

AP AND CIRCLES

Class 10 - Mathematics

1. The first and last terms of an A.P. are 1 and 11. If their sum is 36, then the number of terms will be [1]
a) 7 b) 5
c) 8 d) 6
2. If 7 times the 7th term of an AP is equal to 11 times its 11th term, then its 18th term will be [1]
a) 7 b) 0
c) 18 d) 11
3. The nth term of an AP is $7 - 4n$, then its common difference is [1]
a) -4 b) -3
c) 4 d) 3
4. 30th term of an AP: 10, 7, 4, is [1]
a) 97 b) -87
c) 77 d) -77
5. Which term of the AP 25, 20, 15,... is the first negative term? [1]
a) 7th b) 9th
c) 8th d) 10th
6. In an A.P., if the common difference $d = -3$ and the eleventh term $a_{11} = 15$, then find the first term. [1]
7. Find the common difference of the A.P. and write the next two terms: 51, 59, 67, 75,... [1]
8. The nth term of an AP cannot be $n^2 + 1$. Justify your answer. [1]
9. Write first four terms of the AP, when the first term $a = -1.5$ and the common difference $d = -0.5$ [1]
10. The first and the last terms of an AP are 1 and 11 respectively. If the sum of its terms is 36, find the number of terms. [1]
11. Find the indicated term of the sequence whose nth term is: $a_n = 5n - 4$; a_{12} and a_{15} [1]
12. Find the sum of given A.P: 2, 7, 12, 17, ... to 19 terms. [1]
13. Find the 11th term of the A.P. $-27, -22, -17, -12, \dots$ [1]
14. Show that the sum of first n even natural numbers is equal to $(1 + \frac{1}{n})$ times the sum of the first n odd natural numbers. [2]
15. Write the first term and the common difference. -5, -1, 3, 7, [2]
16. In an AP, if $a = 50$, $d = -4$ and $S_n = 0$, then find the value of n. [2]
17. Find the next five terms of the sequence given by: $a_1 = 4$, $a_n = 4a_{n-1} + 3$, $n > 1$ [2]

18. Let a sequence be defined by $a_1 = 3$, $a_n = 3a_{n-1} + 1$ for all $n > 1$. Find the first four terms of the sequence.
19. The first term of an A.P. is - 7 and the common difference 5. Find its 18th term and the general term. [2]
20. Find the 15th term of an AP whose first term is 17 and fourth term is 44. [2]
21. Find the 12th term from the end of the A.P. - 2, - 4, - 6, ..., - 100. [2]
22. The cost of digging a well after every metre of digging, when it costs ₹ 150 for the first metre and rises by ₹ 50 for each subsequent metre. Is this situation make an arithmetic progression and why? [3]
23. A man saved ₹33000 in 10 months. In each month after the first, he saved ₹100 more than he did in the preceding month. How much did he save in the first month? [3]
24. Prove that the 11th term of an A.P. cannot be $n^2 + 1$. Justify your answer. [3]
25. Find n if the given value of x is the nth term of the given A.P, $1, \frac{21}{11}, \frac{31}{11}, \frac{41}{11}, \dots, x = \frac{171}{11}$ [3]
26. If the sum of a certain number of terms starting from first term of an A.P. is 25, 22, 19,..., is 116. Find the last term. [3]
27. Which term of the AP : 3, 15, 27, 39, will be 132 more than its 54th term? [3]
28. For what value of n, are the nth terms of two APs: 63, 65, 67, and 3, 10, 17, equal? [3]
29. An AP 8,10,12, ... has 60 terms. Find its last term. Hence, find the sum of its last 10 terms. [3]
30. The sum of first n terms of three AP's are S_1 , S_2 and S_3 . The first term of each AP is unity and their common difference is 1, 2 and 3, respectively. [3]
Prove that $S_1 + S_3 = 2 \times S_2$.
31. The common difference of an A.P. is -2. Find its sum, if first term is 100 and last term is -10. [3]
32. Find the sum of the integers between 100 and 200 that are not divisible by 9. [Hint : These numbers will be : Total numbers – Total numbers divisible by 9] [5]
33. Find the sum of all integers between 100 and 550, which are divisible by 9. [5]
34. Find the sum of all integers between 84 and 719, which are multiples of 5. [5]
35. Find the sum of the integers between 100 and 200 that are divisible by 9? [5]
36. The cost of digging a well for the first metre is ₹150 and rises by ₹20 for each succeeding metre. Does this situation make an arithmetic progression and why? [5]
37. Let there be an A.P. with first term 'a', common difference 'd'. If a_n denotes its nth term and S_n the sum of first n terms, find. n and S_n , if $a = 5$, $d = 3$ and $a_n = 50$. [5]
38. Solve the equation: [5]
 $-4 + (-1) + 2 + 5 + \dots + x = 437$.
39. The sum of first m terms of an AP is $(4m^2 - m)$. If its nth term is 107, find the value of n. Also, find the 21st term of this AP. [5]
40. **Assertion (A):** If nth term of an A.P. is $7 - 4n$, then its common difference is -4. [1]
Reason (R): Common difference of an A.P. is given by $d = a_n - 1 - a_n$
- a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A.
- c) A is true but R is false. d) A is false but R is true.
41. A tangent to a circle is a line that touches the circle at: [1]
a) three points b) one point only

c) infinite number of points

d) two points

42. From a point P which is at a distance 13 cm from the centre O of a circle of radius 5 cm, the pair of tangents PQ and PR to the circle are drawn. Then the area of the quadrilateral PQOR is [1]

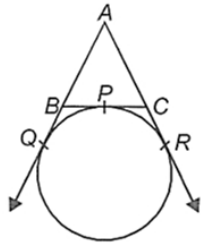
a) 65 cm^2

b) 32.5 cm^2

c) 30 cm^2

d) 60 cm^2

43. In the given figure, a circle touches the side BC of $\triangle ABC$ at P and touches AB and AC produced at Q and R respectively. If $AQ = 5 \text{ cm}$, then find the perimeter of $\triangle ABC$. [1]



a) 6 cm

b) 10 cm

c) 7 cm

d) 11 cm

44. The length of the tangent drawn from a point 8 cm away from the centre of a circle of radius 6 cm is [1]

a) 5 cm

b) $\sqrt{7} \text{ cm}$

c) 10 cm

d) $2\sqrt{7} \text{ cm}$

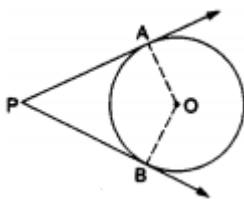
45. If a line intersects a circle in two distinct points, what is it called? [1]

46. A circle is inscribed in $\triangle ABC$ touching AB, BC and AC at P, Q and R respectively. If $AB = 10 \text{ cm}$, $AR = 7 \text{ cm}$ and $CR = 5 \text{ cm}$, find the length of BC. [1]

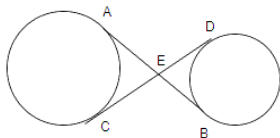
47. Distance between two parallel lines is 14 cm. Find the radius of the circle which will touch both the lines. [1]

48. XY and PQ are two tangents drawn at the end points of the diameter AB of a circle. Prove that $XY \parallel PQ$. [1]

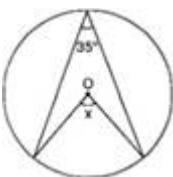
49. In the given figure, O is the centre of the circle. PA and PB are tangents. Show that AOBP is a cyclic quadrilateral. [2]



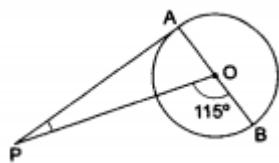
50. In the given figure, common tangents AB and CD to two circles intersect at E. Prove that $AB = CD$. [2]



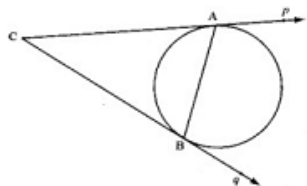
51. Find an angle marked as x in given figure where O is the centre of the circle:- [2]



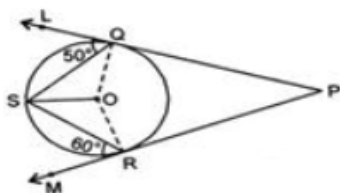
52. In the given figure, PA is a tangent from an external point P to a circle with centre O. If $\angle POB = 115^\circ$, find $\angle APO$. [2]



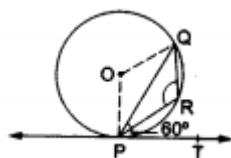
53. Prove that the tangents drawn at the end of a chord of a circle make equal angle with the chord. [2]



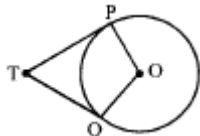
54. In figure, PQL and PRM are tangents to the circle with centre O at the points Q and R respectively and S is a point on the circle such that $\angle SQL = 50^\circ$ and $\angle SRM = 60^\circ$. Then, find $\angle QSR$. [2]



55. O is the centre of a circle of radius 8 cm. The tangent at a point A on the circle cuts a line through O at B such that $AB = 15$ cm. Find OB. [2]
56. A quadrilateral ABCD is drawn to circumscribe a circle. Prove that $AB + CD = AD + BC$ [2]
57. In the given figure, PQ is a chord of a circle with centre O and PT is a tangent. If $\angle QPT = 60^\circ$, find $\angle PRQ$. [2]

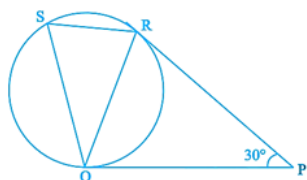


58. Prove that the perpendicular at the point of contact to the tangent to a circle passes through the centre. [2]
59. In the adjoining figure, TP and TQ are tangents to the circle with centre O such that $\angle POQ = 110^\circ$. Then find $\angle PTQ$. [3]

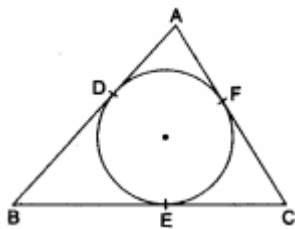


60. In the given figure, tangents PQ and PR are drawn to a circle such that $\angle RPQ = 30^\circ$. A chord RS is drawn parallel to tangent PQ. Find the $\angle RQS$. [3]

Hint: Draw a line through Q and perpendicular to QP.]

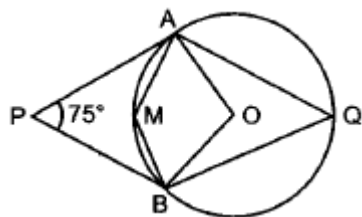


61. Two tangent segments PA and PB are drawn to a circle with centre O such that $\angle APB = 120^\circ$. Prove that $OP = 2AP$. [3]
62. In the given figure, a circle inscribed in a triangle ABC, touches the sides AB, BC and AC at points D, E and F respectively. If $AB = 12$ cm, $BC = 8$ cm and $AC = 10$ cm, find the lengths of AD, BE and CF. [3]



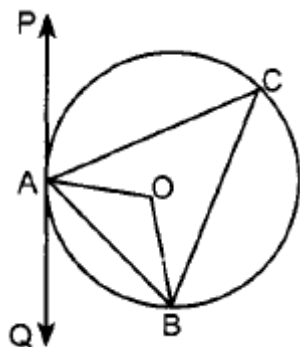
63. In the given figure, O is the centre of the circle. Determine $\angle AQB$ and $\angle AMB$, if PA and PB are tangents

[3]



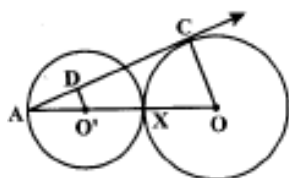
64. PAQ is a tangent to the circle with centre O at a point A as shown in figure. If $\angle OBA = 35^\circ$, find the value of $\angle BAQ$ and $\angle ACB$.

[3]



65. Equal circles with centres O and O' touch each other at X. OO' produced to meet a circle with centre O', at A. AC is a tangent to the circle whose centre is O. O'D is perpendicular to AC. Find the value of $\frac{DO'}{CO}$.

[3]



66. A point P is 13 cm from the centre of the circle. The length of the tangent drawn from P to the circle is 12 cm. Find the radius of the circle.

[3]

67. If two tangents are drawn to a circle from an external point, show that they subtend equal angles at the centre.

[3]

68. The two tangents from an external point P to a circle with centre O are PA and PB. If $\angle APB = 70^\circ$, what is the value of $\angle AOB$?

[3]

69. In a right triangle ABC in which $\angle B = 90^\circ$, 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.

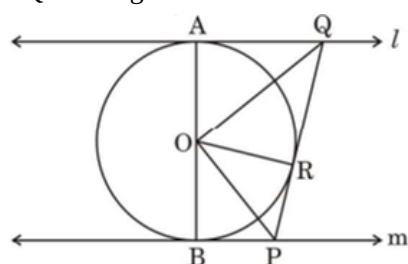
[5]

70. QR is the tangent to the circle whose centre is P. If QA \parallel RP and AB is the diameter, prove that RB is a tangent to the circle.

[5]

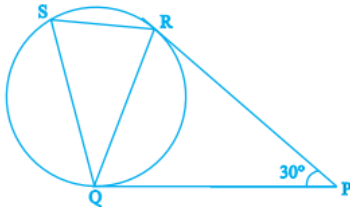
71. In Figure, the tangent l is parallel to the tangent m drawn at points A and B respectively to a circle centred at O. PQ is a tangent to the circle at R. Prove that $\angle POQ = 90^\circ$.

[5]



72. Tangents PQ and PR are drawn to a circle such that $\angle RPQ = 30^\circ$. A chord RS is drawn parallel to tangent PQ. Find $\angle RQS$. [5]

Hint : Draw a line through Q and perpendicular to QP.



73. In a right triangle ABC in which $\angle B = 90^\circ$, a circle is drawn with AB as diameter intersecting the hypotenuse AC at P. Prove that the tangent to the circle at P bisect BC. [5]
74. In Figure, a right triangle ABC in which $\angle B = 90^\circ$, AB = 12 cm and BC = 5 cm is shown. Find the radius of the circle inscribed in the triangle ABC. [5]



75. **Assertion (A):** A tangent to a circle is perpendicular to the radius through the point of contact. [1]

Reason (R): The lengths of tangents drawn from the external point to a circle are equal.

- | | |
|---|---|
| a) Both A and R are true and R is the correct explanation of A. | b) Both A and R are true but R is not the correct explanation of A. |
| c) A is true but R is false. | d) A is false but R is true. |