

## Applied Academy

H-76 Sec 22

## AP AND CIRCLES

## Class 10 - Mathematics

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. [2]

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 15<sup>th</sup> term of an AP whose first term is 17 and fourth term is 44. [2]

21. Find the 12<sup>th</sup> 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 11<sup>th</sup> 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 n<sup>th</sup> 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 54<sup>th</sup> 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 n<sup>th</sup> 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:  $-4 + (-1) + 2 + 5 + \dots + x = 437$ . [5]

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 n<sup>th</sup> 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.

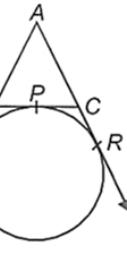
41. A tangent to a circle is a line that touches the circle at: [1]

a) three points b) one point only

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)  $65 \text{ cm}^2$       b)  $32.5 \text{ cm}^2$   
 c)  $30 \text{ cm}^2$       d)  $60 \text{ cm}^2$

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

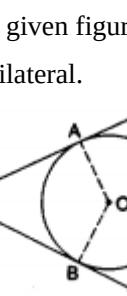
45. If a line intersects a circle in two distinct points, what is it called? [1]

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]

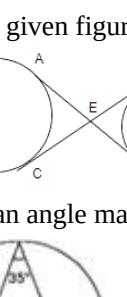
47. Distance between two parallel lines is 14 cm. Find the radius of the circle which will touch both the lines. [1]

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]

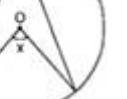
49. In the given figure, O is the centre of the circle. PA and PB are tangents. Show that AOBP is a cyclic quadrilateral. [2]



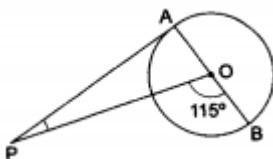
50. In the given figure, common tangents AB and CD to two circles intersect at E. Prove that  $AB = CD$ . [2]



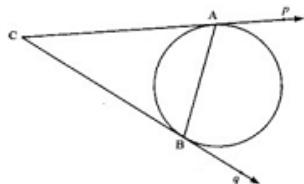
51. Find an angle marked as x in given figure where O is the centre of the circle:- [2]



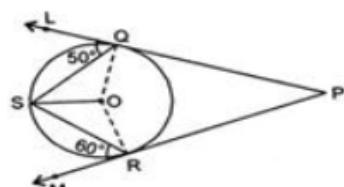
52. In the given figure, PA is a tangent from an external point P to a circle with centre O. If  $\angle POB = 115^\circ$ , find  $\angle APO$ . [2]



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



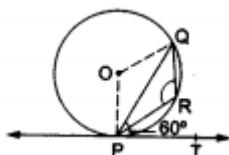
54. In figure,  $PQL$  and  $PRM$  are tangents to the circle with centre  $O$  at the points  $Q$  and  $R$  respectively and  $S$  is a point on the circle such that  $\angle SQL = 50^\circ$  and  $\angle SRM = 60^\circ$ . Then, find  $\angle QSR$ . [2]



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]

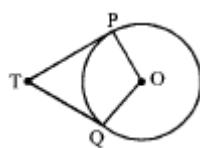
56. A quadrilateral  $ABCD$  is drawn to circumscribe a circle. Prove that  $AB + CD = AD + BC$  [2]

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]



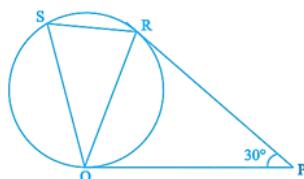
58. Prove that the perpendicular at the point of contact to the tangent to a circle passes through the centre. [2]

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]



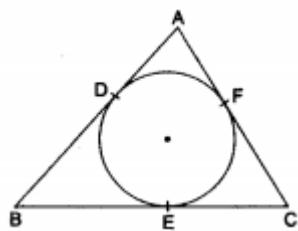
60. In the given figure, tangents  $PQ$  and  $PR$  are drawn to a circle such that  $\angle RPQ = 30^\circ$ . A chord  $RS$  is drawn parallel to tangent  $PQ$ . Find the  $\angle RQS$ . [3]

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

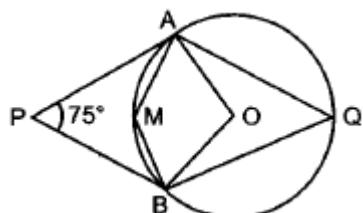


61. Two tangent segments  $PA$  and  $PB$  are drawn to a circle with centre  $O$  such that  $\angle APB = 120^\circ$ . Prove that  $OP = 2AP$ . [3]

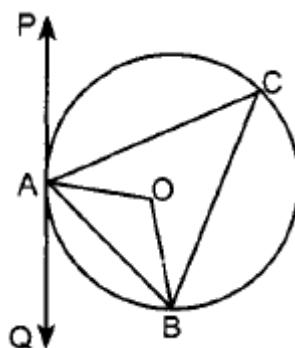
62. In the given figure, a circle inscribed in a triangle  $ABC$ , touches the sides  $AB$ ,  $BC$  and  $AC$  at points  $D$ ,  $E$  and  $F$  respectively. If  $AB = 12$  cm,  $BC = 8$  cm and  $AC = 10$  cm, find the lengths of  $AD$ ,  $BE$  and  $CF$ . [3]



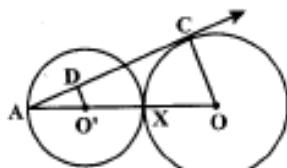
63. In the given figure, O is the centre of the circle. Determine  $\angle AQB$  and  $\angle AMB$ , if PA and PB are tangents [3]



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]

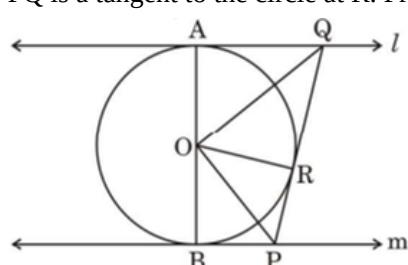
67. If two tangents are drawn to a circle from an external point, show that they subtend equal angles at the centre. [3]

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]

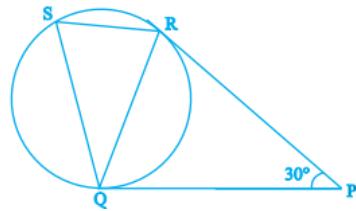
70. QR is the tangent to the circle whose centre is P. If  $QA \parallel RP$  and AB is the diameter, prove that RB is a tangent to the circle. [5]

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]



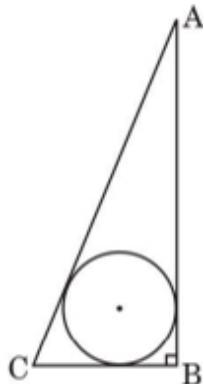
72. Tangents PQ and PR are drawn to a circle such that  $\angle RPQ = 30^\circ$ . A chord RS is drawn parallel to tangent PQ. Find  $\angle RQS$ . [5]

**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 bisects 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.