Name : Circles - Tangent Properties

Chapter: Tangent Properties of Circles

Grade: ICSE Grade X

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If 'l' is the length of the tangent drawn to a circle with radius 'r' from point 'P' which is 'd' cm away from the centre, then

(i)
$$d = \sqrt{(l^2 - r^2)}$$
 (ii) $l = \sqrt{(d^2 + r^2)}$ (iii) $d = \sqrt{(l^2 + r^2)}$ (iv) $l = \sqrt{(d^2 - r^2)}$ (v) $r = \sqrt{(l^2 + d^2)}$

2. Two circles with radii R and r touch internally. If the distance between their centres is d, then

(i)
$$d > R - r$$
 (ii) $d = R + r$ (iii) $d < R + r$ (iv) $d = R - r$ (v) $d < R - r$

3. The distance between the centres of two circles is d. If the radii are r_1 and r_2 , the length of their transverse common tangent is

(i) None of these (ii)
$$\sqrt{d^2 + (r_1 - r_2)^2}$$
 (iii) $\sqrt{d^2 - (r_1 - r_2)^2}$ (iv) $\sqrt{d^2 + (r_1 + r_2)^2}$ (v) $\sqrt{d^2 - (r_1 + r_2)^2}$

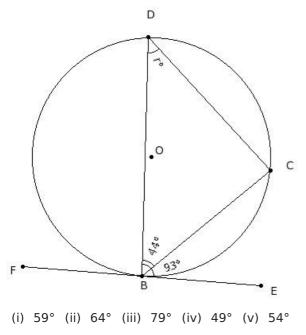
The distance between the centres of two circles is d.

 $\dot{}$ If the radii are r_1 and r_2 , the length of their direct common tangent is

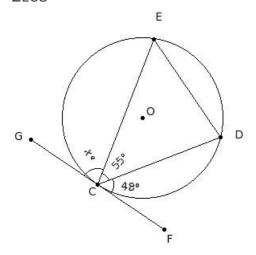
(i) None of these (ii)
$$\sqrt{d^2 - (r_1 + r_2)^2}$$
 (iii) $\sqrt{d^2 + (r_1 + r_2)^2}$ (iv) $\sqrt{d^2 - (r_1 - r_2)^2}$ (v) $\sqrt{d^2 + (r_1 - r_2)^2}$

- 5. Two circles with equal radii are
 - (i) concentric (ii) not similar (iii) congruent (iv) only similar but not congruent
- 6. The angle between a tangent to a circle and the radius drawn at the point of contact is
 - (i) 100° (ii) 90° (iii) 105° (iv) 95° (v) 120°
- 7. If two circles of radii 15 cm and 6 cm touch internally, the distance between their centres is
 - (i) 9 cm (ii) 11 cm (iii) 7 cm (iv) 10 cm (v) 8 cm
- 8. If two circles of radii 10 cm and 2 cm touch externally, the distance between their centres is
 - (i) 12 cm (ii) 13 cm (iii) 11 cm (iv) 14 cm (v) 10 cm
- 9. If two circles touch internally, the number of their common tangents is
 - (i) 0 (ii) 3 (iii) 1 (iv) 2 (v) (-1)
- 10. If two circles intersect, the number of their common tangents is
 - (i) 5 (ii) 0 (iii) 3 (iv) 1 (v) 2
- 11. If two circlestouch externally, the number of their common tangents is
 - (i) 3 (ii) 1 (iii) 6 (iv) 4 (v) 2

In the given figure, O is the centre of the circle and EF is the tangent at B. If \angle CBD = 44° and \angle EBC = 93°, find \angle BDC

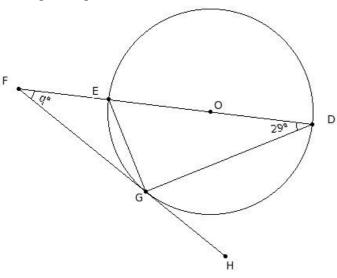


In the given figure, O is the centre of the circle and FG is the tangent at C. If $\angle DCE = 55^{\circ}$ and $\angle FCD = 48^{\circ}$, find $\angle ECG$



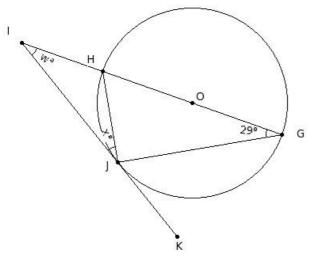
(i) 77° (ii) 87° (iii) 107° (iv) 92° (v) 82°

14. In the given figure, O is the centre of the circle and FH is the tangent at G . If \angle EDG = 29°, find \angle EFG



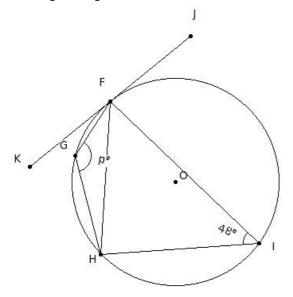
(i) 47° (ii) 37° (iii) 62° (iv) 32° (v) 42°

15. In the given figure, O is the centre of the circle and IK is the tangent at J. If \angle HGJ = 29°, find \angle HIJ + \angle HJI



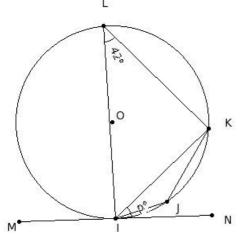
(i) 66° (ii) 61° (iii) 91° (iv) 76° (v) 71°

16. In the given figure, O is the centre of the circle and JK is the tangent at F. If \angle FIH = 48°, find \angle FGH



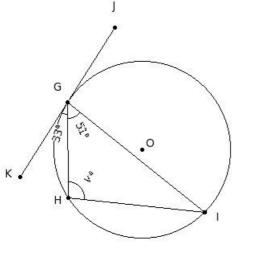
(i) 162° (ii) 132° (iii) 142° (iv) 147° (v) 137°

17. In the given figure, O is the centre of the circle and MN is the tangent at I. If \angle ILK = 42°, find \angle NIK



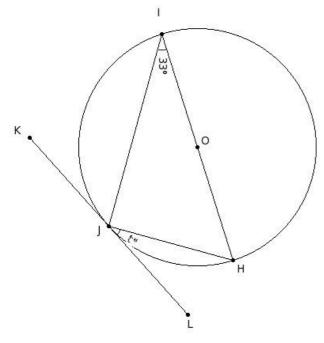
(i) 57° (ii) 72° (iii) 42° (iv) 52° (v) 47°

In the given figure, O is the centre of the circle and JK is the tangent at G. If \angle IGH = 51° and \angle HGK = 33°, find \angle IHG



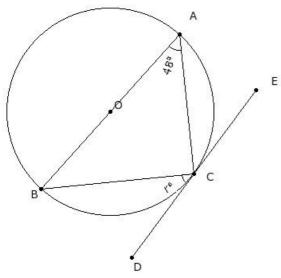
(i) 101° (ii) 111° (iii) 126° (iv) 106° (v) 96°

19. In the given figure, O is the centre of the circle and KL is the tangent at J. If \angle JIH = 33°, find \angle LJH



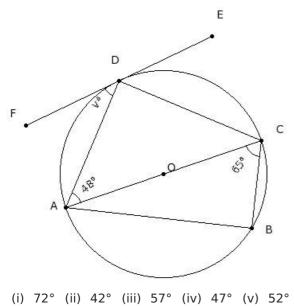
(i) 43° (ii) 63° (iii) 33° (iv) 38° (v) 48°

20. In the given figure, O is the centre of the circle and DE is the tangent at C. If \angle CAB = 48°, find \angle DCB

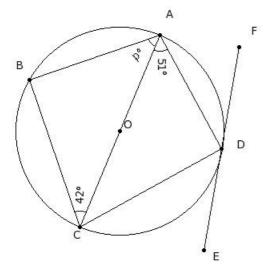


(i) 58° (ii) 48° (iii) 63° (iv) 78° (v) 53°

In the given figure, O is the centre of the circle and EF is the tangent at D. If $\angle CAD = 48^{\circ}$ and $\angle ACB = 65^{\circ}$, find $\angle FDA$

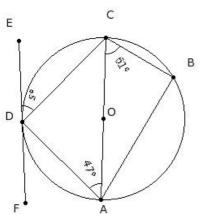


In the given figure, O is the centre of the circle and EF is the tangent at D. If $\angle CAD = 51^{\circ}$ and $\angle ACB = 42^{\circ}$, find $\angle CAB$



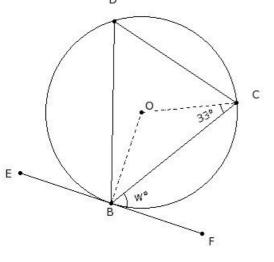
(i) 53° (ii) 78° (iii) 48° (iv) 58° (v) 63°

In the given figure, O is the centre of the circle and EF is the tangent at D. If $\angle CAD = 47^{\circ}$ and $\angle ACB = 61^{\circ}$, find $\angle EDC$



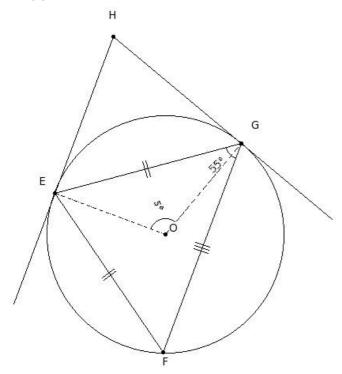
(i) 52° (ii) 62° (iii) 57° (iv) 77° (v) 47°

24. In the given figure, O is the centre of the circle and EF is the tangent at B. If \angle OCB = 33°, find \angle FBC



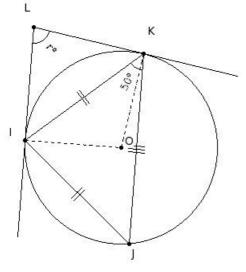
(i) 72° (ii) 57° (iii) 62° (iv) 87° (v) 67°

In the given figure, O is the centre of the circle and the tangents EH and GH meet at point H. If \angle FGE = 55°, find \angle EOG



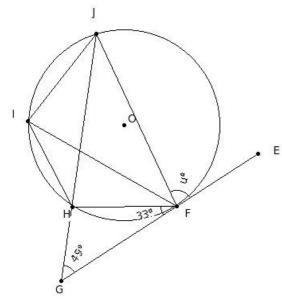
(i) 140° (ii) 125° (iii) 120° (iv) 110° (v) 115°

In the given figure, O is the centre of the circle and the tangents IL and KL meet at point L. If \angle JKI = 50°, find \angle KLI



(i) 90° (ii) 110° (iii) 95° (iv) 85° (v) 80°

27. In the given figure, O is the centre of the circle and EG is the tangent at F. If \angle FGH = 49°, \angle GFH = 33°, find \angle JFE



(i) 97° (ii) 92° (iii) 87° (iv) 82° (v) 112°

28. Which of the following statements are true?

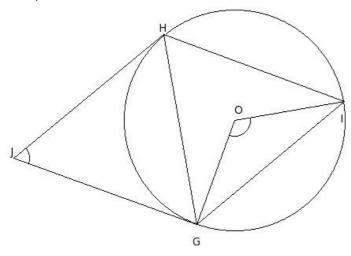
- a) An infinite number of chords may be drawn for a circle.
- b) Every circle has a unique diameter.
- c) An infinite number of diameters may be drawn for a circle.
- d) Two semi-circles of a circle together make the whole circle.
- e) One and only one tangent can be drawn to a circle from a point outside it.

(i) {b,a} (ii) {a,c,d} (iii) {b,a,c} (iv) {e,c} (v) {b,e,d}

29. Which of the following statements are true?

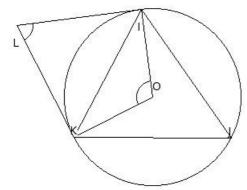
- a) Every circle has a unique diameter.
- b) A secant of a circle is a segment having its end points on the circle.
- c) Diameter of a circle is a part of the semi-circle of the circle.
- d) One and only one tangent can be drawn to pass through a point on a circle.
- e) One and only one tangent can be drawn to a circle from a point outside it.
- (i) {b,d,c} (ii) {a,c} (iii) {c,d} (iv) {e,a,c} (v) {b,d}

O is the centre of the circumcircle of \triangle GHI. Tangents at G and H intersect at J. If \angle GJH = 59.47° and \angle GOI = 120°, find \angle IGH



(i) 69.73° (ii) 89.73° (iii) 74.73° (iv) 64.73° (v) 59.73°

31. O is the centre of the circumcircle of $\triangle IJK$. Tangents at I and K intersect at L. If $\angle ILK = 70.29^{\circ}$, find $\angle KJI$



(i) 84.85° (ii) 64.85° (iii) 69.85° (iv) 59.85° (v) 54.85°

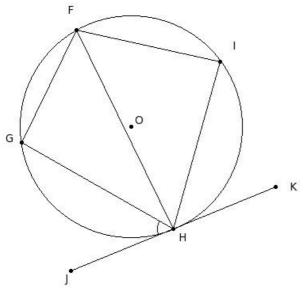
- 32. A line which intersects the circle at two distinct points is called a
 - (i) semi-circle (ii) segment (iii) radius (iv) major segment (v) secant
- 33. A line which touches a circle at only one point is called a
 - (i) tangent (ii) segment (iii) secant (iv) chord (v) centre
- 34. If the two radii OP and OQ of a circle are at right angles to each other, then the sector OPQ is called a
 - (i) tangent (ii) quadrant (iii) chord (iv) secant (v) semi-circle
- 35. Which of the following statements are true?
 - a) Atmost two common tangents can be drawn touching any two circles.
 - b) A maximum of four common tangents can be drawn touching any two circles.
 - c) Atmost three common tangents can be drawn touching two circles which touch each other.
 - d) Atmost one common tangent can be drawn for any two concentric circles.
 - (i) {a,c,b} (ii) {d,c} (iii) {b,c} (iv) {a,b} (v) {a,d,b}

36. Which of the following statements are true?
a) A diameter is a limiting case of a chord.
b) A secant has two end points.
c) A tangent is the limiting case of a secant.
d) A secant and a chord are same.
e) A radius is a limiting case of a diameter.
(i) {e,b,a} (ii) {a,c} (iii) {d,c} (iv) {d,c,a} (v) {b,a}
(1) (2) (1) (2) (1) (2) (2) (2) (2) (2)
37. Which of the following statements are true?
a) The sides of a triangle can be tangents to a circle.
b) Only two tangents can be drawn from a point outside the circle.
c) Atmost one tangent can be drawn through a point inside the circle.
d) Two tangents to a circle always intersect.
e) Only one tangent can be drawn through a point on a circle.
(i) {c,a} (ii) {d,b} (iii) {c,a,b} (iv) {c,d,e} (v) {a,b,e}
38. Which of the following statements are true?
a) Two different tangents can meet at a point on the circle.
b) If two tangents are parallel, the distance between them is equal to the diameter of the circle.
c) If two tangents are perpendicular, they form a right angled triangle with their points of contact with the circle
and their point of intersection.
d) A line parallel to a tangent is a secant.
e) If two tangents to a circle intersect, their points of contact with the circle together with their point of
intersection form an isosceles triangle.
(i) {a,d,e} (ii) {d,c} (iii) {a,b,c} (iv) {a,b} (v) {b,c,e}
39. Which of the following statements are true?
a) If two circles intersect, then two common tangents can be drawn.
b) If two circles touch each other externally, there is only one common tangent.
c) If two circles touch each other internally, there is only one common tangent.
d) There exists four common tangents for any two non-intersecting circles.
(i) {b,d} (ii) {a,c,d} (iii) {b,c} (iv) {b,a,c} (v) {b,a}
40. Which of the following statements are true?
a) If two circles touch externally, the distance between their centres is the sum of their radii.
b) If two circles touch externally, the square of the distance between their centres is the sum of the squares of
their radii.
c) If two circles touch internally, their centres and the point of contact form a scalene triangle.
d) If two circles touch internally, the square of the distance between their centres is the difference of the squares of their radii.
e) If two circles touch externally, their centres and the point of contact form an isosceles triangle.
f) If two circles touch internally, the distance between their centres is the difference of their radii.
(i) [h f a] (ii) [h a] (iii) [d a a] (iv) [- f] (v) [- f]
(i) {b,f,a} (ii) {b,a} (iii) {d,e,a} (iv) {a,f} (v) {c,f}

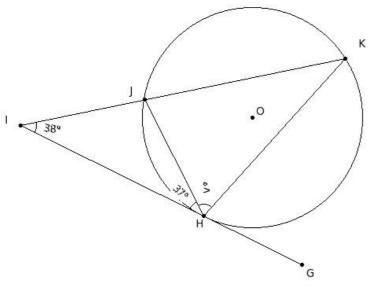
41. Two circles are of radii 1 cm and 5 cm. If the distance between their centres is 7 cm, what is the length of their direct common tangent?

(i) 4.74 cm (ii) 6.74 cm (iii) 7.74 cm (iv) 5.74 cm (v) 3.74 cm

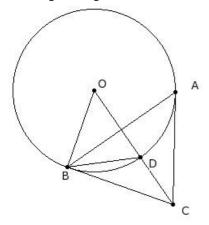
- 42. Two circles are of radii 1 cm and 2 cm. If the distance between their centres is 4 cm, what is the length of their transverse common tangent?
 - (i) 3.65 cm (ii) 0.65 cm (iii) 1.65 cm (iv) 4.65 cm (v) 2.65 cm
- In the given figure, FGHI is a cyclic quadrilateral such that HF bisects \angle IFG and JK is the tangent at H. If \angle HFG = 52°, find \angle JHG



- (i) 67° (ii) 52° (iii) 57° (iv) 82° (v) 62°
- 44. In the given figure, O is the centre of the circle and GI is the tangent at H. If \angle HIJ = 38°, \angle IHJ = 37°, find \angle KHJ

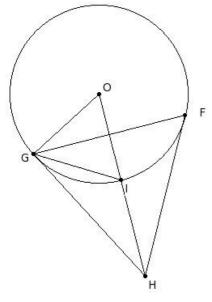


- (i) 73° (ii) 83° (iii) 98° (iv) 78° (v) 68°
- 45. In the given figure, CA and CB are tangent segments to the circle with centre O. Given \angle BCD = 36°, find \angle ABO



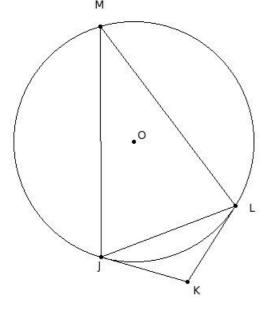
(i) 46° (ii) 36° (iii) 51° (iv) 41° (v) 66°

46. In the given figure, HF and HG are tangent segments to the circle with centre O. Given \angle GHI = 28°, find \angle FGI



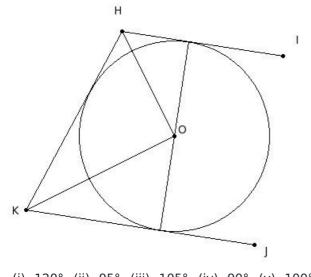
- (i) 61° (ii) 46° (iii) 31° (iv) 41° (v) 36°
- With the vertices of a triangle \triangle IJK as centres, three circles are drawn touching each other externally. If the sides of the triangle are 10 cm , 15 cm and 13 cm , find the radii of the circles
 - (i) 4 cm , 11 cm & 9 cm respectively (ii) 9 cm , 11 cm & 14 cm respectively
 - (iii) 9 cm , 6 cm & 9 cm respectively (iv) 4 cm , 6 cm & 14 cm respectively
 - (v) 4 cm, 6 cm & 9 cm respectively

48. O is the centre of the circle. JK and LK are tangents to the circle. If \angle LMJ = 37°, find \angle JKL



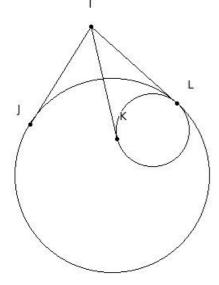
(i) 121° (ii) 116° (iii) 111° (iv) 136° (v) 106°

49. In the given figure, HI and JK are parallel tangents to the circle with centre O. HK is another tangent meeting HI and JK at H and K. Find ∠HOK



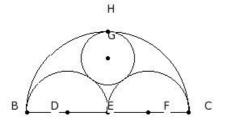
(i) 120° (ii) 95° (iii) 105° (iv) 90° (v) 100°

50. In the given figure, IL is the common tangent to the two circles. IJ & IK are also tangents. Given IJ = 14 cm, find IK



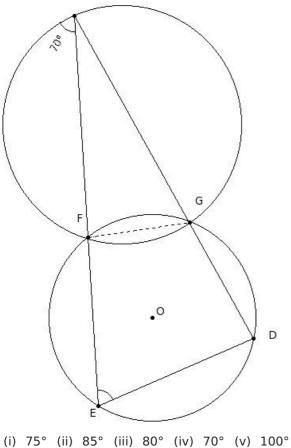
(i) 12 cm (ii) 14 cm (iii) 13 cm (iv) 16 cm (v) 15 cm

BC is a line segment and E is its mid-point. Three semi-circles are drawn with BE, EC and BC as diameters. D, F 51. and E respectively are the centres of these semi-circles. A new circle is drawn touching these three semi-circles. Find its radius, given BD = 5 cm



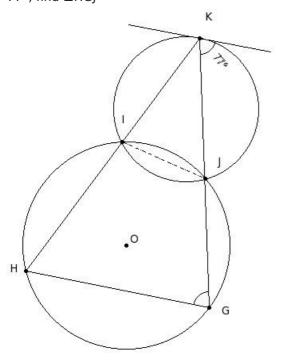
(i) 1.33 cm (ii) 4.33 cm (iii) 5.33 cm (iv) 2.33 cm (v) 3.33 cm

In the given figure, two circles intersect at points F & G. A tangent is drawn at point H. From the same point, two 52. lines are drawn passing through points F & G. They meet the other end of the second circle at E & D. Given $\angle H = 70^{\circ}$, find $\angle DEF$



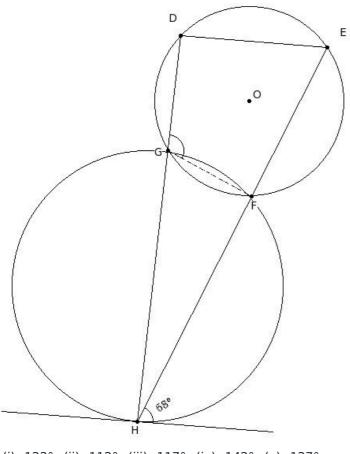
(1) 73 (11) 03 (111) 00 (11) 70 (1) 100

In the given figure, two circles intersect at points I & J. A tangent is drawn at point K. From the same point, two 53. lines are drawn passing through points I & J. They meet the other end of the second circle at H & G. Given $\angle K = 77^{\circ}$, find $\angle HGJ$



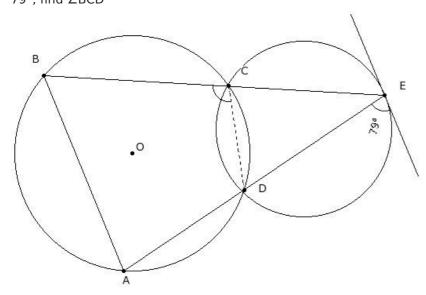
(i) 82° (ii) 87° (iii) 77° (iv) 107° (v) 92°

In the given figure, two circles intersect at points F & G. A tangent is drawn at point H. From the same point, two 54. lines are drawn passing through points F & G. They meet the other end of the second circle at E & D. Given $\angle H = 68^{\circ}$, find $\angle DGF$



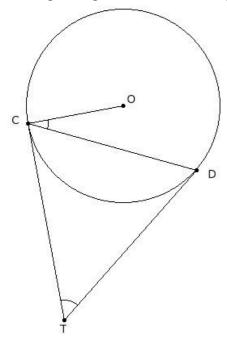
(i) 122° (ii) 112° (iii) 117° (iv) 142° (v) 127°

In the given figure, two circles intersect at points C & D. A tangent is drawn at point E. From the same point, two 55. lines are drawn passing through points C & D. They meet the other end of the second circle at B & A. Given $\angle E = 79^{\circ}$, find $\angle BCD$



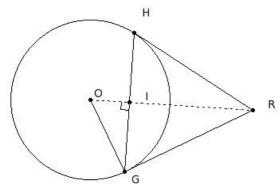
(i) 111° (ii) 116° (iii) 106° (iv) 131° (v) 101°

56. In the given figure, CT & DT are tangents to the circle with centre O. Given $\angle C = 26^{\circ}$, find $\angle T$



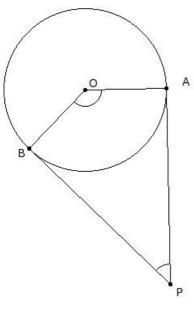
(i) 62° (ii) 57° (iii) 82° (iv) 52° (v) 67°

57. In the given figure, GR & HR are tangents to the circle with centre O. Given OG = 10 cm and GH = 17 cm, find GR



(i) 18.14 cm (ii) 14.14 cm (iii) 15.14 cm (iv) 17.14 cm (v) 16.14 cm

58. In the given figure, AP & BP are tangents to the circle with centre O. Given \angle AOB = 135°, find \angle APB



(i) 75° (ii) 55° (iii) 45° (iv) 60° (v) 50°

		А	ssignment Key			
1) (iii)	2) (iv)	3) (v)	4) (iv)	5) (iii)	6) (ii)	
7) (i)	8) (i)	9) (iii)	10) (v)	11) (i)	12) (iv)	
13) (i)	14) (iv)	15) (ii)	16) (ii)	17) (iii)	18) (v)	
19) (iii)	20) (ii)	21) (ii)	22) (iii)	23) (v)	24) (ii)	
25) (iv)	26) (v)	27) (iv)	28) (ii)	29) (iii)	30) (v)	
31) (v)	32) (v)	33) (i)	34) (ii)	35) (iii)	36) (ii)	
37) (v)	38) (v)	39) (ii)	40) (iv)	41) (iv)	42) (v)	
43) (ii)	44) (v)	45) (ii)	46) (iii)	47) (v)	48) (v)	
49) (iv)	50) (ii)	51) (v)	52) (iv)	53) (iii)	54) (ii)	
55) (v)	56) (iv)	57) (v)	58) (iii)			

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