither a red card nor a queen. [2016]...[1M]

12. 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? [2017] ...[1M]

13. A ticket is drawn at random from a bag containing tickets numbered from 1 to 40. Find the probability that the selected ticket has a number which is a multiple of 5. [2011] ...[2M]

14. A number is selected at random from first 50 natural numbers. Find the probability that it is a multiple of 3 and 4. [2012] ...[2M]

15. A card is drawn at random from a well shuffled pack of 52 playing cards. Find the probability that the drawn card is neither a king nor a queen. [2013] ...[2M]

16. Rahim tosses two different coins simultaneously. Find the probability of getting at least one tail. [2014] ...[2M]

17. Two different dice are tossed together. Find the probability.

(i) Of getting doublet

(ii) Of getting a sum 10, of the numbers on the two dice. [2018] ...[2M]

18. An integer is chosen at random between 1 and 100. Find the probability that it is

(i) Divisible by 8

(ii) Not divisible by 8 [2018] ...[2M]

19. A game consists of tossing a coin 3 times and noting the outcome each time. If getting the same result in all the tosses is a success, find the probability of losing the game. [2019]...[2M]

20. A die is thrown once. Find the probability of getting a number which (i) is a prime number (ii) lies between 2 and 6. [2019] ...[2M]

21. Two dice are thrown simultaneously. What is the probability that

(i) 5 will not come up on either of them?

(ii) 5 will come up on at least one?

(iii) 5 will come up at both dice? [2009] ...[3M]

22. Cards bearing numbers 1, 3, 5, ..., 35 are kept in a bag. A card is drawn at random from the bag. Find the probability of getting a card bearing

(i) A prime number less than 15

(ii) A number divisible by 3 and 5. [2010]...[3M]

23. Two dice are rolled once. Find the probability of getting such numbers on the two dice, whose product is 12. [2011] ...[3M]

24. A box contains 80 discs which are numbered from 1 to 80. If one disc is drawn at random from the box, find the probability that it bears a perfect square number. [2011] ...[3M]

25. A card is drawn from a well shuffled deck of 52 cards. Find the probability of getting (i) a king of red colour (ii) a face card (iii) the queen of diamond. [2012] ...[3M]

26. 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. [2015] ...[3M]

27. Three different coins are tossed together. Find the probability of getting [2016] ...[3M]

    (i) Exactly two heads

    (ii) At least two heads

    (iii) At least two tails.

28. A bag contains 15 white and some black balls. If the probability of drawing a black ball from the bag is thrice that of drawing a white ball, find the number of black balls in the bag. [2017] ...[3M]

29. A group consists of 12 persons, of which 3 are extremely patient, other 6 are extremely honest and rest are extremely kind. A person from the group is selected at random. Assuming that each person is equally likely to be selected, find the probability of selecting a person who is

    (i) Extremely patient

    (ii) Extremely kind or honest. Which of the above values you prefer more? [2013]...[4M]

30. A bag contains cards numbers from 1 to 49. A card is drawn from the bag at random, after mixing the cards thoroughly. Find the probability that the number on the drawn card is

    [2014] ...[4M]

    (A) An odd number

    (B) A multiple of 5

    (C) A perfect square

    (D) An even prime number

31. A card is drawn at random from a well-shuffled deck of playing cards. Find the probability that the card drawn is [2015] ...[4M]

    (i) A card of spade or an ace.

    (ii) A black king.

    (iii) Neither a jack nor a king

    (iv) Either a king or a queen.

32. A number x is selected at random from the 1, 2, 3 and 4. Another number y is selected at random from the numbers 1, 4, 9 and 16. Find the probability the product of x and y is less than 16. [2016] ...[4M]

33. Two different dice are thrown together. Find the probability that the numbers obtained have

    [2017] ...[4M]

    (i) Even sum, and

    (ii) Even product

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