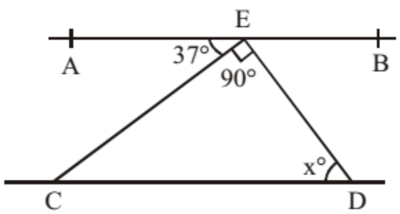
CHAPTER

13 Geometry

1. ABCD is a quadrilateral in which diagonal BD = 64 cm, AL ⊥ BD and CM ⊥ BD, such that AL = 13.2 cm and CM = 16.8 cm. The area of the quadrilateral ABCD (in square centimetres) is **(SSC Sub. Ins. 2012)**
(a) 537.6 (b) 960.0 (c) 422.4 (d) 690.0

2. In ΔABC, ∠B = 60°, ∠C = 40°. If AD bisects ∠BAC and AE ⊥ BC, then ∠EAD is **(SSC Sub. Ins. 2012)**
(a) 40° (b) 80° (c) 10° (d) 20°

3. In the figure below, if AB ∥ CD and CE ⊥ ED, then the value of x is **(SSC Sub. Ins. 2012)**

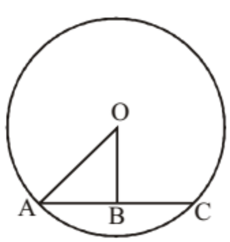


(a) 37 (b) 45 (c) 53 (d) 63

4. PA and PB are two tangents drawn from an external point P to a circle with centre O where the points A and B are the points of contact. The quadrilateral OAPB must be **(SSC Sub. Ins. 2012)**
(a) a square (b) concylic
(c) a rectangle (d) a rhombus

5. G is the centroid of ΔABC. If AG = BC, then ∠BGC is **(SSC Sub. Ins. 2012)**
(a) 60° (b) 120° (c) 90° (d) 30°

6. In the following figure, if OA = 10 and AC = 16, then OB must be **(SSC Sub. Ins. 2012)**



(a) 3 (b) 4 (c) 5 (d) 6

7. If in ΔABC, ∠A = 90°, BC = a, AC = b and AB = c, then the value of tan B + tan C is **(SSC Sub. Ins. 2012)**
(a) $\frac{b^2}{ac}$ (b) $\frac{a^2}{bc}$ (c) $\frac{c^2}{ab}$ (d) $\frac{a^2+c^2}{b}$

8. ABC is a right angled triangle, right angled at C and p is the length of the perpendicular from C on AB. If a, b and c are the lengths of the sides BC, CA and AB respectively, then **(SSC CHSL 2012)**
(a) $\frac{-1}{p^2}=\frac{1}{b^2}+\frac{1}{a^2}$ (b) $\frac{1}{p^2}=\frac{1}{a^2}+\frac{1}{b^2}$
(c) $\frac{1}{p^2}+\frac{1}{a^2}=\frac{1}{b^2}$ (d) $\frac{1}{p^2}=\frac{1}{a^2}-\frac{1}{b^2}$

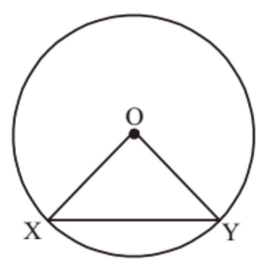
9. If ΔABC is an isosceles triangle with ∠C = 90° and AC = 5 cm, then AB is : **(SSC CHSL 2012)**
(a) 5 cm (b) 10 cm (c) $5\sqrt{2}$ cm (d) 2.5 cm

10. The length of the two sides forming the right angle of a right-angled triangle are 6 cm and 8 cm. The length of its circum-radius is : **(SSC CHSL 2012)**
(a) 5 cm (b) 7 cm (c) 6 cm (d) 10 cm

11. The length of radius of a circumcircle of a triangle having sides 3 cm, 4 cm and 5 cm is: **(SSC CHSL 2012)**
(a) 2 cm (b) 2.5 cm (c) 3 cm (d) 1.5 cm

12. A, O, B are three points on a line segment and C is a point not lying on AOB. If ∠AOC = 40° and OX, OY are the internal and external bisectors of ∠AOC respectively, then ∠BOY is **(SSC CGL 1st Sit. 2012)**
(a) 70° (b) 80° (c) 72° (d) 68°

13. In the following figure, O is the centre of the circle and XO is perpendicular to OY. If the area of the triangle XOY is 32, then the area of the circle is **(SSC CGL 1st Sit. 2012)**



(a) 64π (b) 256π (c) 16π (d) 32π

14. The side BC of Δ ABC is produced to D. If ∠ACD = 108° and ∠B = $\frac{1}{2}$ ∠A then ∠A is **(SSC CGL 1st Sit. 2012)**
(a) 36° (b) 72° (c) 108° (d) 59°

15. Two circles of radii 4 cm and 9 cm respectively touch each other externally at a point and a common tangent touches them at the points P and Q respectively. They the area of a square with one side PQ, is **(SSC CGL 1st Sit. 2012)**
(a) 97 sq. cm (b) 194 sq. cm
(c) 72 sq. cm (d) 144 sq. cm

16. Two tangents are drawn from a point P to a circle at A and B. O is the centre of the circle. If $\angle AOP = 60°$, then $\angle APB$ is **(SSC CGL 1st Sit. 2012)**
(a) 120° (b) 90° (c) 60° (d) 30°

17. If each intetior angle is double of each exterior angle of a regular polygon with n sides, then the value of n is **(SSC CGL 1st Sit. 2012)**
(a) 8 (b) 10 (c) 5 (d) 6

18. If the length of the side PQ of the rhombus PQRS is 6 cm and $\angle PQR = 120°$, then the length of QS, in cm, is **(SSC CGL 1st Sit. 2012)**
(a) 4 (b) 6 (c) 3 (d) 5

19. The angle formed by the hour–hand and the minute–hand of a clock at 2 : 15 p.m. is **(SSC CGL 1st Sit. 2012)**
(a) $27\frac{1}{2}°$ (b) 45° (c) $22\frac{1}{2}°$ (d) 30°

20. Two sides of a triangle are of length 4 cm and 10 cm. If the length of the third side is 'a' cm. then **(SSC CGL 1st Sit. 2012)**
(a) $a > 5$ (b) $6 \le a \le 12$
(c) $a < 5$ (d) $6 < a < 14$

21. In ΔABC, AD is the median and $AD = \frac{1}{2}BC$. If $\angle BAD = 30°$, then measure of $\angle ACB$ is **(SSC CGL 1st Sit. 2012)**
(a) 90° (b) 45° (c) 30° (d) 60°

22. The perimeter of an isosceles, right-angled triangle is 2p unit. The area of the same triangle is: **(SSC CGL 2nd Sit. 2012)**
(a) $(3-2\sqrt{2})p^2$ sq.unit (b) $(2+\sqrt{2})p^2$ sq.unit
(c) $(2-\sqrt{2})p^2$ sq.unit (d) $(3-\sqrt{2})p^2$ sq.unit

23. ΔABC and ΔDEF are similar and their areas be respectively 64 cm² and 121 cm². If EF = 15.4 cm, BC is: **(SSC CGL 2nd Sit. 2012)**
(a) 12.3 cm (b) 11.2 cm (c) 12.1 cm (d) 11.0 cm

24. If G is the centroid of ΔABC and AG = BC, then $\angle BGC$ is: **(SSC CGL 2nd Sit. 2012)**
(a) 75° (b) 45° (c) 90° (d) 60°

25. By decreasing 15° of each angle of a triangle, the ratios of their angles are 2 : 3 : 5. The radian measure of greatest angle is: **(SSC CGL 2nd Sit. 2012)**
(a) $11\pi/24$ (b) $\pi/12$ (c) $\pi/24$ (d) $5\pi/24$

26. O is the circum centre of the triangle ABC with circumradius 13 cm. Let BC = 24 cm and OD is perpendicular to BC. Then the length of OD is: **(SSC CGL 2nd Sit. 2012)**
(a) 7 cm (b) 3 cm (c) 4 cm (d) 5 cm

27. D and E are the mid-points of AB and AC of ΔABC; BC is produced to any point P; DE, DP and EP are joined. Then, **(SSC CGL 2nd Sit. 2012)**
(a) $\Delta PED = \frac{1}{4}\Delta ABC$ (b) $\Delta PED = \Delta BEC$
(c) $\Delta ADE = \Delta BEC$ (d) $\Delta BDE = \Delta BEC$

28. The length of the common chord of two circles of radii 15 cm and 20 cm whose centres are 25 cm apart is (in cm): **(SSC CGL 2nd Sit. 2012)**
(a) 20 (b) 24 (c) 25 (d) 15

29. AB is a diameter of a circle with centre O. CD is a chord equal to the radius of the circle. AC and BD are produced to meet at P. Then the measure of $\angle APB$ is: **(SSC CGL 2nd Sit. 2012)**
(a) 120° (b) 30° (c) 60° (d) 90°

30. R and r are the radius of two circles (R > r). If the distance between the centre of the two circles be *d*, then length of common tangent of two circles is: **(SSC CGL 2nd Sit. 2012)**
(a) $\sqrt{r^2-d^2}$ (b) $\sqrt{d^2-(R-r)^2}$
(c) $\sqrt{(R-r)^2-d^2}$ (d) $\sqrt{R^2-d^2}$

31. P is a point outside a circle and is 13 cm away from its centre. A secant drawn from the point P intersect the circle at points A and B in such a way that PA = 9 cm and AB = 7 cm. The radius of the circle is: **(SSC CGL 2nd Sit. 2012)**
(a) 5.5 cm (b) 5 cm (c) 4 cm (d) 4.5 cm

32. The perimeters of two similar triangle ΔABC and ΔPQR are 36 cm and 24 cm respectively. If PQ = 10 cm, then AB is: **(SSC CGL 2nd Sit. 2012)**
(a) 25 cm (b) 10 cm (c) 15 cm (d) 20 cm

33. In an obtuse-angled triangle ABC, $\angle A$ is the obtuse angle and O is the orthocenter. If $\angle BOC = 54°$, then $\angle BAC$ is **(SSC CGL 1st Sit. 2012)**
(a) 108° (b) 126° (c) 136° (d) 116°

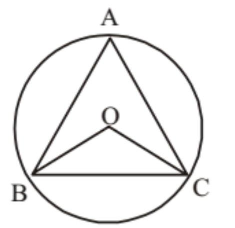
34. If the ratio of areas of two similar triangles is 9 : 16, then the ratio of their corresponding sides is **(SSC CGL 1st Sit. 2012)**
(a) 3 : 5 (b) 3 : 4 (c) 4 : 5 (d) 4 : 3

35. Let BE and CF the two medians of a ΔABC and G be their intersection. Also let EF cut AG at O. Then AO: OG is **(SSC CGL 1st Sit. 2012)**
(a) 1 : 1 (b) 1 : 2 (c) 2 : 1 (d) 3 : 1

36. If S is the circumcentre of ΔABC and $\angle A = 50°$, then the value of $\angle BCS$ is **(SSC CGL 1st Sit. 2012)**
(a) 20° (b) 40° (c) 60° (d) 80°

37. AC and BC are two equal chords of a circle. BA is produced to any point P and CP, when joined cuts the circle at T. Then **(SSC CGL 1st Sit. 2012)**
(a) CT : TP = AB : CA
(b) CT : TP = CA : AB
(c) CT : CB = CA : CP
(d) CT : CB = CP : CA

38. PQ is a direct common tangent of two circles of radii r_1 and r_2 touching each other externally at A. Then the value of PQ^2 is **(SSC CGL 1st Sit. 2012)**
(a) r_1r_2 (b) $2r_1r_2$ (c) $3r_1r_2$ (d) $4r_1r_2$

39.


BC is the chord of a circle with centre O. A is a point on major arc BC as shown in the above figure. What is the value of ∠BAC + ∠OBC ? **(SSC CGL 1st Sit. 2012)**
(a) 120° (b) 60° (c) 90° (d) 180°

40. Two circles with radii 5 cm and 8 cm touch each other externally at a point A. If a straight line through the point A cuts the circles at points P and Q respectively, then AP : AQ is **(SSC CGL 1st Sit. 2012)**
(a) 8 : 5 (b) 5 : 8 (c) 3 : 4 (d) 4 : 5

41. If I is the In-centre of ΔABC and ∠A = 60°, then the value of ∠BIC is **(SSC CGL 1st Sit. 2012)**
(a) 100° (b) 120° (c) 150° (d) 110°

42. The external bisectors of ∠B and ∠C of ΔABC meet at point P. If ∠BAC = 80°, then ∠BPC is **(SSC CGL 1st Sit. 2012)**
(a) 50° (b) 40° (c) 80° (d) 100°

43. When a pendulum of length 50 cm oscillates, it produces an arc of 16 cm. The angle so formed in degree measure is (approx) **(SSC CGL 1st Sit. 2012)**
(a) 18°25′ (b) 18°35′ (c) 18°20′ (d) 18°08′

44. A rail road curve is to be laid out on a circle. What radius should be used if the track is to change direction by 25° in a distance of 40 metres? **(SSC CGL 1st Sit. 2012)**
(a) 91.64 metres (b) 90.46 metres
(c) 89.64 metres (d) 93.64 metres

45. The radius of the circumcircle of the triangle made by x-axis, y-axis and $4x + 3y = 12$ is **(SSC CGL 2nd Sit. 2012)**
(a) 2 unit (b) 2.5 unit (c) 3 unit (d) 4 unit

46. The length of the circum-radius of a triangle having sides of lengths 12 cm, 16 cm and 20 cm is **(SSC CGL 2nd Sit. 2012)**
(a) 15 cm (b) 10 cm (c) 18 cm (d) 16 cm

47. If D is the mid-point of the side BC of ΔABC and the area of ΔABD is 16 cm^2, then the area of ΔABC is **(SSC CGL 2nd Sit. 2012)**
(a) 16 cm^2 (b) 24 cm^2 (c) 32 cm^2 (d) 48 cm^2

48. ABC is a triangle. The medians CD and BE intersect each other at O. Then $\Delta ODE : \Delta ABC$ is **(SSC CGL 2nd Sit. 2012)**
(a) 1 : 3 (b) 1 : 4 (c) 1 : 6 (d) 1 : 12

49. If P, R, T are the area of a parallelogram, a rhombus and a triangle standing on the same base and between the same parallels lines which of the following is true? **(SSC CGL 2nd Sit. 2012)**
(a) $R < P < T$ (b) $P > R > T$
(c) $R = P = T$ (d) $R = P = 2T$

50. AB is a diameter of the circumcircle of ΔAPB; N is the foot of the perpendicular drawn from the point P on AB. If $AP = 8$ cm and $BP = 6$ cm, then the length of BN is **(SSC CGL 2nd Sit. 2012)**
(a) 3.6 cm (b) 3 cm (c) 3.4 cm (d) 3.5 cm

51. Two circles with same radius r intersect each other and one passes through the centre of the other. Then the length of the common chord is **(SSC CGL 2nd Sit. 2012)**
(a) r (b) $\sqrt{3}r$ (c) $\frac{\sqrt{3}}{2}r$ (d) $\sqrt{5}r$

52. The bisector of ∠A of ΔABC cuts BC at D and the circumcircle of the triangle at E. Then **(SSC CGL 2nd Sit. 2012)**
(a) $AB : AC = BD : DC$ (b) $AD : AC = AE : AB$
(c) $AB : AD = AC : AE$ (d) $AB : AD = AE : AC$

53. Two circles intersect each other at P and Q. PA and PB are two diameters. Then ∠AQB is **(SSC CGL 2nd Sit. 2012)**
(a) 120° (b) 135° (c) 160° (d) 180°

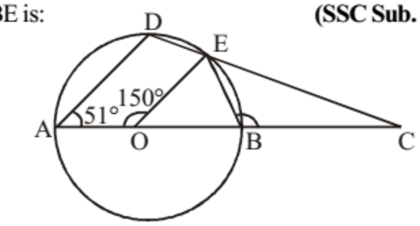
54. O is the centre of the circle passing through the points A, B and C such that ∠BAO = 30°, ∠BCO = 40° and ∠AOC = x°. What is the value of x ? **(SSC CGL 2nd Sit. 2012)**
(a) 70° (b) 140° (c) 210° (d) 280°

55. A and B are centres of the two circles whose radii are 5 cm and 2 cm respectively. The direct common tangents to the circles meet AB extended at P. Then P divides AB. **(SSC CGL 2nd Sit. 2012)**
(a) externally in the ratio 5 : 2 (b) internally in the ratio 2 : 5
(c) internally in the ratio 5 : 2 (d) externally in the ratio 7 : 2

56. A wheel rotates 3.5 times in one second. What time (in seconds) does the wheel take to rotate 55 radian of angle? **(SSC CGL 2nd Sit. 2012)**
(a) 1.5 (b) 2.5 (c) 3.5 (d) 4.5

57. If area of an equilateral triangle is a and height b, then value of $\frac{b^2}{a}$ is: **(SSC Sub. Ins. 2013)**
(a) 3 (b) $\frac{1}{3}$ (c) $\sqrt{3}$ (d) $\frac{1}{\sqrt{3}}$

58. Triangle PQR circumscribes a circle with centre O and radius r cm such that ∠PQR = 90°. If PQ = 3 cm, QR= 4 cm, then the value of r is : **(SSC Sub. Ins. 2013)**
(a) 2 (b) 1.5 (c) 2.5 (d) 1

59. In the following figure. AB be diameter of a circle whose centre is O. If ∠AOE = 150°. ∠DAO = 51° then the measure of ∠CBE is: **(SSC Sub. Ins. 2013)**


(a) 115° (b) 110° (c) 105° (d) 120°

60. The areas of two similar triangles ABC and DEF are 20 cm^2 and 45 cm^2 respectively. If AB = 5 cm. then DE is equal to : **(SSC Sub. Ins. 2013)**

(a) 6.5 cm (b) 7.5 cm (c) 8.5 cm (d) 5.5 cm

61. In a triangle ABC, BC is produced to D so that CD = AC. If $\angle BAD = 111°$ and $\angle ACB = 80°$, then the measure of $\angle ABC$ is: **(SSC Sub. Ins. 2013)**

(a) 31° (b) 33° (c) 35° (d) 29°

62. In ΔABC. $\angle A + \angle B = 145°$ and $\angle C + 2\angle B = 180°$. State which one of the following relations is true? **(SSC Sub. Ins. 2013)**

(a) CA = AB (b) CA < AB
(c) BC < AB (d) CA > AB

63. From a point P, two tangents PA and PB are drawn to a circle with centre O. If OP is equal to diameter of the circle, then $\angle APB$ is **(SSC CHSL 2013)**

(a) 60° (b) 45° (c) 90° (d) 30°

64. A chord 12 cm long is drawn in a circle of diameter 20 cm. The distance of the chord from the centre is **(SSC CHSL 2013)**

(a) 16 cm (b) 8 cm (c) 6 cm (d) 10 cm

65. 360 sq. cm and 250 sq. cm are the areas of two similar triangles. If the length of one of the sides of the first triangle be 8 cm, then the length of the corresponding side of the second triangle is **(SSC CHSL 2013)**

(a) 6 cm (b) $6\frac{1}{5}$ cm (c) $6\frac{1}{3}$ cm (d) $6\frac{2}{3}$ cm

66. If in ΔABC, $\angle ABC = 5\angle ACB$ and $\angle BAC = 3\angle ACB$, then $\angle ABC$ = **(SSC CHSL 2013)**

(a) 120° (b) 130° (c) 80° (d) 100°

67. The perpendiculars, drawn from the vertices to the opposite sides of a triangle, meet at the point whose name is **(SSC CHSL 2013)**

(a) orthocentre (b) incentre
(c) circumcentre (d) centroid

68. If ΔABC is similar to ΔDEF such that BC = 3 cm, EF = 4 cm and area of ΔABC = 54 cm^2, then the area of ΔDEF is : **(SSC CGL 1st Sit. 2013)**

(a) 54 cm^2 (b) 66 cm^2 (c) 78 cm^2 (d) 96 cm^2

69. A chord AB of a circle C_1 of radius $(\sqrt{3}+1)$ cm touches a circle C_2 which is concentric to C_1. If the radius of C_2 is $(\sqrt{3}-1)$ cm, the length of AB is: **(SSC CGL 1st Sit. 2013)**

(a) $4\sqrt{3}$ cm (b) $2\sqrt[4]{3}$ cm
(c) $8\sqrt{3}$ cm (d) $4\sqrt[4]{3}$ cm

70. In a triangle ABC, AB = AC, $\angle BAC = 40°$. Then the external angle at B is : **(SSC CGL 1st Sit. 2013)**

(a) 80° (b) 90° (c) 70° (d) 110°

71. A chord of length 30 cm is at a distance of 8 cm from the centre of a circle. The radius of the circle is : **(SSC CGL 1st Sit. 2013)**

(a) 19 (b) 17 (c) 23 (d) 21

72. If ABCD be a rectangle and P, Q, R, S be the mid points of $\overline{AB}, \overline{BC}, \overline{CD}$ and $\overline{DA}$ respectively, then the area of the quadrilateral PQRS is equal to: **(SSC CGL 1st Sit. 2013)**

(a) $\frac{1}{2}$ area (ABCD) (b) area (ABCD)
(c) $\frac{1}{3}$ area (ABCD) (d) $\frac{3}{4}$ area (ABCD)

73. P and Q are two points on a circle with centre at O. R is a point on the minor arc of the circle, between the points P and Q. The tangents to the circle at the points P and Q meet each other at the point S. If $\angle PSQ = 20°$, $\angle PRQ$ = ? **(SSC CGL 1st Sit. 2013)**

(a) 100° (b) 80° (c) 200° (d) 160°

74. AB and CD are two parallel chords of a circle such that AB = 10 cm and CD = 24 cm. If the chords are on the opposite sides of the centre and distance between them is 17 cm, then the radius of the circle is: **(SSC CGL 1st Sit. 2013)**

(a) 10 cm (b) 11 cm (c) 12 cm (d) 13 cm

75. ABC is an isosceles triangle such that AB = AC and $\angle B = 35°$. AD is the median to the base BC. Then $\angle BAD$ is: **(SSC CGL 1st Sit. 2013)**

(a) 55° (b) 70° (c) 35° (d) 110°

76. ABCD is a cyclic trapezium with AB || DC and AB = diameter of the circle. If $\angle CAB = 30°$ then $\angle ADC$ is **(SSC CGL 2nd Sit. 2013)**

(a) 60° (b) 120° (c) 150° (d) 30°

77. ABC is a triangle. The bisectors of the internal angle $\angle B$ and external angle $\angle C$ intersect at D. If $\angle BDC = 50°$, then $\angle A$ is **(SSC CGL 2nd Sit. 2013)**

(a) 100° (b) 90° (c) 120° (d) 60°

78. AB is the chord of a circle with centre O and DOC is a line segment originating from a point D on the circle and intersecting, AB produced at C such that BC = OD. If $\angle BCD = 20°$, then $\angle AOD$ = ? **(SSC CGL 2nd Sit. 2013)**

(a) 20° (b) 30° (c) 40° (d) 60°

79. In a circle of radius 17 cm, two parallel chords of lengths 30 cm and 16 cm are drawn. If both the chords are on the same side of the centre, then the distance between the chords is **(SSC CGL 2nd Sit. 2013)**

(a) 9 cm (b) 7 cm (c) 23 cm (d) 11 cm

80. ABC is a right angled triangle, B being the right angle. Mid-points of BC and AC are respectively B′ and A′. The ratio of the area of the quadrilateral AA′ B′B to the area of the triangle ABC is **(SSC CGL 2nd Sit. 2013)**

(a) 1 : 2 (b) 2 : 3
(c) 3 : 4 (d) None of the above

81. In a triangle ABC, the side BC is extended up to D. Such that CD = AC, if $\angle BAD = 109°$ and $\angle ACB = 72°$ then the value of $\angle ABC$ is **(SSC CGL 2nd Sit. 2013)**

(a) 35° (b) 60° (c) 40° (d) 45°

82. Two circles touch each other internally. Their radii are 2 cm and 3 cm. The biggest chord of the greater circle which is outside the inner circle of length. **(SSC CGL 2nd Sit. 2013)**

(a) $2\sqrt{2}$cm (b) $3\sqrt{2}$cm (c) $2\sqrt{3}$cm (d) $4\sqrt{2}$cm

83. ABCD is a cyclic quadrilateral AB and DC are produced to meet at P. If $\angle ADC = 70°$ and $\angle DAB = 60°$, then the $\angle PBC + \angle PCB$ is **(SSC CGL 2nd Sit. 2013)**
(a) 130° (b) 150° (c) 155° (d) 180°

84. From a point P which is at a distance of 13 cm from center O of a circle of radius 5 cm, in the same plane, a pair of tangents PQ and PR are drawn to the circle. Area of quadrilateral PQOR is **SSC CGL 2nd Sit. 2013)**
(a) 65 cm² (b) 60 cm² (c) 30 cm² (d) 90 cm²

85. If the arcs of square length in two circles subtend angles of 60° and 75° at their centres, the ratio of their radii is **(SSC CGL 2nd Sit. 2013)**
(a) 3 : 4 (b) 4 : 5 (c) 5 : 4 (d) 3 : 5

86. N is the foot of the perpendicular from a point P of a circle with radius 7 cm, on a diameter AB of the circle. If the length of the chord PB is 12 cm, the distance of the point N from the point B is **(SSC CGL 1st Sit. 2013)**
(a) $3\frac{5}{7}$ cm (b) $10\frac{2}{7}$ cm (c) $6\frac{5}{7}$ cm (d) $12\frac{2}{7}$ cm

87. In a triangle ABC, $\angle A = 90°$, $\angle C = 55°$, $AD \perp BC$. What is the value of $\angle BAD$? **(SSC CGL 1st Sit. 2013)**
(a) 45° (b) 55° (c) 35° (d) 60°

88. If G is the centroid of ΔABC and area of $\Delta ABC = 48 cm^2$, then the area of ΔBGC is **(SSC CGL 1st Sit. 2013)**
(a) 16 cm² (b) 24 cm² (c) 32 cm² (d) 8 cm²

89. The diagonals AC and BD of a cyclic quadrilateral ABCD intersect each other at the point P. Then, it is always true that **(SSC CGL 1st Sit. 2013)**
(a) AP . BP = CP . DP (b) AP . CD = AB . CP
(c) BP. AB = CD. CP (d) AP . CP = BP . DP

90. If O be the circumcentre of a triangle PQR and $\angle QOR = 110°$, $\angle OPR = 25°$, then the measure of $\angle PRQ$ is **(SSC CGL 1st Sit. 2013)**
(a) 55° (b) 60° (c) 65° (d) 50°

91. A vertical stick 12 cm long casts a shadow 8 cm long on the ground. At the same time, a tower casts a shadow 40 m long on the ground. The height of the tower is **(SSC CGL 1st Sit. 2013)**
(a) 65 m (b) 70 m (c) 72 m (d) 60 m

92. A, B, C, D are four points on a circle. AC and BD intersect at a point E such that $\angle BEC = 130°$ and $\angle ECD = 20°$. $\angle BAC$ is **(SSC CGL 1st Sit. 2013)**
(a) 100° (b) 110° (c) 120° (d) 90°

93. In a triangle, if three altitudes are equal, then the triangle is **(SSC CGL 1st Sit. 2013)**
(a) Right (b) Isoceles
(c) Obtuse (d) Equilateral

94. A, B, P are three points on a circle having centre O. If $\angle OAP = 25°$ and $\angle OBP = 35°$, then the measure of $\angle AOB$ is **(SSC CGL 1st Sit. 2013)**
(a) 120° (b) 60° (c) 75° (d) 150°

95. Side BC of ΔABC is produced to D. If $\angle ACD = 140°$ and $\angle ABC = 3\angle BAC$, then find $\angle A$. **(SSC CGL 1st Sit. 2013)**
(a) 55° (b) 45° (c) 40° (d) 35°

96. The length of tangent (upto the point of contact) drawn from an external point P to a circle of radius 5 cm is 12 cm. The distance of P from the centre of the circle is **(SSC CGL Ist. Sitt. 2013)**
(a) 11 cm (b) 12 cm (c) 13 cm (d) 14 cm

97. ABCD is a cyclic quadrilateral, AB is a diameter of the circle. If $\angle ACD = 50°$, the value of $\angle BAD$ is **(SSC CGL 1st Sit. 2013)**
(a) 30° (b) 40° (c) 50° (d) 60°

98. Two circles of equal radii touch externally at a point P. From a point T on the tangent at P, tangents TQ and TR are drawn to the circles with points of contact Q and R respectively. The relation of TQ and TR is **(SSC CGL 1st Sit. 2013)**
(a) TQ < TR (b) TQ > TR
(c) TQ = 2TR (d) TQ = TR

99. When two circles touch externally, the number of common tangents are **(SSC CGL 1st Sit. 2013)**
(a) 4 (b) 3 (c) 2 (d) 1

100. D and E are the mid-points of AB and AC of ΔABC. If $\angle A = 80°$, $\angle C = 35°$, then $\angle EDB$ is equal to **(SSC CGL 1st Sit. 2013)**
(a) 100° (b) 115° (c) 120° (d) 125°

101. If the inradius of a triangle with perimeter 32 cm is 6 cm, then the area of the triangle (in sq. cm) is **(SSC CGL 1st Sit. 2013)**
(a) 48 (b) 100 (c) 64 (d) 96

102. The sum of three altitudes of a triangle is **(SSC CGL 1st Sit. 2013)**
(a) equal to the sum of three sides
(b) less than the sum of sides
(c) greater than the sum of sides
(d) twice the sum af sides

103. In ΔABC, $\angle A + \angle B = 65°$, $\angle B + \angle C = 140°$, then find $\angle B$. **(SSC CGL 1st Sit. 2013)**
(a) 40° (b) 25° (c) 35° (d) 20°

104. The length of the tangent drawn to a circle of radius 4 cm from a point 5 cm away from the centre of the circle is **(SSC CGL 1st Sit. 2013)**
(a) 3 cm (b) $4\sqrt{2}$ cm (c) $5\sqrt{2}$ cm (d) $3\sqrt{2}$ cm

105. A cyclic quadrilateral ABCD is such that AB = BC, AD = DC, $AC \perp BD$, $\angle CAD = \theta$. Then the angle $\angle ABC$ = **(SSC CGL 1st Sit. 2013)**
(a) θ (b) $\frac{\theta}{2}$ (c) 2θ (a) 3θ

106. The height of an equilateral triangle is 15 cm. The area of the triangle is **(SSC CGL 1st Sit. 2013)**
(a) $50\sqrt{3}$ sq. cm. (b) $70\sqrt{3}$ sq. cm.
(c) $75\sqrt{3}$ sq. cm. (d) $150\sqrt{3}$ sq. cm.

107. Two parallel chords of a circle, of diameter 20 cm lying on the opposite sides of the centre are of lengths 12 cm and 16 cm. The distance between the chords is **(SSC CGL 1st Sit. 2013)**
(a) 16cm (b) 24cm (c) 14 cm (d) 20 cm

108. In ΔABC, DE || AC. D and E are two points on AB and CB respectively. If AB = 10 cm and AD 2.4 cm, then BE: CE is **(SSC CGL 1st Sit. 2013)**

(a) 2:3 (b) 2:5 (c) 5:2 (d) 3:2

109. A, B and C are the three points on a circle such that the an gles subtended by the chords AB and AC at the centre O are 90° and 110° respectively. $\angle BAC$ is equal to **(SSC CGL 1st Sit. 2013)**

(a) 70° (b) 80° (c) 90° (d) 100°

110. In a ΔABC, $\frac{AB}{AC} = \frac{BD}{DC}$, $\angle B = 70°$ and $\angle C = 50°$, then $\angle BAD = ?$ **(SSC Sub. Ins. 2014)**

(a) 60° (b) 20° (c) 30° (d) 50°

111. In a ΔABC, AD, BE and CF are three medians. The perimeter of ΔABC is always **(SSC Sub. Ins. 2014)**

(a) equal to $\left(\overline{AD} + \overline{BE} + \overline{CF}\right)$

(b) greater than $\left(\overline{AD} + \overline{BE} + \overline{CF}\right)$

(c) less than $\left(\overline{AD} + \overline{BE} + \overline{CF}\right)$

(d) None of these

112. In a ΔABC, $\overline{AD}$, $\overline{BE}$ and $\overline{CF}$ are three medians. Then the ratio $\left(\overline{AD} + \overline{BE} + \overline{CF}\right) : \left(\overline{AB} + \overline{AC} + \overline{BC}\right)$ is **(SSC Sub. Ins. 2014)**

(a) equal to $\frac{3}{4}$ (b) less than $\frac{3}{4}$

(c) greater than $\frac{3}{4}$ (d) equal to $\frac{1}{2}$

113. Two circles with radii 25 cm and 9 cm touch each other externally. The length of the direct common tangent is **(SSC Sub. Ins. 2014)**

(a) 34 cm (b) 30 cm (c) 36 cm (d) 32 cm

114. If AB = 5 cm, AC = 12 and $AB \perp AC$ then the radius of the circumcircle of ΔABC is **(SSC Sub. Ins. 2014)**

(a) 6.5 cm (b) 6 cm (c) 5 cm (d) 7 cm

115. The sum of the interior angles of a polygon is 1444°. The number of sides of the polygon is **(SSC CHSL 2014)**

(a) 6 (b) 9 (c) 10 (d) 12

116. In ΔABC, D and E are two points on the sides AB and AC respectively so that DE||BC and $\frac{AD}{BD} = \frac{2}{3}$. Then $\frac{\text{area of trapezium DECB}}{\text{area of } \Delta ABC}$ is equal to **(SSC CHSL 2014)**

(a) $\frac{5}{9}$ (b) $\frac{21}{25}$ (c) $1\frac{4}{5}$ (d) $5\frac{1}{4}$

117. The perimeters of two similar triangles ΔABC and ΔPQR are 36 cm and 24 cm respectively. If PQ = 10 cm, the AB is **(SSC CHSL 2014)**

(a) 15 cm (b) 12 cm (c) 14 cm (d) 26 cm

118. If the sides of a right angled triangle are three consecutive integers, then the length of the smallest side is **(SSC CHSL 2014)**

(a) 3 units (b) 2 units (c) 4 units (d) 5 units

119. Two circles intersect each other at the points A and B. A straight line parallel to AB intersects the circles at C, D, E and F. If CD = 4.5 cm, then the measure of EF is **(SSC CHSL 2014)**

(a) 1.50 cm (b) 2.25 cm (c) 4.50 cm (d) 9.00 cm

120. In a quadrilateral ABCD, the bisectors of $\angle A$ and $\angle B$ meet at O. If $\angle C = 70°$ and $\angle D = 130°$, then measure of $\angle AOB$ is **(SSC CGL 1st Sit. 2014)**

(a) 40° (b) 60° (c) 80° (d) 100°

121. In ΔABC, E and D are points on sides AB and AC respectively such that $\angle ABC = \angle ADE$. If AE = 3 cm, AD = 2 cm and EB = 2 cm, then length of DC is **(SSC CGL 1st Sit. 2014)**

(a) 4 cm (b) 4.5 cm (c) 5.0 cm (d) 5.5 cm

122. In a circle with centre O, AB is a chord, and AP is a tangent to the circle. If $\angle AOB = 140°$, then the measure of $\angle PAB$ is **(SSC CGL 1st Sit. 2014)**

(a) 35° (b) 55° (c) 70° (d) 75°

123. In ΔABC, $\angle A < \angle B$. The altitude to the base divides vertex angle C into two parts C_1 and C_2, with C_2 adjacent to BC. Then **(SSC CGL 1st Sit. 2014)**

(a) $C_1 + C_2 = A + B$ (b) $C_1 - C_2 = A - B$

(c) $C_1 - C_2 = B - A$ (d) $C_1 + C_2 = B - A$

124. If O is the in-centre of ΔABC; if $\angle BOC = 120°$, then the measure of $\angle BAC$ is **(SSC CGL 1st Sit. 2014)**

(a) 30° (b) 60° (c) 150° (d) 75°

125. Two parallel chords of a circle of diameter 20 cm are 12 cm and 16 cm long. If the chords are in the same side of the centre, then the distance between them is **(SSC CGL 1st Sit. 2014)**

(a) 28 cm (b) 2 cm (c) 4 cm (d) 8 cm

126. The interior angle of a regular polygon is 140°. The number of sides of that polygon is **(SSC CGL 1st Sit. 2014)**

(a) 9 (b) 8 (c) 7 (d) 6

127. If two circles of radii 9 cm and 4 cm touch externally, then the length of a common tangent is **(SSC CGL 1st Sit. 2014)**

(a) 5 cm (b) 7 cm (c) 8 cm (d) 12 cm

128. If in a triangle ABC, BE and CF are two medians perpendicular to each other and if AB=19cm and AC=22cm then the length of BC is : **(SSC Sub. Ins. 2015)**

(a) 20.5cm (b) 19.5cm (c) 13cm (d) 26cm

129. Two circles of radii 10 cm and 8 cm intersect and the length of the common chord is 12 cm. Then the distance between their centres is: **(SSC Sub. Ins. 2015)**

(a) 15 cm (b) 10 cm (c) 8 cm (d) 13.3 cm

130. Two isosceles triangles have equal vertical angles and their areas are in the ratio 9:16. Then the ratio of their corresponding heights is: **(SSC Sub. Ins. 2015)**
(a) 4.5 : 8 (b) 8 : 4.5 (c) 3 : 4 (d) 4 : 3

131. The perimetres of two similar triangles are 30 cm and 20cm respectively. If one side of the first triangle is 9cm. Determine the corresponding side of the second triangle: **(SSC Sub. Ins. 2015)**
(a) 15 cm (b) 5 cm (c) 6 cm (d) 13.5 cm

132. The diagonal of a quadrilateral shaped field is 24m and the perpendiculars dropped on it from the remaining opposite vertices are 8m and 13m. The area of the field is: **(SSC Sub. Ins. 2015)**
(a) 252 m^2 (b) 1152 m^2 (c) 96 m^2 (d) 156 m^2

133. In ΔABC, $\angle B = 60°$, and $\angle C = 40°$; AD and AE are respectively the bisector of $\angle A$ and perpendicular on BC. The measure of $\angle EAD$ is : **(SSC CHSL 2015)**
(a) 9° (b) 11° (c) 12° (d) 10°

134. ABCD is a square. Draw a triangle QBC on side BC considering BC as base and draw a triangle PAC on AC as its base such that $\Delta QBC \sim \Delta PAC$.

Then $\frac{\text{Area of } \Delta QBC}{\text{Area of } \Delta PAC}$ is equal to:

(a) $\frac{2}{1}$ (b) $\frac{1}{3}$ (c) $\frac{1}{2}$ (d) $\frac{2}{3}$

135. The distance between centres of two circles of radii 3 cm and 8 cm is 13 cm. If the points of contact of a direct common tangent to the circles are P and Q, then the length of the lien segment PQ is : **(SSC CHSL 2015)**
(a) 11.9 cm (b) 11.5 cm (c) 12 cm (d) 11.58 cm

136. In ΔABC, $AB = BC = K$, $AC = \sqrt{2}\,K$, then ΔABC is a : **(SSC CHSL 2015)**
(a) Isosceles triangle (b) Right angled triangle
(c) Equilateral triangle (d) Right isosceles triangle

137. Two circles of radii 5 cm and 3 cm touch externally, then the ratio in which the direct common tangent to the circles divides externally the line joining the centres of the circles is : **(SSC CHSL 2015)**
(a) 2.5 : 1.5 (b) 1.5 : 2.5 (c) 3 : 5 (d) 5 : 3

138. In ΔABC, a line through A cuts the side BC at D such that BD : DC = 4 : 5. If the area of $\Delta ABD = 60\text{ cm}^2$, then the area of ΔADC is **(SSC CGL 1st Sit. 2015)**
(a) 50 cm^2 (b) 60 cm^2 (c) 75 cm^2 (d) 90 cm^2

139. A tangent is drawn to a circle of radius 6cm from a point situated at a distance of 10 cm from the centre of the circle. The length of the tangent will be **(SSC CGL 1st Sit. 2015)**
(a) 4 cm (b) 5 cm (c) 8 cm (d) 7 cm

140. Two poles of height 7 m and 12 m stand on a plane ground. If the distance between their feet is 12 m, the distance between their top will be **(SSC CGL 1st Sit. 2015)**
(a) 13 m (b) 19 m (c) 17 m (d) 15 m

141. The measure of an angle whose supplement is three times as large as its complement, is **(SSC CGL 1st Sit. 2015)**
(a) 30° (b) 45° (c) 60° (d) 75°

142. The sides of a triangle having area 7776 sq. cm are in the ratio 3:4:5. The perimeter of the triangle is **(SSC CGL 1st Sit. 2015)**
(a) 400 cm (b) 412 cm (c) 424 cm (d) 432 cm

143. Two chords of length a unit and b unit of a circle make angles 60° and 90° at the centre of a circle respectively, then the correct relation is **(SSC CGL 1st Sit. 2015)**
(a) $b = \sqrt{2}\,a$ (b) $b = 2a$ (c) $b = \sqrt{3}a$ (d) $b = \frac{3}{2}a$

144. In a parallelogram PQRS, angle P is four times of angle Q, then the measure of $\angle R$ is **(SSC CGL 1st Sit. 2015)**
(a) 36° (b) 72° (c) 130° (d) 144°

145. If a clock started at noon, then the angle turned by hour hand at 3.45 PM is **(SSC CGL 1st Sit. 2015)**
(a) $104\frac{1°}{2}$ (b) $97\frac{1°}{2}$ (c) $112\frac{1°}{2}$ (d) $117\frac{1°}{2}$

146. Let C_1 and C_2 be the inscribed and circumscribed circles of a triangle with sides 3 cm, 4 cm and 5 cm then area of C_1 to area of C_2 is **(SSC CGL 1st Sit. 2015)**
(a) $\frac{9}{16}$ (b) $\frac{9}{25}$ (c) $\frac{4}{25}$ (d) $\frac{16}{25}$

147. If the three angles of a triangle are :

$(x + 15°), \left(\frac{6x}{5} + 6°\right)$ and $\left(\frac{2x}{3} + 30°\right)$ then the triangle is :

(SSC CGL 1st Sit. 2015)
(a) scalene (b) isosceles
(c) right angled (d) equilateral

148. If the number of vertices, edges and faces of a rectangular parallelopiped are denoted by v, e and f respectively, the value of (v – e + f) is **(SSC CGL 1st Sit. 2015)**
(a) 4 (b) 2 (c) 1 (d) 0

149. If the altitude of an equilateral triangle is $12\sqrt{3}$ cm, then its area would be : **(SSC CGL 1st Sit. 2015)**
(a) 12 cm^2 (b) 72 cm^2
(c) $36\sqrt{3}$ cm^2 (d) $144\sqrt{3}$ cm^2

150. Internal bisectors of $\angle Q$ and $\angle R$ of ΔPQR intersect at O. If $\angle ROQ = 96°$ then the value of $\angle RPQ$ is : **(SSC CGL 1st Sit. 2015)**
(a) 12° (b) 6° (c) 36° (d) 24°

151. If the measure of three angles of a triangle are in the ratio 2 : 3 : 5, then the triangle is : **(SSC CGL 1st Sit. 2015)**
(a) equilateral (b) isocsceles
(c) Obtuse angled (d) right angled

152. G is the centroid of ΔABC. The medians AD and BE intersect at right angles. If the lengths of AD and BE are 9 cm and 12 cm respectively; then the length of AB (in cm) is ? **(SSC CGL 1st Sit. 2015)**
(a) 10 (b) 10.5 (c) 9.5 (d) 11

153. If a person travels from a point L towards east for 12 km and then travels 5 km towards north and reaches a point M, then shortest distance from L to M is : **(SSC CGL 1st Sit. 2015)**
(a) 14 (b) 12 (c) 17 (d) 13

154. If D, E and F are the mid points of BC, CA and AB respectively of the ΔABC then the ratio of area of the parallelogram DEFB and area of the trapezium CAFD is : **(SSC CGL 1st Sit. 2015)**
(a) 1 : 3 (b) 1 : 2 (c) 3 : 4 (d) 2 : 3

155. O is the orthocentre of ΔABC , and if ∠BOC = 110° then ∠BAC will be **(SSC CGL 1st Sit. 2016)**
(a) 110° (b) 70° (c) 100° (d) 90°

156. BE and CF are two altitudes of a triangle ABC. If AB = 6 cm , AC = 5 cm and CF = 4 cm , then the length of BE is **(SSC CGL 1st Sit. 2016)**
(a) 4.8 cm (b) 7.5 cm (c) 3.33 cm (d) 5.5 cm

157. In a Δ ABC, BC is extended upto D :

$\angle ACD = 120°, \angle B = \frac{1}{2}\angle A.$ Then $\angle A$ is

(SSC CGL 1st Sit. 2016)
(a) 60° (b) 75° (c) 80° (d) 90°

158. O is the centre of a circle and AB is the tangent to it touching at B . If OB = 3 cm. and OA = 5 cm, then the measure of AB in cm is **(SSC CGL 1st Sit. 2016)**
(a) $\sqrt{34}$ (b) 2 (c) 8 (d) 4

159. X and Y are the mid points of sides AB and AC of a triangle ABC. If BC + XY=12 units, then BC – XY is **(SSC CGL 1st Sit. 2016)**
(a) 8 units (b) 4 units (c) 6 units (d) 2 units

160. In ΔPQR, L and M are two points on the sides PQ and PR respectively such that LM II QR. If PL = 2cm; LQ = 6cm and PM = 1.5 cm, then MR (in cm) is **(SSC CGL 1st Sit. 2016)**
(a) 0.5 (b) 4.5 (c) 9 (d) 8

161. The length of the radius of a circle with centre O is 5 cm and the length of the chord AB is 8 cm. The distance of the chord AB from the point O is **(SSC CGL 1st Sit. 2016)**
(a) 2 cm (b) 3 cm (c) 4 cm (d) 15 cm

162. In a triangle ABC, if ∠A + ∠C = 140° and ∠A + 3∠B = 180°, then ∠A is equal to **(SSC CGL 1st Sit. 2016)**
(a) 80° (b) 40° (c) 60° (d) 20°

163. If PA and PB are two tangents to a cirlce with centre O such that ∠APB = 80°. Then, ∠AOP =? **(SSC CGL 1st Sit. 2016)**
(a) 40° (b) 50° (c) 60° (d) 70°

164. Which of the set of three sides can't form a triangle? **(SSC CGL 1st Sit. 2016)**
(a) 5 cm, 6 cm, 7 cm (b) 5 cm, 8 cm, 15 cm
(c) 8 cm, 15 cm, 18 cm (d) 6 cm, 7 cm, 11 cm

165. AB is the diameter of a circle with centre O and P be a point on its circumference, If ∠POA = 120°, then the value of ∠PBO is: **(SSC CGL 1st Sit. 2016)**
(a) 30° (b) 60° (c) 50° (d) 40°

166. An arc of 30° in one circle is double an arc in a second circle, the radius of which is three times the radius of the first. Then the angles subtended by the arc of the second circle at its centre is **(SSC CGL 1st Sit. 2016)**
(a) 3° (b) 4° (c) 5° (d) 6°

167. Which of the following ratios can be the ratio of the sides of a right angled triangle? **(SSC CGL 1st Sit. 2016)**
(a) 9 : 6 : 3 (b) 13 : 12 : 5
(c) 7 : 6 : 5 (d) 5 : 3 : 2

168. Number of circles that can be drawn through three non-colinear points is **(SSC CGL 1st Sit. 2016)**
(a) exactly one (b) two
(c) three (d) more than three

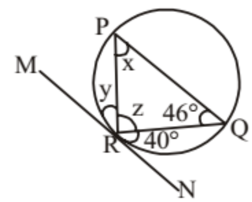
169. Two circles touch each other internally. The radius of the smaller circle is 6 cm and the distance between the centre of two circles is 3 cm. The radius of the larger circle is **(SSC CGL 1st Sit. 2016)**
(a) 7.5 cm (b) 9 cm (c) 8 cm (d) 10 cm

170. PQR is an equilateral triangle. MN is drawn parallel to QR such that M is on PQ and N is on PR. If PN = 6 cm, then the length of MN is **(SSC CGL 1st Sit. 2016)**
(a) 3 cm (b) 6 cm (c) 12 cm (d) 4.5 cm

171. In the triangle ABC, ∠BAC = 50° and the bisectors of ∠ABC and ∠ACB meets at P. What is the value (in degrees) of ∠BPC? **(SSC CGL 2017)**
(a) 100 (b) 105 (c) 115 (d) 125

172. Two circles of same radius intersect each other at P and Q. If the length of the common chord is 30 cm and distance between the centres of the two circles is 40 cm, then what is the radius (in cm) of the circles? **(SSC CGL 2017)**
(a) 25 (b) $25\sqrt{2}$ (c) 50 (d) $50\sqrt{2}$

173. In the given figure, ∠QRN = 40°, ∠PQR = 46° and MN is a tangent at R. What is the value (in degrees) of x, y and z respectively? **(SSC CGL 2017)**



(a) 40, 46, 94 (b) 40, 50, 90
(c) 46, 54, 80 (d) 50, 40, 90

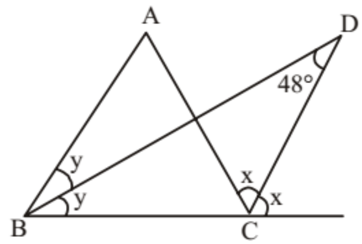
174. In ΔPQR, ∠R = 54°, the perpendicular bisector of PQ at S meets QR at T. If ∠TPR = 46°, then what is the value (in degrees) of ∠PQR? **(SSC CGL 2017)**
(a) 25 (b) 40 (c) 50 (d) 60

175. The perimeter of an isosceles triangle is 32 cm and each of the equal sides is 5/6 times of the base. What is the area (in cm²) of the triangle? **(SSC CGL 2017)**
(a) 39 (b) 48 (c) 57 (d) 64

176. If length of each side of a rhombus PQRS is 8 cm and $\angle PQR = 120°$, then what is the length (in cm) of QS? **(SSC CGL 2017)**

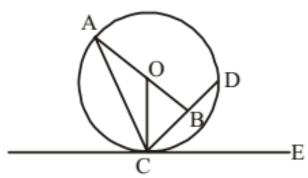
(a) $4\sqrt{5}$ (b) 6 (c) 8 (d) 12

177. In the given figure, ABC is a triangle. The bisectors of internal $\angle B$ and external $\angle C$ intersect at D. If $\angle BDC = 48°$, then what is the value (in degrees) of $\angle A$? **(SSC CGL 2017)**



(a) 48 (b) 96 (c) 100 (d) 114

178. In the given figure, O is the centre of the circle and $\angle DCE = 45°$. If $CD = 10\sqrt{2}$ cm, then what is the length (in cm) of AC. (CB = BD): **(SSC CGL 2017)**



(a) 14 (b) 15.5 (c) 18.5 (d) 20

179. In triangle ABC, a line is drawn from the vertex A to a point D on BC. If BC = 9 cm and DC = 3 cm, then what is the ratio of the areas of triangle ABD and triangle ADC respectively? **(SSC CGL 2017)**

(a) 1 : 1 (b) 2 : 1 (c) 3 : 1 (d) 4 : 1

180. PQR is a right angled triangle in which $\angle R = 90°$. If $RS \perp PQ$, PR = 3 cm and RQ = 4 cm, then what is the value of RS (in cm)? **(SSC CGL 2017)**

(a) 12/5 (b) 36/5 (c) 5 (d) 2.5

181. In triangle PQR, A is the point of intersection of all the altitudes and B is the point of intersection of all the angle bisectors of the triangle. If $\angle PBR = 105°$, then what is the value of $\angle PAR$ (in degrees)? **(SSC CGL 2017)**

(a) 60 (b) 100 (c) 150 (d) 115

182. If there are four lines in a plane, then what cannot be the number of points of intersection of these lines? **(SSC CGL 2017)**

(a) 0 (b) 5 (c) 4 (d) 7

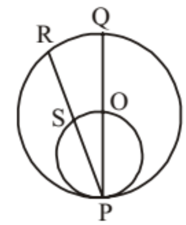
183. In ΔABC, $\angle BAC = 90°$ and AD is drawn perpendicular to BC. If BD = 7 cm and CD = 28 cm, then what is the length (in cm) of AD? **(SSC CGL 2017)**

(a) 3.5 (b) 7 (c) 10.5 (d) 14

184. A chord of length 60 cm is at a distance of 16 cm from the centre of a circle. What is the radius (in cm) of the circle? **(SSC CGL 2017)**

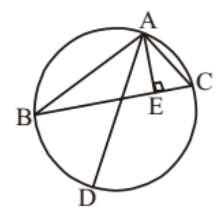
(a) 17 (b) 34 (c) 51 (d) 68

185. In the given figure, a smaller circle touches a larger circle at P and passes through its centre O. PR is a chord of length 34 cm, then what is the length (in cm) of PS? **(SSC CGL 2017)**



(a) 9 (b) 17 (c) 21 (d) 25

186. In the given figure, ABC is a triangle in which, AB = 10 cm, AC = 6 cm and altitude AE = 4 cm. If AD is the diameter of the circum-circle, then what is the length (in cm) of circum-radius? **(SSC CGL 2017)**



(a) 3 (b) 7.5 (c) 12 (d) 15

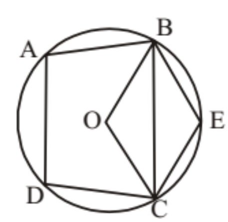
187. Find the sum of interior angles of a dodecagon? **(SSC CHSL 2017)**

(a) 1620° (b) 1800° (c) 1440° (d) 1260°

188. In $\Delta PQR, \angle P : \angle Q : \angle R = 2 : 2 : 5$. A line parallel to QR is drawn which touches PQ and PR at A and B respectively. What is the value of $\angle PBA - \angle PAB$? **(SSC Sub. Ins. 2017)**

(a) 60 (b) 30 (c) 24 (d) 36

189. In the given figure, O is the centre of the circle, $\angle DAB = 110°$ and $\angle BEC = 100°$. What is the value (in degrees) of $\angle OCB$? **(SSC Sub. Ins. 2017)**

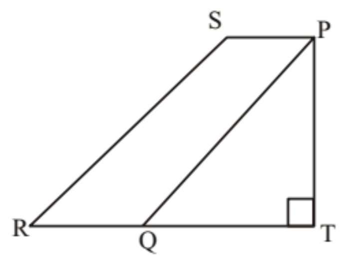


(a) 5 (b) 10 (c) 15 (d) 20

190. If ΔDEF is right angled at E, DE = 15 and $\angle DFE = 60°$, then what is the value of EF? **(SSC Sub. Ins. 2017)**

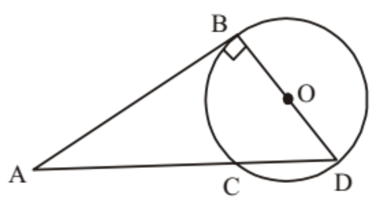
(a) $5\sqrt{3}$ (b) 5 (c) 15 (d) 30

191. In the given figure, area of isosceles triangle PQT is 128 cm^2 and QT = PQ and PQ = 4 PS, PT || SR, then what is the area (in cm^2) of the quadrilateral PTRS? **(SSC Sub. Ins. 2017)**



(a) 80 (b) 64 (c) 124 (d) 72

192. In the given figure , BD passes through centre O, AB = 12 and AC = 8. What is the radius of the circle? **(SSC Sub. Ins. 2017)**



(a) $3\sqrt{2}$ (b) $4\sqrt{3}$ (c) $3\sqrt{5}$ (d) $3\sqrt{3}$

193. Let ΔABC ~ ΔQPR and $\frac{ar(\Delta ABC)}{ar(\Delta PQR)} = \frac{9}{16}$. If AB = 12cm, BC = 6cm and AC = 9cm. Then PR is equal to: **(SSC Sub. Ins. 2018)**

(a) 12 cm (b) 16 cm (c) 8 cm (d) 9cm

194. In ΔABC, ∠A = 30°. If the bisectors of the angle B and angle C meet at a point O in the interior of the triangle, then ∠BOC is equal to: **(SSC Sub. Ins. 2018)**

(a) 75° (b) 105° (c) 120° (d) 90°

195. ABCD is a cyclic quadrilateral such that AB is the diameter of the circle circumscribing it and ∠ADC = 145°. What is the measure of ∠BAC ? **(SSC Sub. Ins. 2018)**

(a) 40° (b) 50° (c) 35° (d) 55°

196. PA and PB are two tangents from a point P outside a circle with centre O. If A and B are points on the circle such that ∠APB = 80°, then ∠OAB is equal to: **(SSC Sub. Ins. 2018)**

(a) 45° (b) 40° (c) 55° (d) 50°

197. OABC is a quadrilateral, where O is the centre of a circle and A, B, C are points in the circle, such that ∠ABC = 120°. What is the ratio of the measure of ∠AOC to that of ∠OAC? **(SSC CHSL-2018)**

(a) 3 : 1 (b) 4 : 1 (c) 2 : 1 (d) 3 : 2

198. A and B are two points on a circle with centre O. AT is a tangent, such that ∠BAT = 45°. N is a point on OA, such that BN = 10 cm. The length of the median OM of the Δ NOB is : **(SSC CHSL-2018)**

(a) $10\sqrt{2}$ cm (b) $5\sqrt{2}$ cm
(c) $5\sqrt{3}$ cm (d) 5 cm

199. The side BC of a right-angled triangle ABC (∠ABC = 90°) is divided into four equal parts at P, Q and R respectively. If $AP^2 + AQ^2 + AR^2 = 3b^2 + 17na^2$, then n is equal to : **(SSC CHSL-2018)**

(a) $-\frac{1}{8}$ (b) $\frac{3}{4}$ (c) $\frac{1}{8}$ (d) $-\frac{3}{4}$

200. It is given that ΔABC ~ ΔPRQ and that Area ABC : Area PRQ = 16 : 169. If AB = x, AC = y, BC = z (all in cm), then PQ is equal to: **(SSC CHSL-2018)**

(a) $\frac{13}{4}y$ (b) $\frac{13}{4}z$ (c) $\frac{13}{4}x$ (d) $\frac{13}{8}x$

201. In a circle with centre O, AB is the diameter and CD is a chord such that ABCD is a trapezium. If ∠BAC = 40°, then ∠CAD is equal to: **(SSC CGL-2018)**

(a) 15° (b) 20° (c) 50° (d) 10°

202. ΔABC ~ ΔRQP and AB = 4 cm, BC = 6 cm and AC = 5 cm. If ar(ΔABC) : ar(ΔPQR) = 9 : 4, then PQ is equal to: **(SSC CGL-2018)**

(a) $\frac{20}{9}$ cm (b) $\frac{8}{3}$ cm (c) 4 cm (d) $\frac{10}{3}$ cm

203. From a point P outside a circle, PAB is a secant and PT is a tangent to the circle, where, A, B and T are points on the circle. If PT = 5 cm, PA = 4 cm and AB = x cm, then x is equal to: **(SSC CGL-2018)**

(a) 2.25 cm (b) 2.75 cm (c) 2.45 cm (d) 1.75 cm

204. In ΔABC, AD is the median and G is a point on AD such that AG : GD = 2 : 1. Then ar(ΔBDG) : ar(ΔABC) is equal to: **(SSC CGL-2018)**

(a) 1 : 4 (b) 1 : 9 (c) 1 : 6 (d) 1 : 3

205. In ΔABC, P is a point on BC such that BP : PC = 4 : 11. If Q is the midpoint of BP, then ar(ΔABQ) : ar(ΔABC) is equal to: **(SSC CGL-2018)**

(a) 2 : 11 (b) 2 : 15 (c) 3 : 13 (d) 2 : 13

206. In a circle with centre O, an arc ABC subtends an angle of 110° at the centre of the circle. The chord AB is produced to a point *P*. Then ∠CBP is equal to: **(SSC CGL-2018)**

(a) 60° (b) 55° (c) 65° (d) 70°

207. In a circle of radius 17 cm, a chord is at a distance of 8 cm from the centre of the circle. What is the length of the chord? **(SSC CGL-2018)**

(a) 20 cm (b) 15 cm (c) 25 cm (d) 30 cm

208. ΔABC ~ ΔNLM and ar(ΔABC) : ar(ΔLMN) = 4 : 9. If AB = 6 cm, BC = 8 cm and AC = 12 cm, then ML is equal to: **(SSC CGL-2018)**

(a) 18 cm (b) 9 cm (c) 6 cm (d) 12 cm

209. A, B and C are three points on a circle such that the angles subtended by the chord AB and AC at the centre O are 110° and 130°, respectively. Then the value of ∠BAC is : **(SSC CGL 2019-20)**

(a) 65° (b) 60° (c) 70° (d) 75°

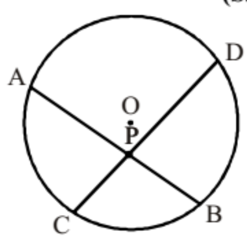
210. In ΔABC, MN || BC, the area of quadrilateral MBCN = 130 sqcm. If AN : NC = 4 : 5, then the area of ΔMAN is : **(SSC CGL 2019-20)**

(a) 45 cm^2 (b) 65 cm^2 (c) 32 cm^2 (d) 40 cm^2

211. The area of ΔABC is 44 cm^2. If D is the midpoint of BC and E is the midpoint of AB, then the area (in cm^2) of ΔBDE is : **(SSC CGL 2019-20)**

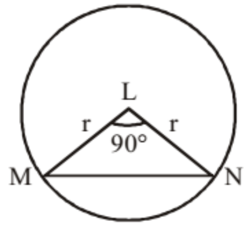
(a) 11 (b) 5.5 (c) 22 (d) 44

212. In the given figure, O is the centre of the circle. Its two chords AB and CD intersect each other at the point P within the circle. If AB = 15 cm, PB = 9 cm, CP = 3 cm, then find the length of PD. **(SSC CHSL 2019-20)**



(a) 20 cm (b) 22 cm (c) 16 cm (d) 18 cm

213. In the figure, L is the centre of the circle, and ML is the perpendicular to LN. If the area of the triangle MLN is 36, then the area of the circle is: **(SSC CHSL 2019-20)**



(a) 68π (b) 70π (c) 66π (d) 72π

214. A circle touches all the four sides of a quadrilateral *ABCD* whose sides are $AB = 8.4$ cm, $BC = 9.8$ cm and $CD = 5.6$ cm. The length of side *AD*, in cm, is: **(SSC CGL 2020-21)**

(a) 2.8 (b) 4.2 (c) 3.8 (d) 4.9

215. In $\Delta ABC, \angle C = 90°$ and Q is the midpoint of BC. If $AB = 10$ cm and $AC = 2\sqrt{10}$ cm, then the length of AQ is: **(SSC CGL 2020-21)**

(a) $5\sqrt{2}$ cm (b) $3\sqrt{5}$ cm

(c) $\sqrt{55}$ cm (d) $5\sqrt{3}$ cm

216. $\Delta ABC \sim \Delta DEF$ and the area of ΔABC is 13.5 cm^2 and the area of ΔDEF is 24 cm^2. If BC = 3.15 cm, then the length (in cm) of EF is: **(SSC CGL 2020-21)**

(a) 4.8 (b) 5.1 (c) 4.2 (d) 3.9

217. The radii of two concentric circles are 12 cm and 13 cm. AB is a diameter of the bigger circle. BD is a tangent to a smaller circle touching it at D. Find the length (in cm) of AD ? (correct to one decimal place) **(SSC CGL 2020-21)**

(a) 23.5 (b) 25.5 (c) 24.5 (d) 17.6

218. Two equal circles of radius 8 cm intersect each other such that each passes through the centre of the other. The length of the common chord is: **(SSC CHSL 2021)**

(a) 8 cm (b) $8\sqrt{3}$ cm

(c) $4\sqrt{3}$ cm (d) $8\sqrt{2}$ cm

219. Two circles with centres O and P and radii 17 cm and 10 cm, cut, each other at A and B. The length of the common chord AB is 16 cm. What is the perimeter of the triangle OAP (in cm)? **(SSC CHSL 2021)**

(a) 33 (b) 25 (c) 40 (d) 48

220. Two circles of radii 10 cm and 12 cm intersect each other and the length of their common chord is 16 cm. What is the distance (in cm) between their centres? **(SSC MTS 2021)**

(a) $6+5\sqrt{5}$ (b) $6+4\sqrt{5}$

(c) $6+3\sqrt{5}$ (d) $6+2\sqrt{5}$

221. In a ΔABC, the bisectors of ∠B and ∠C meet at O. If ∠BOC = 142°, then the measure of ∠A is : **(SSC Sub-Inspector 2020-21)**

(a) 52° (b) 68° (c) 104° (d) 116°

222. The sides of a triangle are 24 cm, 26 cm and 10 cm. At each of its vertices, circles of radius 4.2 cm are drawn. What is the area (in cm^2) of the triangle, excluding the portion covered by the sectors of the circles? $\left(\pi = \frac{22}{7}\right)$ **(SSC Sub-Inspector 2020-21)**

(a) 120 (b) 105.86 (c) 92.28 (d) 27.72

223. A circle is inscribed in a triangle ABC. It touches sides AB, BC and AC at points R, P and Q, respectively. If AQ = 3.5 cm, PC = 4.5 cm and BR = 7 cm, then the perimeter (in cm) of the triangle ΔABC is: **(SSC Sub-Inspector 2020-21)**

(a) 30 (b) 15 (c) 28 (d) 45

224. In Δ ABC, BD ⊥ AC at D. E is a point on BC such that ∠BEA = x°. If ∠EAC = 46° and ∠EBD = 60°, then the value of x is: **(SSC Sub-Inspector 2020-21)**

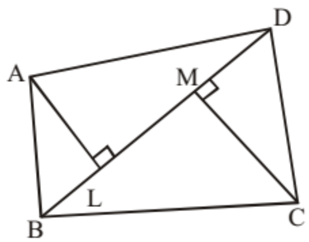
(a) 72° (b) 78° (c) 68° (d) 76°

225. PA and PB are two tangents from a point P outside the circle with centre O. If A and B are points on the circle such that ∠ APB = 128°, then ∠ OAB is equal to: **(SSC Sub-Inspector 2020-21)**

(a) 72° (b) 52° (c) 38° (d) 64°

HINTS & EXPLANATIONS

1. **(b)**



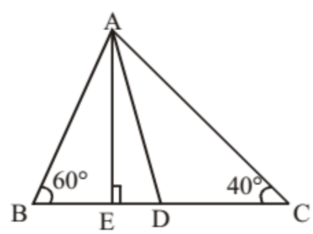
Given :
BD = 64 cm
AL = 13.2 cm
CM = 16.8 cm
So, Area (ABCD) = Area (ΔABD) + Area (ΔBCD)

$= \frac{1}{2} \times AL \times BD + \frac{1}{2} \times CM \times BD$

$= \frac{1}{2} \times BD \times (AL + CM) = \frac{64}{2}\ (13.2 + 16.8)$

$= 32 \times 30 = 960\ cm^2$

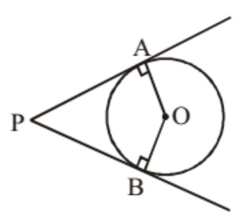
2. **(c)**



In ΔABC,
$\angle A + \angle B + \angle C = 180°$
$\angle A + 60° + 40° = 180°$
$\angle A = 180° - 60° - 40° = 80°$
AD bisects ∠BAC
$\therefore\ \angle A = \angle BAD + \angle DAC$
$\angle BAD = \angle DAC = 40°$
Now, In ΔABE
$\angle B + \angle E + \angle BAE = 180°$
$60° + 90° + \angle BAE = 180°$
$\angle BAE = 30°$
$\therefore\ \angle EAD = \angle BAD - \angle BAE = 40° - 30° = 10°$

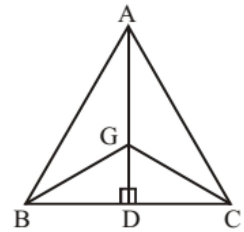
3. **(c)** ∠AEC = ∠ECD (Alternate interior angles as AB ∥ CD)
In ΔCED,
$\angle ECD + \angle CED + x° = 180°$
(Sum of angles of a triangle are 180°)
$37° + 90° + x° = 180°$
$x° = 180° - 37° - 90°$
$x° = 53°$

4. **(b)**



OAPB is concyclic because ∠A + ∠B = 180°
& ∠O + ∠P = 180°

5. **(c)**



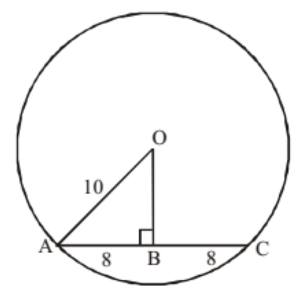
AG = BC (Given)
BD = DC (given) and AD is median

$\therefore\ GD = \frac{AG}{2} = \frac{BC}{2} = BD$

So, GD = BD = DC
ΔBGD & ΔGCD are both isosceles Δ.
Then ∠BGC = ∠BGD + ∠CGD = 90°

$\Rightarrow \frac{90°}{2} + \frac{90°}{2} = 90°$

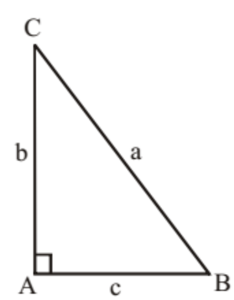
6. **(d)**



In OAB,
$OA^2 = OB^2 + AB^2$

[∵ $AB = \frac{1}{2}$ AC, because line drawn from centre to a chord bisect & perpendicular to it]
$(10)^2 = (OB)^2 + (8)^2$
$100 - 64 = OB^2$
$OB^2 = 36$
$OB = 6$

7. **(b)**



In right angled ΔABC,

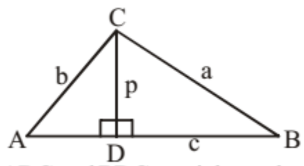
$\tan B = \frac{P}{B} = \frac{b}{c}$

$\tan C = \frac{P}{B} = \frac{c}{b}$

$\tan B + \tan C = \frac{b}{c} + \frac{c}{b}$

$= \frac{b^2 + c^2}{bc} = \frac{a^2}{bc} \quad [\because a^2 = b^2 + c^2]$

8. (b) Here,
$\angle ACB = 90°$
$\angle ADC = 90°$
$\angle BDC = 90°$



Triangles ACB, ADC and BDC are right angle triangles.
Here, Area of ΔABC = Area of ΔADC + Area of ΔBDC

$\Rightarrow \frac{1}{2} a \times b = \frac{1}{2} \times p \times AD + \frac{1}{2} \times p \times DB$

$\Rightarrow ab = p(AD + DB)$

$\Rightarrow ab = pc \Rightarrow c = \frac{ab}{p} \quad \ldots(1)$

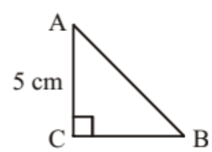
Now, In ΔABC,

$c^2 = a^2 + b^2 \Rightarrow \left(\frac{ab}{p}\right)^2 = a^2 + b^2$

$\Rightarrow \frac{a^2 b^2}{p^2} = a^2 + b^2$

$\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$

9. (c) ΔABC is an isocoles triangle.
Therefore, AC = BC = 5 cm
Now, $AB^2 = AC^2 + BC^2$



$AB^2 = 5^2 + 5^2 \Rightarrow \sqrt{25 + 25} = 5\sqrt{2}$ cm

10. (a) In a right angled Δ, the length of circumradius is half the length of hypotenuse.

$\therefore \quad H^2 = 6^2 + 8^2$
$H^2 = 36 + 64 \Rightarrow H^2 = 100$
$H = 10$ cm

Hence, Circumradius = 5 cm

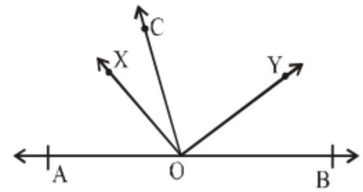
11. (b) Circumradius of a triangle

$= \frac{abc}{\sqrt{(a+b+c)(a+b-c)(b+c-a)(a+c-b)}}$

$= \frac{3 \times 4 \times 5}{\sqrt{(3+4+5)(3+4-5)(4+5-3)(3+5-4)}}$

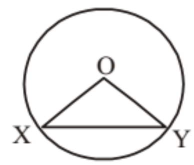
$= \frac{60}{\sqrt{12 \times 2 \times 6 \times 4}} = 2.5$ cm

12. (a)



OX is the bisector of $\angle AOC$.
$\therefore \angle AOC = 2\angle COX$
OY is the bisector of $\angle BOC$.
$\therefore \angle BOC = 2\angle COY$
$\therefore \angle AOC + \angle BOC$
$= 2\angle COY + 2\angle COX = 180°$
$\Rightarrow 2(\angle COX + \angle YOC) = 180°$
$\Rightarrow \angle XOY = 90°$
$\therefore \angle AOX + \angle XOY + \angle BOY = 180°$
$\therefore \angle BOY = 180° - 90° - 20° = 70°$

13. (a)



$\angle XOY = 90°$; OX = OY = radices (r)
$\therefore \Delta XOY$ is a right angled triangle.

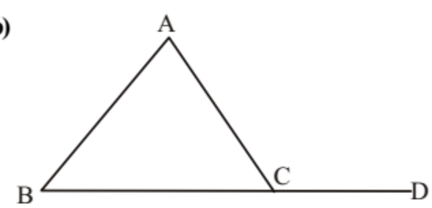
$\therefore \frac{1}{2} \times (OX) \times (OY) = 32$

$\Rightarrow r^2 = 2 \times 32 = 64$

$\therefore r = \sqrt{64} = 8$

$\therefore$ Area of circle $= \pi r^2$
$= 64\pi$ sq. units

14. (b)



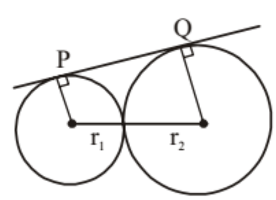
$\angle ACD = \angle ABC + \angle BAC$

$\Rightarrow 108° = \frac{\angle A}{2} + \angle A$

$\Rightarrow \frac{3\angle A}{2} = 108°$

$\Rightarrow \angle A = \frac{108 \times 2}{3} = 72°$

15. (d)



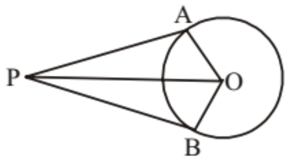
$r_1 + r_2 = 13$ cm
$r_2 - r_1 = 9 - 4 = 5$ cm

$$PQ = \sqrt{(\text{distance between centres})^2 - (r_2 - r_1)^2}$$

$$= \sqrt{(13^2 - 5^2)} = 12 \text{ cm}$$

$\therefore$ Area of square of side PQ = 12 × 12 = 144 sq. cm.

16. (c)



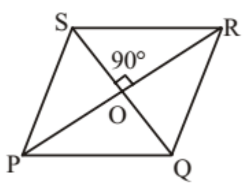
In right Δs OAP and OPB,
AP = PB, OA = OB
OP = OP
$\therefore \Delta OAP \cong \Delta OBP$
$\therefore \angle AOP = \angle POB$ and $\angle APO = \angle OPB$
From Δ AOP,
$\angle APO = 180° - 90° - 60° = 30°$
$\therefore \angle APB = 2 \times 30 = 60°$

17. (d) Let exterior angle = x
then, interior ∠be = 2x

$$x + 2x = 180$$
$$3x = 180$$
$$x = 60°$$

$$\text{no. of side } n = \frac{360}{60} = 6$$

18. (b)



$$\angle PQO = \frac{1}{2} PQR = 60°$$

From ΔPOQ,
$\angle OPQ = 180° - 90° - 60° = 30°$

$$\sin(\angle OPQ) = \frac{OQ}{PQ}$$

$$\Rightarrow OQ = PQ \sin 30° = 6 \times \frac{1}{2} = 3$$

$\therefore QS = 2 \times 3 = 6$ cm

19. (c) Angle traced by hour hand in an hour = 30°

$\therefore$ Angle traced In $2\frac{1}{4}$ i.e. $\frac{9}{4}$ hours

$$= \frac{9}{4} \times 30° = \frac{135°}{2}$$

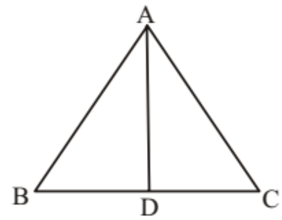
Angle traced by minute hand in 60 minutes = 360°
$\therefore$ Angle traced in 15 minutes

$$= \frac{360}{60} \times 15 = 90°$$

$$\therefore \text{Required angle } = 90° - \frac{135°}{2} = \frac{45°}{2} = 22\frac{1°}{2}$$

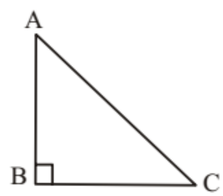
20. (d) The sum of any two sides of a triangle is greater than third side and their difference is less than third side.
$10 - 4 < a < 10 + 4$
$6 < a < 14$

21. (d)



BD = DC = AD
∠BAD = 30° {given}
In Δ ABD,
$\therefore \angle ABD = \angle BAD = 30°$
$\therefore \angle ADB = 180° - 2 \times 30° = 120°$
$\therefore \angle ADC = 180° - 120° = 60°$
$\therefore$ AD = DC
$\Rightarrow \angle DAC = \angle ACD = 60°$

22. (a)



AB = BC = x

$$\therefore \quad AC = \sqrt{AB^2 + BC^2} = \sqrt{x^2 + x^2}$$

$$= \sqrt{2}x \text{ units}$$

$$\therefore 2x + \sqrt{2}x = 2p$$

$$\Rightarrow x(2 + \sqrt{2}) = 2p$$

$$\Rightarrow x = \frac{2p}{2 + \sqrt{2}} = \frac{2p(2 - \sqrt{2})}{(2 + \sqrt{2})(2 - \sqrt{2})}$$

$$= \frac{2(2 - \sqrt{2})p}{4 - 2} = (2 - \sqrt{2})p$$

$$\therefore \text{Area of triangle} = \frac{1}{2}x^2$$

$$= \frac{1}{2} \times (2 - \sqrt{2})^2 p^2 = \frac{4 + 2 - 4\sqrt{2}}{2} p^2$$

$$= (3 - 2\sqrt{2})p^2 \text{ sq.units}$$

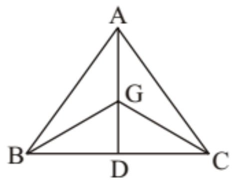
23. (b) $\dfrac{\Delta ABC}{\Delta DEF} = \dfrac{64}{121} = \dfrac{BC^2}{EF^2}$

$$\Rightarrow \frac{8}{11} = \frac{BC}{EF} \Rightarrow \frac{8}{11} = \frac{BC}{15.4}$$

$$\Rightarrow BC = \frac{8 \times 15.4}{11} = 11.2 \text{ cm}$$

24. (c) In ΔABC

Given $AG = BC$



$\frac{1}{2}AG = \frac{1}{2}BC$

i.e., $GD = BD = DC$

In ΔBGD

$BD = DG \therefore \angle GBD = \angle DGB$ ...(i)

In ΔCGD

$GD = DC, \therefore \angle GCD = \angle DGC$ ...(ii)

$\angle GBD + \angle DGB + \angle DGC + \angle DCG = 180$

$2(\angle BGD + \angle CGD) = 180$

$\angle BGC = \frac{180}{2} = 90°$

25. (a) $2x + 3x + 5x = 180° - 45° = 135°$

$\Rightarrow 10x = 135°$

$\Rightarrow x = \frac{135}{10} = \frac{27}{2}$

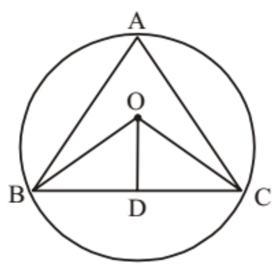
$\therefore$ Largest angle

$= 5x + 15° = \left(5\times\frac{27}{2}\right)° + 15° = \frac{135+30}{2} = \frac{165°}{2}$

$\because 180° = \pi$ radian

$\therefore \frac{165°}{2} = \frac{\pi}{180}\times\frac{165}{2} = \frac{11\pi}{24}$ radian

26. (d)



$BD = \frac{BC}{2} = 12$ cm

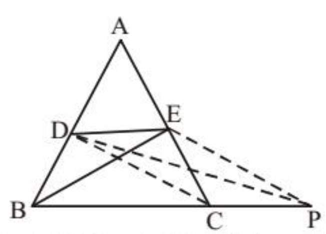
$OB = 13$ cm

From ΔOBD,

$= OD = \sqrt{OB^2 - BD^2}$

$= \sqrt{13^2 - 12^2} = \sqrt{169-144} = \sqrt{25} = 5$ cm

27. (a)



In ΔABC, point D and E are mid point of side AB and AC.

So, CD is the median of ΔABC.

$\therefore$ ar $(\Delta ADC) = \frac{1}{2}ar(\Delta ABC)$ ...(i)

Again, from ΔACD, ED is median of ΔACD

So, ar $(\Delta CDE) = \frac{ar(ADC)}{2}$ ...(ii)

from (i) and (ii),

ar $(\Delta CDE) = \frac{ar\,(\Delta ABC)}{4}$ ...(iii)

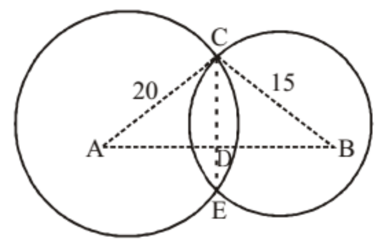
By midpoint theorem, $DE \parallel BP$

So, ar $(\Delta CDE) =$ ar(ΔPDE) ...(iv)

from (iii) and (iv)

ar$(\Delta PDE) = \frac{ar(\Delta ABC)}{4}$

28. (b)



Let two circles with centre A and B intersect each other such at points C and E such that CE is its common chord.

As A and B are the centre of the circles So, line AB divides chord CE at point D in two equal parts such that $CD = DE$ and also, $AB \perp CE$

Now, Consider ΔACD and ΔBCD,

$AC = 20$ cm, $BC = 15$ cm (given)

Let, $CD = x$ cm

and $AD = y$ cm then $BD = (25 - y)$ cm.

From ΔADC, $(AC)^2 = (AD)^2 + (CD)^2$

$(20)^2 = y^2 + x^2$ ...(i)

From ΔBDC, $(BC)^2 = (BD)^2 + (CD)^2$

$(15)^2 = (25 - y)^2 + x^2$ ...(ii)

From equation (i) and (ii), we have

$(20)^2 - (15)^2 = y^2 - (25 - y)^2$

$(20 + 15)(20 - 15) = (y - 25 + y)(y + 25 - y)$

$35 \times 5 = 25(2y - 25)$

$2y = 7 + 25 = 32$

$y = 16$

Again, from equation (i),

$(20)^2 = (16)^2 + x^2$

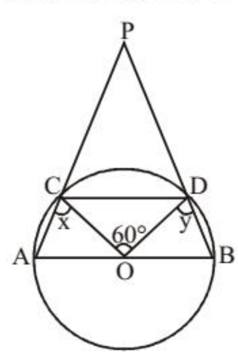
$\therefore x^2 = (20)^2 - (16)^2$

$= 400 - 256 = 144$

$CD = x = 12$ cm.

Common chord $CE = 2 \times CD = 2 \times 12 = 24$ cm

29. (c)



Here, in this circle, AO = OB = CO = OD = radius

From question,

CD = CO = OD

$\therefore$ ΔOCD is an equilateral triangle.

$\therefore \angle OCD = \angle ODC = \angle COD = 60°$

Now, consider the cyclic quadrileteral ABCD,

$\angle CAB + \angle BDC = \angle ACD + \angle ABC = 180°$ ...(i)

Let $\angle ACO = x$ and $\angle BDO = y$.

then, in $\angle$AOC, CO = AO = radius

$\therefore \angle OAC = \angle ACO = x$

Similarly in ΔBOD, $\angle ODB = \angle BDO = y$

Putting these values in equation (i)

$\angle CAB + \angle BDC = 180°$

$\angle CAB + \angle BDO + \angle ODC = 180°$

$x + y + 60° = 180°$

$\therefore x + y = 120°$ ...(ii)

Now, in ΔCPD,

$\angle PCD = 180° - \angle ACD = 180° - (x + 60°)$

and $\angle PDC = 180° - \angle BDC = 180° - (y + 60°)$

Sum of angles in $\Delta CPD = 180°$

$\therefore \angle PCD + \angle CPD + \angle PDC = 180°$

$180° - (x + 60°) + \angle CPD + 180° - (y + 60°) = 180°$

$60° - (x + y) + \angle CPD = 0$

$60° - 120° + \angle CPD = 0$

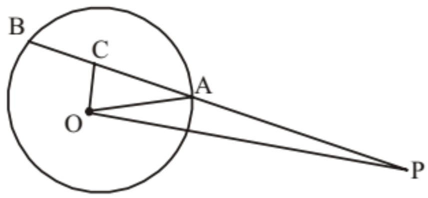
$\therefore \angle CPD = 60°$

Hence, $\angle APB = 60°$

30. (b) Length of common tangent

$= \sqrt{d^2 - (R - r)^2}$

31. (b)



OC $\perp$ AB

AC = BC = 3.5 cm OP = 13 cm

PC = 9 + 3.5 = 12.5 cm

$\therefore OC = \sqrt{OP^2 - PC^2}$

$= \sqrt{13^2 - (12.5)^2} = \sqrt{12.75}$

$\therefore OA = \sqrt{OC^2 + CA^2} = \sqrt{12.75 + (3.5)^2}$

$= \sqrt{12.75 + 12.25} = \sqrt{25} = 5$ cm

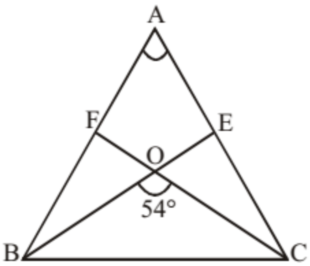
32. (c) $\frac{AB}{PQ} = \frac{BC}{QR} = \frac{CA}{RP} = \frac{AB + BC + CA}{PQ + QR + RP}$

$\Rightarrow \frac{AB}{PQ} = \frac{36}{24}$

$\Rightarrow \frac{AB}{10} = \frac{36}{24}$

$\Rightarrow AB = \frac{36 \times 10}{24} = 15$ cm

33. (b)



Let altitudes drawn from vertex B and C cross each other at Point 'O'.

then, $\angle BOC = 54° = \angle EOF$ {vertically opposite angles}

Now, in quadrilateral AEOF

$\angle AEO + \angle AFO + \angle EAF + \angle EOF = 360°$

$90° + 90° + \angle EAF + 54° = 360°$

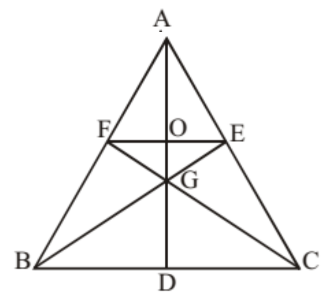
$\therefore \angle EAF = 360° - 90° - 90° - 54° = 126°$

$\therefore \angle EAF = \angle BAC = 126°$

34. (b) Ratio of corresponding sides

$= \sqrt{\frac{9}{16}} = \frac{3}{4}$

35. (d)



Here we extend AG that meet BC at point D.

E and F are mid point, hence $EF = \frac{1}{2}BC$

As, $\Delta AFO \sim \Delta ABD$

$\therefore \frac{OF}{BD} = \frac{AO}{AD} = \frac{1}{2}$

$\therefore$ O be the mid point of AD i.e. AO = OD.

Now, as centroid divides the median in the ratio 2 : 1

$\therefore \frac{AG}{GD} = \frac{2}{1} \Rightarrow \frac{AO + OG}{OD - OG} = \frac{2}{1}$

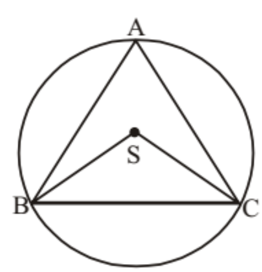
$\Rightarrow \frac{AO + OG}{AO - OG} = \frac{2}{1}$ $\{\because AO = OD\}$

$2(AO) - 2(OG) = AO + OG$

$(AO) = 3(OG)$

$\therefore AO : OG = 3 : 1$

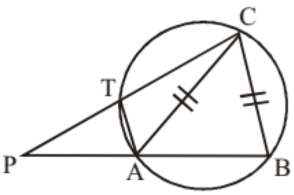
36. (b)



$\angle BAC = 50°$
$\therefore \angle BSC = 100°$
$BS = SC = \text{radius}$

$\therefore \angle BCS = \frac{1}{2}(180 - 100) = 40°$

37. (c)



In ΔPAC and ΔATC,
$\angle ATC = \angle PAC = 180° - \theta$.
$\angle PAC = \angle TCA$
$\therefore \angle PAC \sim \Delta ATC$

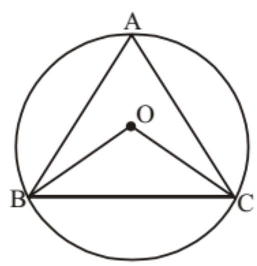
$\therefore \frac{AC}{PC} = \frac{CT}{AC}$

$\Rightarrow \frac{AC}{PC} = \frac{CT}{BC}$

$\Rightarrow CT : CB = AC : PC$

38. (d) $PQ^2 = (r_1 + r_2)^2 - (r_1 - r_2)^2 = 4r_1r_2$

39. (c)

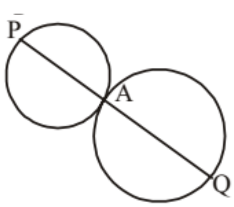


$\angle BOC = 2\angle BAC$
$OB = OC = \text{radius}$
$\therefore \angle OBC = \angle OCB$

$\therefore \angle OBC = 90° - \frac{\angle BOC}{2}$

$= 90° - \angle BAC$
$\therefore \angle BAC + \angle OBC$
$= 90° - \angle BAC + \angle BAC = 90°$

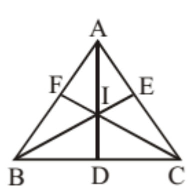
40. (b)



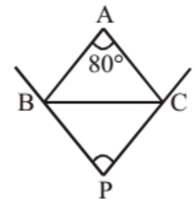
$\therefore AP : AQ = 5 : 8$

41. (b) $\angle BIC = 90° + \frac{A}{2}$

$= 90° + 30° = 120°$



42. (a)



$\angle BPC = 90° - \frac{A}{2} = 90° - \frac{80}{2}$

$= 90° - 40° = 50°$

43. (c) $s = 16$ cm
$r = 50$ cm

$\therefore \theta = \frac{s}{r} = \frac{16}{50} = \frac{8}{25}$ radian

$= \frac{8}{25} \times \frac{180}{\pi}$

$= \frac{8}{25} \times \frac{180}{22} \times 7 = \frac{1008}{55} = 18\frac{18°}{55}$

$= 18°\left(\frac{18}{55} \times 60\right) \approx 18°20'$

44. (a) $\theta = 25° = \frac{25 \times \pi}{180}$ radians

$= \frac{5\pi}{36}$ radians

$\theta = \frac{s}{r}$

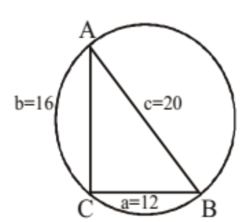
$\Rightarrow r = \frac{s}{\theta} = \frac{40}{\frac{5\pi}{36}} = \frac{40 \times 36}{5\pi}$

$= \frac{40 \times 36 \times 7}{5 \times 22}$ metre $= 91.64$ metre

45. (b) Putting $x = 0$ in $4x + 3y = 12$ we get $y = 4$
Putting $y = 0$ in $4x + 3y = 12$ we get $x = 3$
The triangle so formed is right angle triangle with points (0, 0), (3, 0) and (0, 4)

So diameter is the hypotenus of triangle $= \sqrt{16 + 9}$
= 5 unit
Radius = 2.5 unit

46. (b) Let the sides a = 12 cm, b = 16cm, c = 20 cm then,

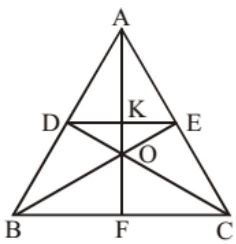


there, $a^2 + b^2 = c^2$
$(12)^2 + (16)^2 = (20)^2$
$144 + 256 = 400$
$400 = 400$
$\therefore$ ΔABC is a right angle triangle, whose hypotenuse AB = 20 cm.
As we know that the Length of the diameter of outer circle of right angle triangle is equal to its hypotenuse.

So, radius of required circle $= \frac{20}{2} = 10$ cm.

47. (c) Area of $\Delta ABD = 16\ cm^2$
Area of $\Delta ABC = 2 \times$ Area of ΔABD [$\because$ In triangle, the midpoint of the opposite side, divides it into two congruent triangles. So their areas are equal and each is half the area of the original triangle]
$\Rightarrow 32\ cm^2$

48. (d) Area of $\Delta ODE = \frac{1}{2} OK \times DE$



$= \frac{1}{2}\left(\frac{1}{2} BC \times OK\right)$

$= \frac{1}{4}[BC \times (AO - AK)]$

$= \frac{1}{4}\left[BC \times \left(\frac{2}{3}AF - \frac{1}{2}AF\right)\right]$

$= \frac{1}{4} \times \frac{1}{3}\left[\frac{1}{2} AF \times BC\right] = \frac{1}{12}$ area of $\Delta ABC = 1 : 12$

49. (d) Parallelogram Area = l × b
Rhombus Area = l × b

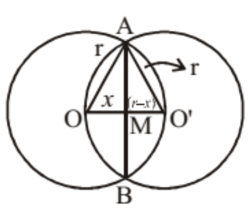
Triangle Area $= \frac{l \times b}{2}$

Therefore R = P = 2T.

50. (a) Since AB is a diameter. Then $\angle APB = 90°$ (angle in the semicircle)
$\Delta BPN \sim \Delta APB$
So, $BN = BP^2 / AB$

$BN = \frac{6 \times 6}{10} = 3.6$ cm

51. (b)



In ΔAOM
$r^2 = AM^2 + x^2$ (where OM = x)
$AM^2 = r^2 - x^2$ ...(1)
In $\Delta AMO'$
$r^2 = (r - x)^2 + AM^2$
$AM^2 = r^2 - (r - x)^2$ ...(2)
From eqn. (1) & (2)
$r^2 - x^2 = r^2 - (r - x)^2$
$\Rightarrow 2rx = r^2$

$\Rightarrow x = \frac{r}{2}$

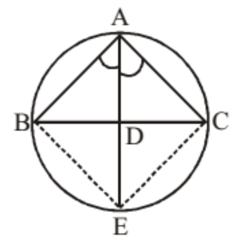
From eq. (1)

$AM^2 = r^2 - \left(\frac{r}{2}\right)^2 = \frac{3}{4}r^2$

$AM = \frac{\sqrt{3}}{2}r$

Length of chord $AB = 2AM = 2 \times \frac{\sqrt{3}}{2}r = \sqrt{3}r$

52. (d)

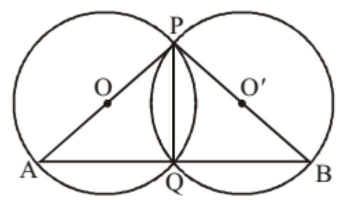


In ΔABC, D is the mid-point of side BC, since, AD divide angle A.
$\therefore$ BD = DC
and $\angle ABC = \angle AEC$ {angle in same sector of circle}
and $\angle CAE = \angle CBE$
from ΔABD and ΔACE

$\frac{AB}{AE} = \frac{AC}{AD}$

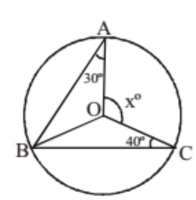
$\frac{AB}{AC} = \frac{AE}{AD} \Rightarrow AB : AC = AE : AD$

53. (d)



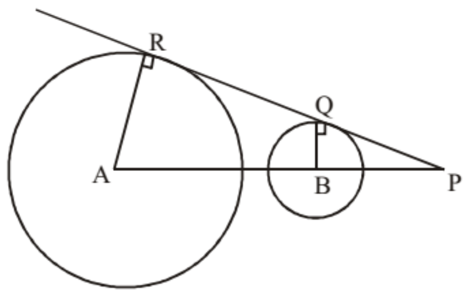
Let O and O′ be the centre of two intersecting circle, where point of intersection are P and Q and PA and PB are their diameter respectively.
$\angle AQP = 90°$ and $\angle BQP = 90°$
{$\because$ Angle in a semicircle is a right angle}
Adding both these angles,
$\angle AQP + \angle BQP = 180°$
$\therefore \angle AQB = 180°$

54. (b) In ΔAOB



AO = BO (radii of circles)
$\therefore \angle ABO = \angle BAO = 30°$
In ΔBOC
BO = CO (radii of circles)
$\therefore \angle BCO = \angle OBC = 40°$
$\angle ABC = \angle ABO + \angle OBC$
$\angle ABC = 30° + 40° = 70°$
$2 \times \angle ABC = \angle AOC \Rightarrow x° = 140$

55. (a)



Here RQ is the common tangent which touches circles with centre A and B at point R and Q respectively

$\therefore \angle ARQ = \angle BQR = 90°$

On extending the line AB, tangent RQ meet the line AB at point P.

Now, In ΔPBQ and ΔPAR,

$BQ \parallel AR$, $\angle P = \angle P$, $\angle Q = \angle R \Rightarrow \angle A = \angle B$.

thus, $\Delta PBQ \sim \Delta PAR$ {from AA theorem}

$$\therefore \frac{AR}{BQ} = \frac{PA}{PB}$$

$$\frac{5}{2} = \frac{PA}{PB} \Rightarrow PA : PB = 5 : 2$$

Hence, point P, divides line AB into 5 : 2 ratio externally.

56. (b) Radian covered in one second $= 2 \times \frac{22}{7} \times 3.5$

Time required to covered 55 radian $= \dfrac{55}{2 \times \frac{22}{7} \times 3.5} = 2.5$

57. (c) Let side of triangle $= x$

$$\therefore \quad \frac{\sqrt{3}}{4} x^2 = a \qquad \text{...(i)}$$

and $\dfrac{\sqrt{3}}{2} x = b$

$$x = \frac{2b}{\sqrt{3}} \qquad \text{...(ii)}$$

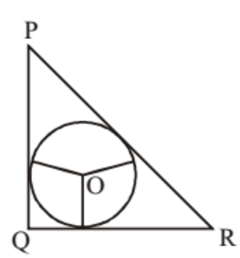
Putting x in equation (i)

$$\frac{\sqrt{3}}{4} \cdot \left(\frac{2b}{\sqrt{3}}\right)^2 = a$$

$$\frac{b^2}{a} = \sqrt{3}$$

58. (d) $PR^2 = PQ^2 + PR^2 = 3^2 + 4^2 = 25$

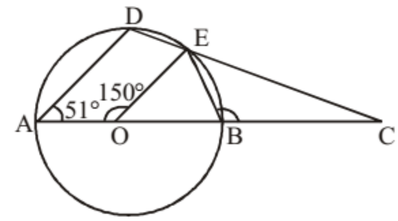
$\therefore PR = \sqrt{25} = 5$ cm



$$r = \frac{\text{Area of triangle}}{\text{Semi} - \text{perimeter of triangle}}$$

$$= \frac{\frac{1}{2} \times 3 \times 4}{\frac{3+4+5}{2}} = \frac{6}{6} = 1 \text{ cm}$$

59. (c)



$\angle AOE = 150°$

$\angle DAO = 51°$

$\angle EOB = 180° - 150° = 30°$

$OE = OB =$ radius

$\therefore \angle OEB = \angle OBE = \dfrac{150}{2} = 75°$

$\therefore \angle CBE = 180° - 75° = 105°$

60. (c) $\dfrac{\Delta ABC}{\Delta DEF} = \dfrac{AB^2}{DE^2}$

$\Rightarrow \dfrac{20}{45} = \dfrac{25}{DE^2}$

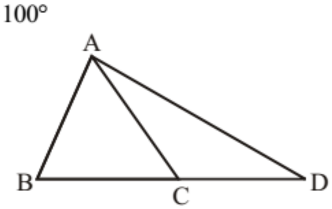
$\Rightarrow DE^2 = \dfrac{45 \times 25}{20} = \dfrac{225}{4}$

$\therefore DE = \dfrac{15}{2} = 7.5$ cm

61. (d) $\angle ACB = 80°$

$\angle ACD = 180° - 80° = 100°$

$\therefore \angle CAD = \angle CDA$



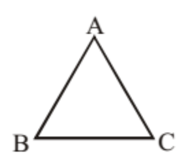
$= \dfrac{80}{2} = 40°$

$\angle BAC = 111° - 40°$

$= 71°$

$\angle ABC = 180° - 71° - 80° = 29°$

62. (d)



$\angle A + \angle B = 145°$

$\angle C + 180° - 145° = 35°$

$\angle C + 2\angle B = 180°$

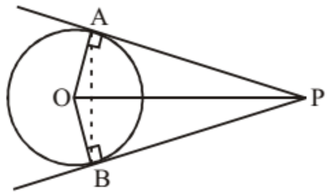
$\Rightarrow 2\angle B = 180° - 35° = 145°$

$\Rightarrow \angle B = \dfrac{145}{2} = 72.5° = \angle A$

$\angle B > \angle C$

$\therefore CA > AB$

63. (a)



AP and PB are two tangents to the circle

$\therefore \angle OAP = \angle OBP = 90°$

In ΔOAP, Let $\angle OPA = \theta$.

$OP = 2 \times$ radius {given}

$\therefore OP = 2 \times OA$

Now, $\sin\theta = \frac{OA}{OP} = \frac{1}{2}$

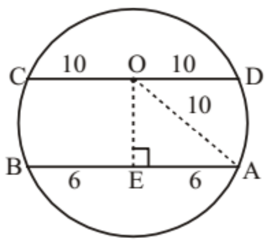
$\therefore \sin\theta = \sin 30° \Rightarrow \theta = 30°$

Again In ΔBOP, $\angle OPA = \angle OPB = \theta = 30°$ {By symmetry}

$\therefore \angle APB = 30° + 30° = 60°$.

64. (b) Given, $AB = 12$ cm; $CD = 20$ cm

$OE = ?$



Now, $AE = EB = 6$cm (The line drawn from centre of circle to the chord bisect the chord)

In ΔOAE, By phythagoras theorem

$(OA)^2 = (OE)^2 + (AE)^2 \Rightarrow (10)^2 = (OE)^2 + (6)^2$

$100 - 36 = (OE)^2 \Rightarrow 64 = OE^2 \Rightarrow \boxed{OE = 8\,cm}$

65. (d) Let the length of the corresponding side of other triangle is x. Then

$$\frac{360}{250} = \left(\frac{8}{x}\right)^2 \Rightarrow \left(\frac{6}{5}\right)^2 = \left(\frac{8}{x}\right)^2$$

$$x = \frac{20}{3} = 6\frac{2}{3}cm$$

66. (d) $\angle A + \angle B + \angle C = 180°$

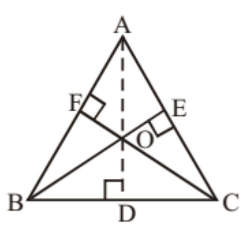
$3\angle C + 5\angle C + \angle C = 180°$

$9\angle C = 180°$

$\angle C = 20°$

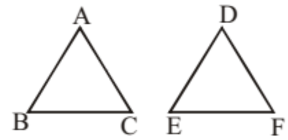
$\angle B = 100°$

67. (a) Orthocenter is the point where all three altitudes of the triangle intersect. An altitude is a line which passes through a vertex of the triangle and is perpendicular to the opposite side.



Here in the triangle ABC, AD, BE and CF are three altitudes drawn from point A, B and C on the side BC, AC and AB respectively. All the three altitudes intersect each other at a common point 'O'. That point 'O' is called 'Orthocenter' of the triangle ABC.

68. (d)

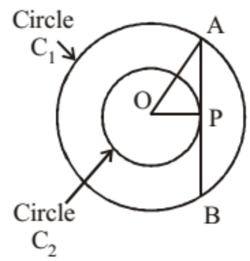


$\Delta ABC \sim \Delta DEF$

$$\therefore \frac{\Delta ABC}{\Delta DEF} = \frac{3^2}{4^2} \Rightarrow \frac{54}{\Delta DEF} = \frac{9}{16}$$

$$\Rightarrow \Delta DEF = \frac{16 \times 54}{9} = 96\,cm^2.$$

69. (d) Let A chord AB of circle C_1, touches the concentric circle C_2 at point 'P'.



Here $OA =$ radius of circle $C_1 = (\sqrt{3}+1)$

$OP =$ radius of circle $C_2 = (\sqrt{3}-1)$

As AP is a tangent to the circle C_2.

$\therefore \angle OPA = 90°$

Now, from ΔOPA, $(OA)^2 = (OP)^2 + (AP)^2$

$(AP)^2 = (OA)^2 - (OP)^2$

$= (\sqrt{3}+1)^2 - (\sqrt{3}-1)^2 = 4\sqrt{3}$

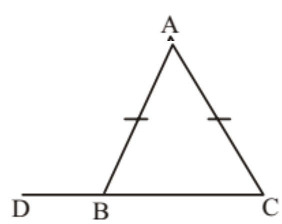
$\therefore AP = 2(3)^{1/4}$

Chord $AB = 2 \times AP$

$= 2 \times 2\,(3)^{1/4}$

$= 4(3)^{1/4}$

70. (d)



Since, $AB = AC$ {given}

$\angle ABC = \angle ACB$

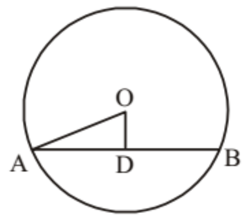
$\angle BAC = 40°$ {given}

$\therefore \angle ABC + \angle ACB = \{180° - 40°\} = 140°$

$\therefore \angle ABC = 70°$

$\therefore \angle ABD = 180° - 70° = 110°$

71. (b)



Here chord AB = 300 cm

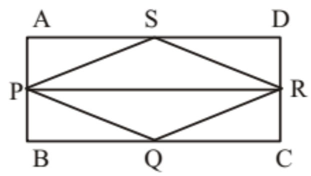
AD = 15 cm

OD = 8 cm

$OA = \sqrt{15^2 + 8^2} = \sqrt{225 + 64} = \sqrt{289}$

= 17 cm

72. (a)



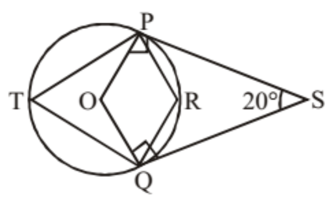
$ar\,\Delta PSR = \frac{1}{2}$ APRD ....(i)

$as\,\Delta PQR = \frac{1}{2}$ PBCR ....(ii)

Adding Both eq.

$ar\,\Delta PSRQ = \frac{1}{2}$ ABCD

73. (a)



In quadrilateral POQS, $\angle S = 20°$

$\angle OPS = \angle OQS = 90°, \angle POQ = ?.$

{Since PS and QS are tangent to the circle"

$\therefore$ Sum of angles in a quadrilateral = 360°

$\angle OPS + \angle S + \angle OQS + \angle POQ = 360°$

$90° + 20° + 90° + \angle POQ = 360°$

$\Rightarrow \angle POQ = 160°$

$\angle PTQ = \frac{1}{2} \times (\angle POQ)$

{Angle made on perimeter by the same chord is half of the angle made at the centre}

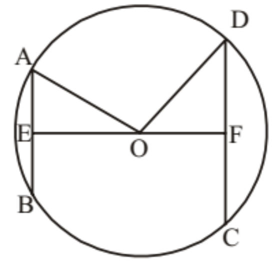
$\therefore \angle PTQ = \frac{1}{2} \times 160° = 80°$

Now, In cyclic quadrilateral PRQT,

$\angle PTQ + \angle PRS = 180°$

$80° + \angle PRQ = 180° \Rightarrow \angle PRQ = 180° - 80° = 100°$

74. (d)



AB = 10 cm, AE = 5 cm

OE = x

CD = 24 cm, DF = 12 cm

OF = 17 – x

OA = OD = radius

$\Rightarrow 5^2 + x^2 = 12^2 + (17 - x)^2$

$\Rightarrow 25 + x^2 = 144 + 289 - 34x + x^2$

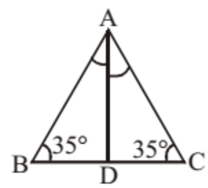
$\Rightarrow 34x = 408$

$\Rightarrow x = \frac{408}{34} = 12$

$\therefore OA = \sqrt{5^2 + 12^2} = 13$ cm

75. (a) As, AB = AC

$\therefore \angle ABC = \angle ACB = 35°$



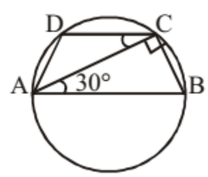
$\angle BAC = 180° - 35° - 35° = 110°$

$\angle BAC = \angle BAD + \angle CAD = 2\angle BAD$

{Since AD is a median}

$\therefore \angle BAD = 55°$

76. (b)



AB is a diameter of the circle

$\therefore \angle ACB = 90°$ {Angle made by the diameter on the semicircle

$\angle BAC = 30°$ {given)

$\therefore \angle BAC = \angle ACD = 30°$ {As AB || CD}.

$\angle BCD = 90° + 30° = 120°$

As ABCD is cyclic quadrilateral

$\therefore \angle BAD + \angle BCD = 180°$

$\angle BAD + 120° = 180°$

$\angle BAD = 180° - 120° = 60°$

$\angle BAD = \angle CAB + \angle CAD = 60°$

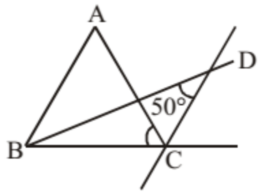
$30° + \angle CAD = 60° \Rightarrow \angle CAD = 30°$

Again, AB || CD, $\therefore \angle BAD + \angle ADC = 180°$

$60° + \angle ADC = 180°$

$\therefore \angle ADC = 180° - 60° = 120°$.

77. (a)



From question $\angle BDC = 50°$

In ΔBDC, $\angle DBC + \angle BDC + \angle BCD = 180°$

$$\Rightarrow \angle\left(\frac{B}{2}\right) + \angle D + \angle C + \left(\frac{180° - \angle C}{2}\right) = 180°$$

$$\frac{\angle B}{2} + 50° + 90° + \frac{\angle C}{2} = 180°$$

$$\frac{\angle B + \angle C}{2} = 180° - 90° - 50° = 40°$$

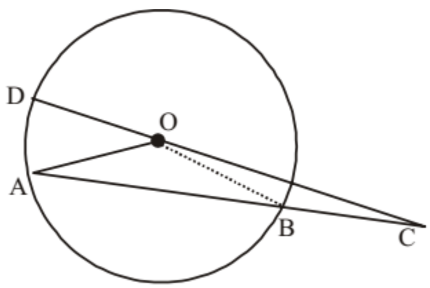
$\angle B + \angle C = 40 \times 2 = 80°$

From ΔABC, $\angle A + \angle B + \angle C = 180°$

$\angle A + 80° = 180°$

$\angle A = 180° - 80° = 100°$

78. (d)



Here BC = OD = radius {given}

In ΔBOC,

BC = OB (radius).

$\therefore \angle BOC = \angle BCO = 20°$

$\angle OBA = \angle BOC + \angle BCO = 20° + 20° = 40°$

Again, In ΔAOB,

AO = BO = radius

$\angle OAB = \angle OBA = 40°$

$\therefore \angle AOB = 180° - 40° - 40° = 100°$

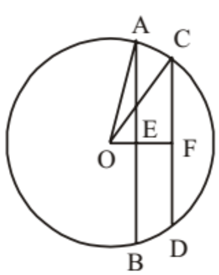
Again,

$\angle AOD + \angle AOB + \angle BOC = 180°$

$\angle AOD + 100° + 20° = 180°$

$\angle AOD = 180° - 120° = 60°$

79. (b)



AE = 15 cm

OA = 17 cm

$$\therefore OE = \sqrt{17^2 - 15^2}$$

$$= \sqrt{(17+15)(17-15)} = \sqrt{32 \times 2} = 8 \text{ cm}$$

CF = 8 cm

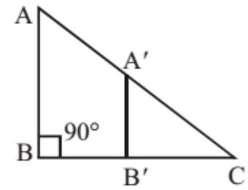
OC = 17 cm

$$\therefore OF = \sqrt{17^2 - 8^2}$$

$$= \sqrt{(17+8)(17-8)} = \sqrt{25 \times 9} = 15 \text{ cm}$$

Distance between two chords = OF – OE = 15 – 8 = 7 cm

80. (c)



B′ and A′ are mid-point of the side BC and AC.

Then, $A'B' = \frac{1}{2}AB$ and also $A'B' \parallel AB$ and $B'C = \frac{1}{2}BC$

Area of $\Delta A'B'C = \frac{1}{2} \times A'B' \times B'C$

$$= \frac{1}{2} \times \frac{AB}{2} \times \frac{BC}{2}$$

Area of $\Delta ABC = \frac{1}{2} \times AB \times BC$

Area of $AA'B'B = \Delta ABC - \Delta A'B'C$

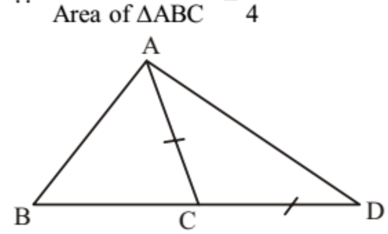
$$= \frac{1}{2}AB \times BC - \frac{1}{2} \times \frac{AB}{2} \times \frac{BC}{2}$$

$$= \left(\frac{4-1}{4}\right) \times \left(\frac{1}{2} \times AB \times BC\right).$$

$$= \frac{3}{4} \text{ (Area of } \Delta ABC)$$

$$\therefore \frac{\text{Area of } AA'B'B}{\text{Area of } \Delta ABC} = \frac{3}{4}$$

81. (a)



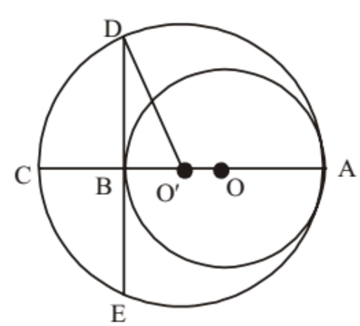
$\angle ACD = 180° - \angle ACB = 180° - 72° = 108°$

$$\angle CAD = \angle ADC = \frac{72°}{2} = 36°$$

Now from ΔABD

$\therefore \angle ABD = 180° - 109° - 36° = 35°$

82. (d)

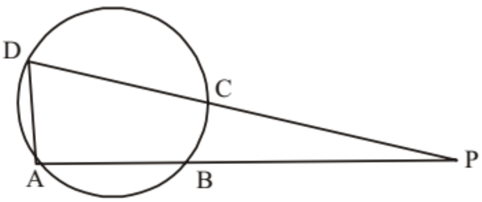


O′A = 3 cm
OA = 2 cm
CA = 6 cm
O′D = 3 cm
O′B = 1 cm

BD = $\sqrt{3^2 - 1} = 2\sqrt{2}$

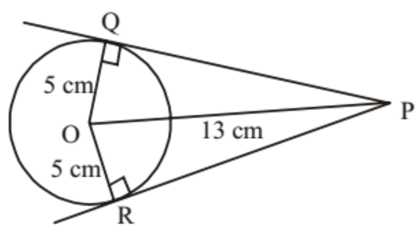
DE = $4\sqrt{2}$ cm

83. (a)



As ABCD is a cyclic quadrilateral.
In which
$\angle ADC = 70°$
$\angle ABC = 180° - 70° = 110°$
$\Rightarrow \angle PBC = 180° - 110° = 70°$
And $\angle DAB = 60°$
$\angle BCD = 180° - 60° = 120°$
$\Rightarrow \angle PCB = 180° - 120° = 60°$
$\therefore \angle PBC + \angle PCB = 70° + 60° = 130°$

84. (b)



In ΔOQP and ΔORP,
$\angle OQP = \angle ORP = 90°$
OR = OR {= radius}
PQ = PR {tangent}
$\therefore \Delta OQP \cong \Delta ORP$
Area of ΔOQP = Area of ΔORP

Now, PQ = $\sqrt{OP^2 - OQ^2}$

$= \sqrt{13^2 - 5^2} = 12$

$\therefore \square$ PQOR = 2 × ΔOPQ

$\therefore$ Area = $2 \times \frac{1}{2} \times 5 \times 12$

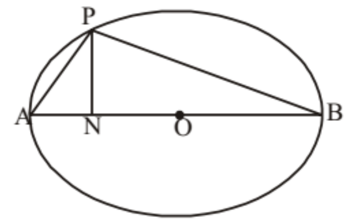
$= 60 \text{ cm}^2$

85. (c) $\theta = \frac{s}{r}$ [When θ = 2π]

$\Rightarrow s = r\hat{\theta}$
$\Rightarrow s = r_1\theta_1 = r_2\theta_2$

$\Rightarrow \frac{r_1}{r_2} = \frac{\theta_2}{\theta_1} = \frac{75}{60} = \frac{5}{4}$

86. (b)



AB = 14 cm, PB = 12 cm
$\angle APB = 90°$

$\therefore AP = \sqrt{14^2 - 12^2}$

$= \sqrt{(14+12)(14-12)} = \sqrt{26 \times 2} = \sqrt{52}$

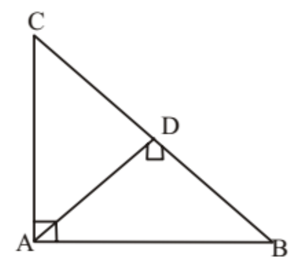
ON = x ∴ AN = 7 − x ; BN = 7 + x
$\therefore$ From Δ PAN, $PN^2 = AP^2 - AN^2$
$PN^2 = 52 - (7 - x)^2$
$\therefore$ From Δ PNB, $PN^2 = PB^2 - BN^2$
$PN^2 = (12)^2 - (7 + x)^2$
$\therefore 52 - (7 - x)^2 = 144 - (7 + x)^2$
$\Rightarrow 52 - (49 - 14x + x^2) = 144 - (49 + 14x + x^2)$
$\Rightarrow 52 - 49 + 14x - x^2 = 144 - 49 - 14x - x^2$
$\Rightarrow 28x = 144 - 52 = 92$

$\Rightarrow x = \frac{92}{28} = \frac{23}{7}$

$\therefore$ BN = 7 + x

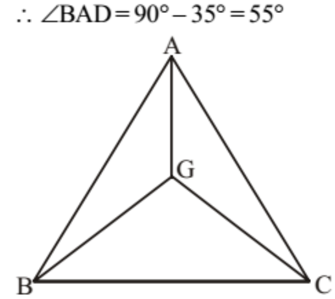
$= 7 + \frac{23}{7} = \frac{49 + 23}{7} = \frac{72}{7} = 10\frac{2}{7}$ cm

87. (b)



$\angle A = 90°, \angle C = 55°$
$\therefore \angle B = 90° - 55° = 35°$
$\angle ADB = 90°$
$\therefore \angle BAD = 90° - 35° = 55°$

88. (a)

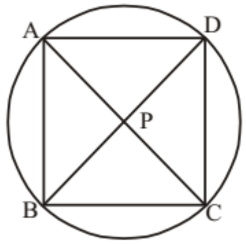


As G is the centroid of ΔABC,

$\Delta BGC = \frac{1}{3} \times \Delta ABC$

$= \frac{1}{3} \times 48 = 16 \text{ cm}^2.$

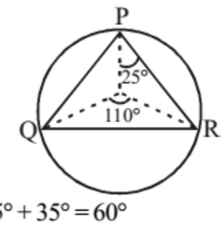
89. (d)



Here, AC and BD are chords of the circle.

$\therefore$ AP . CP = BP . DP

90. (b) In ΔOPR, OP = OR = radius



$\therefore \angle OPR = \angle ORP = 25°$

In ΔOQR, OQ = OR = radius

$\therefore \angle OQR = \angle ORQ$

$= \frac{180° - 110°}{2} = 35°$

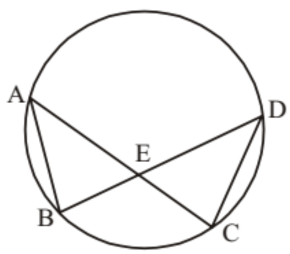
$\therefore \angle PRQ = \angle PRO + \angle ORQ = 25° + 35° = 60°$

91. (d) $\frac{\text{Height of tower}}{\text{Length of stick}} = \frac{\text{Length of shadow of tower}}{\text{Length of shadow of stick}}$

$\Rightarrow \frac{h}{12} = \frac{40}{8}$

$\Rightarrow h = \frac{40 \times 12}{8} = 60$ metre

92. (b)



$\therefore \angle BEC = 130°$

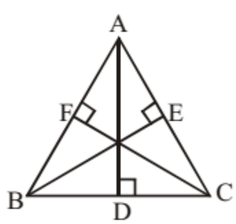
$\therefore \angle DEC = 180° - 130° = 50°$

$\therefore \angle EDC = 180° - 50° - 20° = 110°$

$\therefore \angle BAC = \angle EDC = 110°$

(Angles on the same arc)

93. (a)



Let ΔABC is a equilateral triangle of side AB = BC = AC = 2a unit.

AD, BE and CF are three altitudes in the ΔABC,

In equilateral triangle $\angle A = \angle B = \angle C = 60°$

$BD = \frac{2a}{2} = a,\ AB = 2a$

In ΔABD, $\tan 60° = \frac{AD}{BD} \Rightarrow \sqrt{3} = \frac{AD}{a} \Rightarrow AD = \sqrt{3}a$

Similarly, In ΔACF,

$\tan 60° = \frac{CF}{AF} \Rightarrow \sqrt{3} = \frac{CF}{a} \Rightarrow CF = \sqrt{3}.a$

Similarly, in ΔBCE,

$\tan 60° = \frac{BE}{CE} \Rightarrow \sqrt{3} = \frac{BE}{a} \Rightarrow BE = \sqrt{3}a$

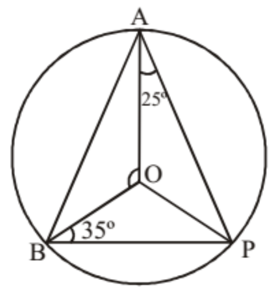
Here, we get AD = BE = CF

Hence, three altitude are equal

Thus, triangle must be a equilateral triangle.

94. (a) In ΔOBP.

OB = OP (radius)



$\therefore \angle OBP = \angle OPB = 35°$

In ΔAOP

OA = OP (radius)

$\therefore \angle OAP = \angle OPA = 25°$

Now, $\angle APB = \angle OPA + \angle OPB$

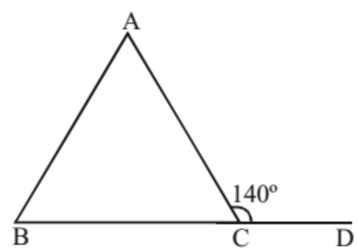
$= 25° + 35° = 60°$

Hence, $\angle AOB = 2\angle APB$

(Since, Angle be substended by arc at centre is twice the angle subtend at the perimeter)

$= 2 \times 60° = 120°$

95. (d)



$\angle ACB + \angle ACD = 180°$ (linear pair)

$\therefore \angle ACB = 180° - 140° = 40°$

In Δ ABC,

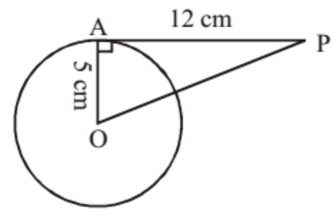
$\angle BAC + \angle ABC + \angle ACB = 180°$

$\angle BAC + 3\angle BAC + 40° = 180°$

$4\angle BAC = 180° - 40°$

$\angle BAC = \frac{140}{4} = 35°$

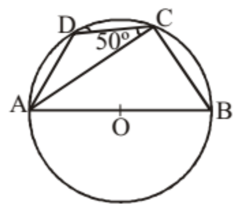
96. (c)



AP is a tangent and OA is a radius.

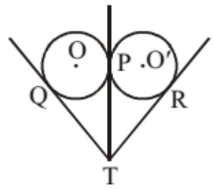
Therefore, OA is $\perp$ at AP.
So, In Δ OAP
$OP^2 = OA^2 + AP^2 = 5^2 + 12^2$
$OP^2 = 25 + 144 = 169$
OP = 13 cm

97. (b) In Δ ABC, $\angle ACB = 90^\circ$
$\therefore \angle ACB + \angle ACD =$
$90^\circ + 50^\circ = 140^\circ$



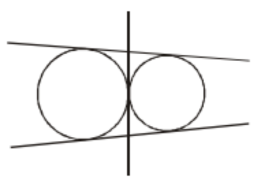
As angle mode by triangle in semicircle is equal to 90°.
$\therefore$ In quad. ABCD, $\angle BAD + \angle BCD = 180^\circ$
(angle of opp. pair of quad is equal to 180°)
$\angle BAD = 180^\circ - 140^\circ = 40^\circ$

98. (d)



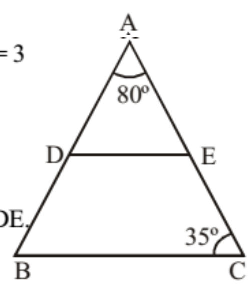
Let two circles with centre O and O' touches each other at point P. From point T tangent TQ and TR are drawn on two circles equal radius.
As we know two tangent drawn from a external points are always equal
So, TQ = TP ...(i)
and TP = TR ...(ii)
from (i) and (ii), TQ = TP = TR

99. (b)



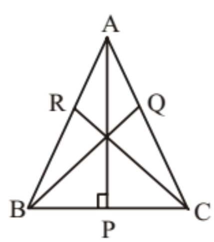
Number of common tengent = 3

100. (b) As D and E are mid point so,
DE is parallel to BC
So $\angle AED = \angle C = 35^\circ$
Since $\angle A = 80^\circ$
Then $\angle ADE = 65^\circ$
$\angle EDB$ is supplement to $\angle ADE$,
So, $\angle EDB = 180^\circ - \angle ADE$
$= 180^\circ - 65^\circ = 115^\circ$



101. (d) Area of triangle = Inradius × Semi-perimeter
$= 6 \times 16 = 96$ sq. cm.

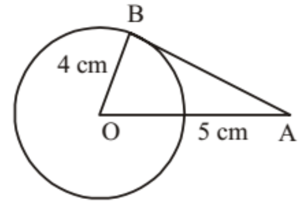
102 (b)



We know that Altitude from a point on a line is the shortest distance of that point from the line.
AP < AB
BQ < BC
CR < AC
$\therefore AP + BQ + CR < AB + BC + AC$

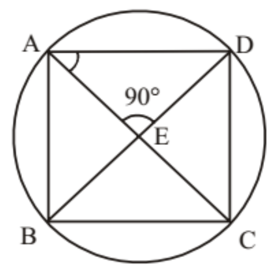
103. (b) $\angle A + \angle B = 65^\circ$
$\therefore \angle C = 180^\circ - 65^\circ = 115^\circ$
$\angle B + \angle C = 140^\circ$
$\therefore \angle B = 140^\circ - 115^\circ = 25^\circ$

104. (a)



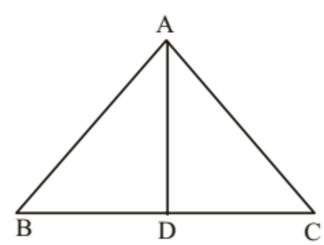
Here OB = 4 cm (radius)
OA = 5 cm
As AB is a tangent to the circle,
$\therefore \angle OBA = 90^\circ$
OA = 5, OB = 4
$\therefore AB = \sqrt{OA^2 - OB^2}$
$= \sqrt{25 - 16} = \sqrt{9} = 3$ cm

105. (c)



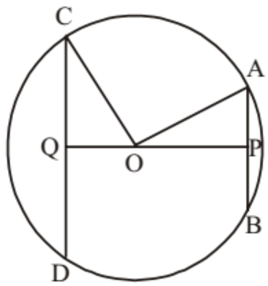
$\angle B + \angle D = 180^\circ$
$\angle A + \angle C = 180^\circ$
$\angle DAC = \theta$ {given}
$\angle AED = 90^\circ$ {given}
In ΔAED,
$\therefore \angle ADE = 90^\circ - \theta = \angle CDE$
$\therefore \angle ABC = 180^\circ - 2(90^\circ - \theta) = 2\theta$

106. (c)



Let, AB = BC = CA = 2a cm,
AD $\perp$ BC
$AD = \sqrt{AB^2 - BD^2}$
$= \sqrt{4a^2 - a^2} = \sqrt{3}a \quad \therefore \sqrt{3}a = 15$
$\Rightarrow a = 5\sqrt{3}$
$\therefore 2a = \text{side} = 10\sqrt{3}$ cm
$\therefore$ Area of triangle
$= \frac{\sqrt{3}}{4} \times (10\sqrt{3})^2 = 75\sqrt{3}$ sq. cm.

107. (c)



$OA = OC = 10$ cm (radius)
$AB = 12$ cm
$AP = PB = 6$ cm
$CD = 16$ cm
$CQ = QD = 8$ cm

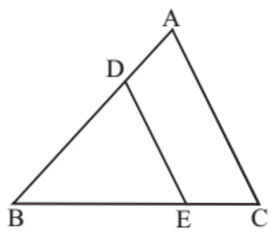
From ΔOCQ, $OQ = \sqrt{OC^2 - CQ^2}$

$OQ = \sqrt{10^2 - 8^2} = \sqrt{18 \times 2} = 6$ cm

From ΔOAP, $OP = \sqrt{OA^2 - AP^2}$

$OP = \sqrt{10^2 - 6^2} = \sqrt{16 \times 4} = 8$ cm
$\therefore PQ = 6 + 8 = 14$ cm

108. (d)



From question, $DE \parallel AC$

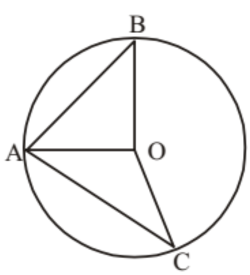
$\Delta ABC \sim \Delta BDE \ \therefore \ \frac{AB}{BD} = \frac{BC}{BE}$

$\Rightarrow \frac{AB}{BD} - 1 = \frac{AC}{BE} - 1$

$\Rightarrow \frac{AD}{BD} = \frac{CE}{BE} \Rightarrow \frac{BD}{AD} = \frac{BE}{CE}$

$\Rightarrow \frac{10-4}{4} = \frac{BE}{CE} \Rightarrow \frac{BE}{CE} = \frac{3}{2}$

109. (b)



$\angle AOB = 90°$; $OA = OB = r$
$\therefore \angle BAO = \angle ABO = 45°$
$\therefore \angle AOC = 110°$; $OA = OC = r$

$\therefore \angle OAC = \angle OCA = \frac{70}{2} = 35°$

$\therefore \angle BAC = 45° + 35° = 80°$

110. (c) In ΔABC, If $\frac{AB}{AC} = \frac{BD}{CD}$

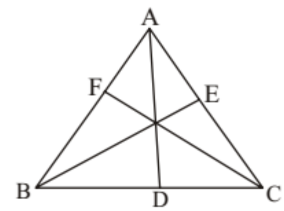
then by the converse of internal angle bisector theorem, we get that AD bisects angle A.

$\therefore \angle BAD = \angle CAD = \frac{1}{2}\angle A$

Again, we know that, sum of angles in a triangle $= 180°$
$\therefore \angle A + \angle B + \angle C = 180°$
$\angle A + 70° + 50° = 180° \Rightarrow \angle A = 60°$

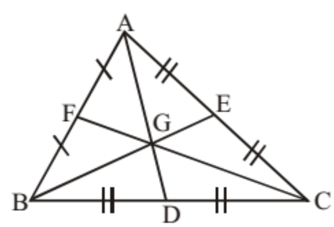
$\therefore \angle BAD = \frac{\angle A}{2} = \frac{60°}{2} = 30°$

111. (b)



Let ABC be the triangle and D, E and F are midpoints of BC, CA and AB respectively.
in Δ ABC, AD is median
$AB + AC > 2\,AD$
Similarly, we get
$BC + AC > 2\,CF$
$BC + AB > 2\,BE$
On adding the above inequations, we get
$(AB + AC + BC + AC + BC + AB) > 2(AD + BE + CF)$
$2\,(AB + AC + BC) > 2\,(AD + BE + CF)$
$\therefore AB + BC + BC > AD + BE + CF$
Thus, the perimeter of triangle is greater than the sum of the medians.

112. (c)



In a triangle sum of two sides are always greater than third sides and point of intersection of medians of a triangle is called centroid of that triangle, which divides the median into 2 : 1 ratio.
$\therefore BG : GE = 2:1; CG:GF = 2:1$
$AG : GD = 2:1$

$\Rightarrow \frac{BG + GE}{BG} = \frac{2+1}{2} \Rightarrow \frac{BE}{BG} = \frac{3}{2} \Rightarrow BE = \frac{3}{2}BG$

Similarly, $CF = \frac{3}{2}CG$ and $AD = \frac{3}{2}AG$

Now, In ΔBGC, $BG + GC > BC$

$\frac{3}{2}(BG + GC) > \frac{3}{2}BC$

$BE + CF > \frac{3}{2}BC$ ...(i)

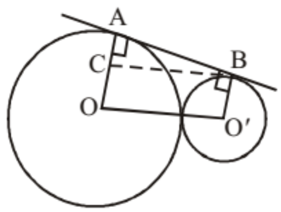
Similarly, $AD + CF > \frac{3}{2}CA$ ...(ii)

and $AD + BE > \frac{3}{2}AB$ ...(iii)

$$2(AD + BE + CF) > \frac{3}{2}(AB + BC + CA)$$

$$\frac{(AD + BE + CF)}{(AB + BC + CA)} > \frac{3}{4}$$

113. (b)

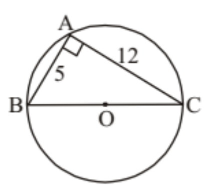


Let two circles with center O and O′ and radius $OA = 25$ cm and $O'B = 9$ cm.
draw $BC \parallel OO'$
then $O'B = OC = 9$ cm
$AC = 25 - 9 = 16$ cm
From ΔABC,
$BC = OO' = 25 + 9 = 34$ cm
$AC = 16$ cm

$$AB = \sqrt{(BC)^2 - (AC)^2}$$

$$= \sqrt{(34)^2 - (16)^2} = \sqrt{50 \times 18} = 30 \text{ cm}$$

114. (a) In ΔABC, $AB \perp AC$,
$BC^2 = AB^2 + AC^2$
$BC^2 = (5)^2 + (12)^2$
$BC^2 = 25 + 144$
$BC^2 = 169$
$BC = \sqrt{169} = 13$ cm



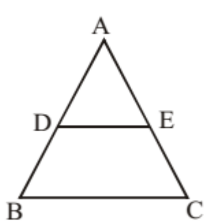
Radius of triangle $= \frac{BC}{2} = \frac{13}{2} = 6.5$ cm

115. (c) Sum of interior angles of polygon $= (n - 2) \times 180°$
$(n - 2) \times 180° = 1440$

$$n - 2 = \frac{1440}{180} = 8$$

$n = 10$
Hence, the number of sides is 10.

116. (b)



Since DE is parallel to BC
$\Delta ADE \sim \Delta ABC$

$$\frac{ar(\Delta ABC)}{ar(\Delta ADE)} = \frac{(AB)^2}{(AD)^2} = \frac{(2+3)^2}{(2)^2} = \frac{25}{4}$$

$$\frac{ar(DECB)}{ar(ADE)} + \frac{ar(ADE)}{ar(ADE)} = \frac{(2+3)^2}{2^2} = \frac{25}{4}$$

$$\frac{ar(DECB)}{ar(ADE)} = \frac{25}{4} - 1 = \frac{21}{4}$$

$$\frac{ar(DECB)}{ar(ADE) + ar(DECB)} = \frac{21}{4 + 21}$$

$$\frac{ar(DECB)}{ar(ABC)} = \frac{21}{25}$$

117. (a) $\Delta ABC \sim \Delta PQR$ (given)

$$\frac{AB}{PQ} = \frac{BC}{QR} = \frac{AC}{PR}$$

(Corresponding sides are proportional)

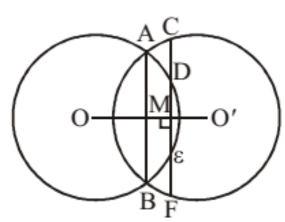
$$\Rightarrow \frac{AB}{PQ} = \frac{BC}{QR} = \frac{AC}{PR} = \frac{AB + BC + AC}{PQ + QR + PR}$$

$$\Rightarrow \frac{AB + BC + AC}{PQ + QR + PR} = \frac{AB}{PQ} \Rightarrow \frac{\text{Perimeter of ABC}}{\text{Perimeter of PQR}} = \frac{AB}{PQ}$$

$$\Rightarrow \frac{36}{24} = \frac{AB}{10} \Rightarrow AB = \frac{36 \times 10}{24} \Rightarrow 15 \text{ cm}$$

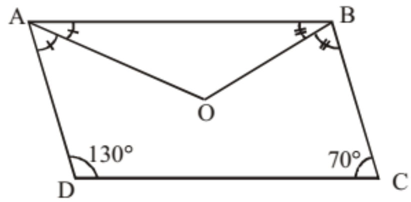
118. (a) Let the three sides are x, $(x + 1)$ and $(x + 2)$
In a right angle triangle, sum of square of base and height is equal to the square of hypotenuse
$\therefore (x + 2)^2 = x^2 + (x + 1)^2$
$4x + 4 = x^2 + 2x + 1$
$x^2 - 2x - 3 = 0$
$(x - 3)(x + 1) = 0 \Rightarrow x = 3$
Thus, three sides are $x = 3$ unit
$x + 1 = 3 + 1 = 4$ unit
$x + 2 = 3 + 2 = 5$ unit
Smallest side $= x = 3$ unit.

119. (c)



As we see, DE is the chord of the circle with center 'O' then, line $OO' \perp$ bisect DE
$\therefore DM = ME$ ...(i)
Again, CF is the chord of the circle with center O′.
Again line $OO' \perp$ bisect CF
$\therefore CM = MF$
$\Rightarrow CD + DM = ME + EF$
$4.5 + DM = DM + EF$ {from (i)}
$\therefore EF = 4.5$ cm

120. **(d)**



$A+B+C+D=360$

$A+B=360-(130+70)=160°$

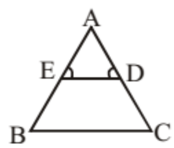
$\frac{A}{2}+\frac{B}{2}=80°$ ...(1)

In ΔAOB,

$\frac{A}{2}+\frac{B}{2}+\angle AOB=180°$

$\angle AOB=180°-80°=100°$

121. **(d)** In ΔADE and ΔABC



$\angle A=\angle D$

$\angle B=\angle D$

Then third angle $\angle C=\angle E$

(By AAA)

$\Delta ADE \sim \Delta ABC$

$\frac{AE}{AD}=\frac{AC}{AB}$

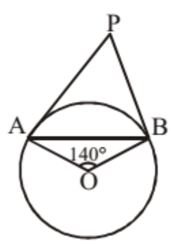
$\frac{3}{2}=\frac{2+DC}{3+2}$

$15=4+2DC$

$11=2DC$

$DC=5.5$ cm

122. **(c)**



In ΔAOB, $\angle A+\angle B+\angle O=180°$

$\angle A+\angle B=180-140°=40°$

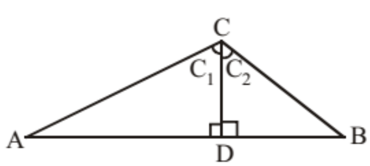
$\angle A=\angle B=20°$ $\{\because AO=BO=\text{radius}\}$

$\therefore \angle PAO=90°$ {As PA is tangent to the circle}

$\Rightarrow \angle PAB+\angle BAO=90°$

$\angle PAB=90°-20°=70°$

123. **(c)**



In ΔADC, sum of angles $=180°$

$A+D+C_1=180°$; $A+C_1=180°-90°=90°$

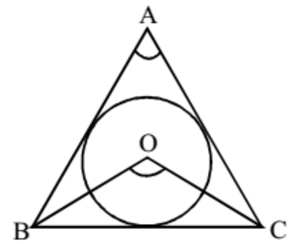
Similarly, In ΔBDC,

$B+D+C_2=180°$; $B+C_2=180°-90°=90°$

$A+C_1=B+C_2$

$C_1-C_2=B-A$

124. **(b)**



While $\angle BOC$ is in circle then

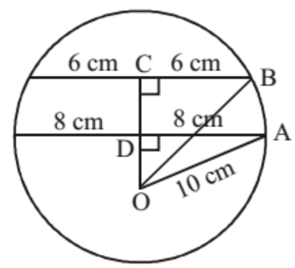
$\angle BOC=90+\frac{1}{2}\angle BAC$

$90+\frac{1}{2}\angle BAC=120$

$\frac{1}{2}\angle BAC=30$

$\angle BAC=60°$

125. **(b)**



In ΔADO,

$OD=\sqrt{(AO)^2-AD^2}=\sqrt{100-64}=6$ cm

In ΔBCO,

$OC=\sqrt{OB^2-CB^2}$

$=\sqrt{100-36}=8$ cm

distance between chords $=OC-OD$

$=2$CM

126. **(a)** Let n be the number of sides.

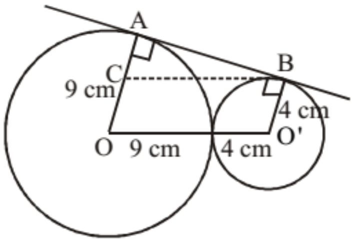
$(n-2)\times 180°=140°\times n$

$180n-360=140n$

$40n=360$

$n=\frac{360}{40}=9$

127. (d)

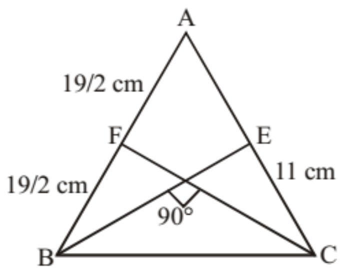


In figure, $AC = AO - CO$
$= 9\text{ cm} - 4\text{ cm} = 5\text{ cm}$ $\{\because CO = BO'\}$
Also, $CB = OO' = 13$ cm
In ΔABC

$AB = \sqrt{CB^2 - AC^2}$

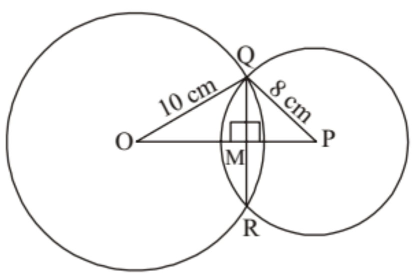
$= \sqrt{(13cm)^2 - (5cm)^2}$
$= 12$ cm

128. (c)



From question, median $BE \perp CF$.
In this case we know that
$(AB)^2 + (AC)^2 = 5(BC)^2$
$(19)^2 + (22)^2 = 5(BC)^2$
$361 + 484 = 5(BC)^2$
$845 = 5(BC)^2$
$BC = \sqrt{169} = 13$ cm

129. (d)



Line joining the centre is $\perp$ bisector of common chord

$\therefore QM = MR = \frac{1}{2}QR = \frac{1}{2} \times 12 = 6\text{cm}$

In ΔOMQ, $\angle OMQ = 90°$
$OQ^2 = OM^2 + MQ^2$ (Pythagorus theorem)
$10^2 = OM^2 + 6^2$
$OM^2 = 100 - 36 = 64$
$OM = 8\text{cm}$

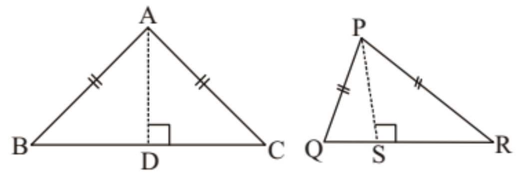
In ΔQMP, $\angle QMP = 90°$
$QP^2 = QM^2 + PM^2$ (Pythagorus theorem)
$8^2 = 6^2 + PM^2$

$PM = 64 - 36 = \sqrt{28} = 2\sqrt{7}$

$OP = OM + MP = 8 + 2\sqrt{7}$
So distance between centres O and P

$= 8 + 2\sqrt{7} = 13.3$ cm

130. (c)

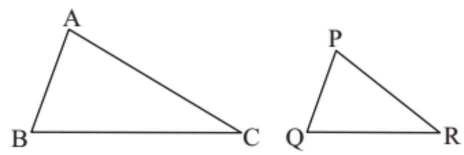


Let ΔABC and ΔPQR are two isosceles triangles

$$\frac{\text{Area of } \Delta ABC}{\text{Area of } \Delta PQR} = \frac{(AD)^2}{(PS)^2}$$

$$\frac{AD}{PS} = \sqrt{\frac{9}{16}} = \frac{3}{4}$$

131. (c)



Let ΔABC and ΔPQR are two similar triangles

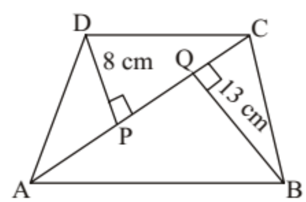
$$\frac{\text{Perimeter } \Delta ABC}{\text{Perimeter } \Delta PQR} = \frac{AB}{PQ}$$

$$\frac{30}{20} = \frac{9}{PQ}$$

$$PQ = \frac{20 \times 9}{30} = 6\text{ cm}$$

132. (a) In ΔADC

Area of $\Delta ADC = \frac{1}{2} \times DP \times AC$

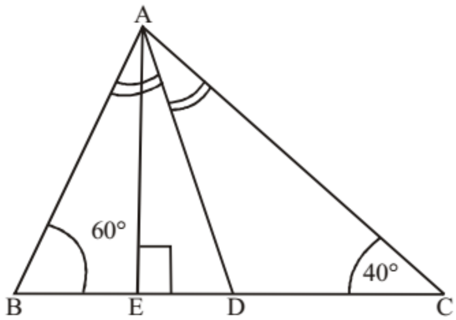


Area of $\Delta ADC = \frac{1}{2} \times 8 \times 24 = 96\text{ m}^2$

Similarly, Area of $\Delta BAC = \frac{1}{2} \times 13 \times 24 = 156\text{ m}^2$

Area of Quadrilateral $= 96 + 156 = 252\text{ m}^2$

133. (d)



In ΔABC

$\angle A = 180° - (60° + 40°) = 80°$

$\angle BAD = \angle DAC = 40°$ (AD is bisector of $\angle A$)

In $\angle AEC$

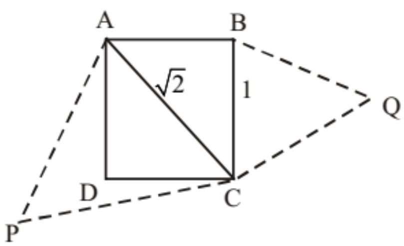
$\angle EAC = 180° - (90° + 40°) = 50°$

So, $\angle EAD = \angle EAC - \angle DAC$

$= 50° - 40°$

$\angle EAD = 10°$

134. (c)



ABCD is a square.

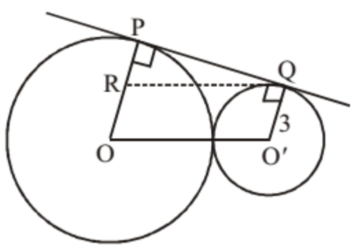
$\Delta QBC \sim \Delta PAC$ (Given)

$\therefore \dfrac{\text{Area } \Delta QBC}{\text{Area } \Delta PAC} = \dfrac{BC^2}{AC^2}$

If BC = 1 then $AC = \sqrt{2}$

$\therefore$ Required ratio $= \dfrac{BC^2}{AC^2} = \dfrac{1}{2}$

135. (c)



Draw a line $RQ \parallel OO'$

then $O'Q = RO = 3$ cm

Now $PR = OP - RO$

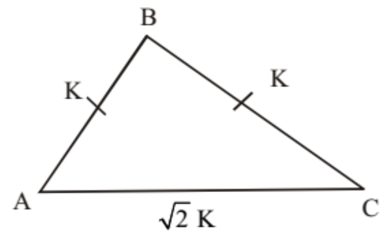
$= 8 - 3 = 5$ cm

From ΔPQR, $RQ = OO' = 13$ cm {given}

$(PQ)^2 = (RQ)^2 - (PR)^2$

$\Rightarrow PQ = \sqrt{(13)^2 - (5)^2} = \sqrt{144} = 12\,\text{cm}$

136. (d) In ΔABC



$AC = \sqrt{2}K$

$AC^2 = 2K^2$

$AC^2 = AB^2 + BC^2$

So ΔABC is right angled triangle

So, in ΔABC

$\dfrac{AB}{AC} = \dfrac{K}{\sqrt{2}K} = \dfrac{1}{\sqrt{2}}$

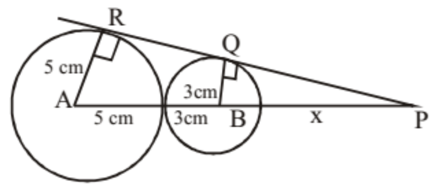
So $\cos\theta = \dfrac{1}{\sqrt{2}}$

$\theta = 45°$

So, In triangle ABC, $\angle B = 90°$; $\angle C = 45°$; $\angle A = 45°$

Hence, triangle ABC is right isosceles triangle.

137. (d)



Let PB = x cm.

In $\angle PQB$ and PRA,

$\angle Q = \angle R = 90°$, $\angle P = \angle P$ {common}

$\therefore \Delta PQB \sim \Delta PRA$ {AA criteria}

So, $\dfrac{PA}{PB} = \dfrac{RA}{QB}$

$\dfrac{x+8}{x} = \dfrac{5}{3} \Rightarrow 5x = 3x + 24$

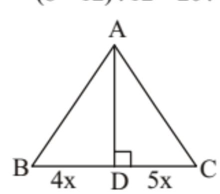
$x = \dfrac{24}{2} = 12$ cm

Now, point P divide the line joining the centers of two circles externally into.

$AP : PB = (8 + x) : x$

$= (8 + 12) : 12 = 20 : 12 \Rightarrow 5 : 3$

138. (c)



Let AE is the height of the triangle ABC, then

Area of $\Delta ABD = \dfrac{1}{2} \times BD \times AE$

$60 = \dfrac{1}{2} \times 4x \times AE \qquad ...(1)$

Area of $\Delta ADC = \frac{1}{2} \times DC \times AE$

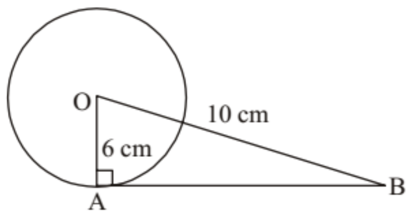
Area of $\Delta ADC = \frac{1}{2} \times 5x \times AE$ ... (2)

Dividing eqn. (1) and (2)

$$\frac{60}{\text{Area of } \Delta ADC} = \frac{\frac{1}{2} \times 4x \times AE}{\frac{1}{2} \times 5x \times AE}$$

$\Rightarrow$ Area of Δ ADC $= \frac{5x \times 60}{4x} = 75 cm^2$

139. (c)

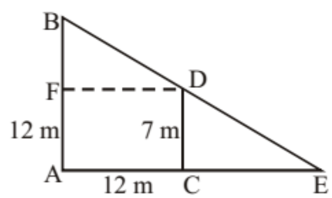


$AB^2 + OA^2 = OB^2 \Rightarrow AB^2 = OB^2 = OA^2$

$AB^2 = (10)^2 - (6)^2 = 100 - 36 = 64$

$AB = 8cm$

140. (a)



Let AB ad CD are two poles of height 12 m and 7 m seperated by a distance AC = 12 m

Draw a line DF ∥ AC

Then DF = 12 m

and BF = AB – AF = AB – CD = 12 – 7 = 5m

Now from ΔBDF, $BD = \sqrt{(DF)^2 + (BF)^2}$

$= \sqrt{(12)^2 + (5)^2} = \sqrt{144 + 25}$

$= \sqrt{169} = 13$ cm

$\therefore$ Distance between the top of two poles BD = 13 m.

141. (b) Let 'x' be the measure of an angle.

Then its complement angle $= 90° - x$

and its supplement angle $= 180° - x$

According to question

$(180° - x) = 3(90° - x)$

$180° - x = 270° - 3x$

$2x = 90°$

$x = 45°$

142. (d) Let sides of Δ be $3x$, $4x$, $5x$

$$s = \frac{a+b+c}{2} = 6x$$

Area of $\Delta = \sqrt{s(s-a)(s-b)(s-c)}$

$$7776 = \sqrt{6x.3x.2x.x}$$

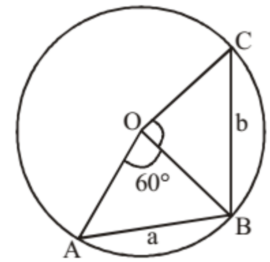
$7776 = 6x^2$

$\therefore x = 36$

Sides of Δ will be 108, 144 and 180

Perimeter of Δ is 108 + 144 + 180 = 432 cm

143. (a)



Let the chord AB = a and chord BC = b makes angle $\angle AOB = 60°$ and $\angle BOC = 90°$ at the center 'O' of the circle. There, OA = OB = OC = radius

In ΔAOB, $\angle OAB = \angle OBA$

and $\angle AOB = 60°$

$\therefore \angle OAB + \angle OBA = 180° - 60° = 120°$

$\Rightarrow \angle OAB + \angle OAB = 120°$

$\Rightarrow \angle OAB = 60°$

Thus, $\angle OAB = \angle OBA = \angle AOB = 60°$

$\therefore$ AOB is equilateral triangle

Hence, AO = OB = AB = a unit

Now, from ΔBOC, $\angle BOC = 90°$, BC = b unit

$\bar{O}\bar{B} = \bar{O}\bar{C}$ = a unit

$(BC)^2 = (OB)^2 + (OC)^2$

$b^2 = a^2 + a^2 \Rightarrow b^2 = 2a^2$

$$b = \sqrt{2}a.$$

144. (d) $P = 4Q$

$P + Q = 180°$

$4Q + Q = 180°$

$$Q = \frac{180}{5} = 36°$$

So, $R = 180° - 36° = 144°$

145. (c) Clock started at 12 pm

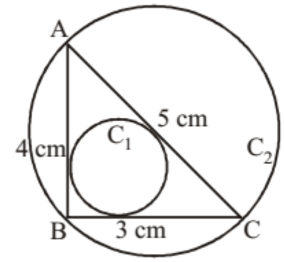
Angle turned by hour hand in one hour $= \frac{360}{12} = 30°$

Angle turned by hour hand in one minute $= \frac{30}{60} = \frac{1°}{2}$

Angle turned by hour hand in 3 hour 45 minutes

$$= 3 \times 30° + 45 \times \frac{1}{2} = 112\frac{1°}{2}$$

146. (c)



Let ΔABC has three sides BC, AB and AC equal to 3 cm, 4 cm and 5 cm respectively.

Now, as, $(5)^2 = (3)^2 + (4)^2$

i.e. $(AC)^2 = (AB)^2 + (BC)^2$

$\therefore \Delta ABC$ is a right angle triangle

Then, for circum circle C_2, radius $= \frac{AC}{2} = \frac{5}{2} = 2.5$

Area $C_2 = \pi(2.5)^2$

Again, for incircle, radius $(r) = \frac{A}{S} = \frac{\frac{1}{2}\times 3\times 4}{(3+4+5)/2} = 1$

Area of circle $C_1 = \pi(1)^2$

Now, $\frac{\text{Area of } C_1}{\text{Area of } C_2} = \frac{\pi(1)^2}{\pi(2.5)^2} = \frac{4}{25}$

147. (d) Angles are $= (x + 15°)$,

$\left(\frac{6x}{5}+6°\right)$ and $\left(\frac{2x}{3}+30°\right)$

We know that

Sum of the angles of a triange is 180°.

$\Rightarrow x + 15° + \frac{6x}{5} + 6° + \frac{2x}{3} + 30° = 180$

$\Rightarrow \frac{15x+18x+10x}{15} + 51 = 180$

$\Rightarrow \frac{43x}{15} = 180 - 51 = 129$

$\Rightarrow 43x = 129 \times 15$

$x = 45°$

Then angle are $= (45+15°)$, $\left(\frac{6\times 45}{5}+6°\right)$ and $\left(\frac{2\times 45}{3}+30°\right)$

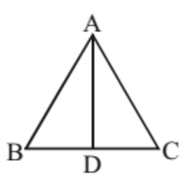
$= 60°, 60°, 60°$

So this is an equilateral triangle.

148. (b) The value of $= v - e + f$

$= 8 - 12 + 6 = 2.$

149. (d)



Let ΔABC is a equilateral triangle with AD as an altitude from A on side BC. Let $AB = BC = AC = x$

From question $AD = 12\sqrt{3}$ cm.

then from ΔABD,

$(AD)^2 + (BD)^2 = (AB)^2$

$(12\sqrt{3})^2 + \left(\frac{x}{2}\right)^2 = x^2$

$144 \times 3 = x^2 - \frac{x^2}{4}$

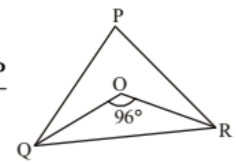
$\frac{3x^2}{4} = 144 \times 3$

$x = \sqrt{144\times 4} = 12 \times 2 = 24$ cm.

Area of the $\Delta ABC = \frac{\sqrt{3}}{4}\times (x)^2$

$= \frac{\sqrt{3}}{4} \times 24 \times 24 = 144\sqrt{3}\ \text{cm}^2.$

150. (a) $\angle QOR = 90 + \frac{\angle P}{2}$



$\Rightarrow 96° = 90° + \frac{\angle P}{2}$

$\Rightarrow \frac{\angle P}{2} = 6°$

$\therefore \angle P = 12°$

151. (d) Sum of the angle of a triangle = 180°

$\Rightarrow 2x° + 3x° + 5x° = 180°$

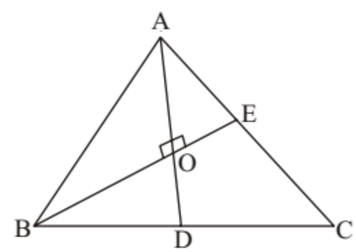
$\Rightarrow 10x° = 180°$

$x° = 18°$

Angle are = 36°, 54°, 90° So, this is right angles triangle.

152. (a) Given AD = 9 cm

BE = 12 cm



Here AD and BE Intersect at O $(AD \perp BE)$

$\therefore \angle AOB = 90°$

$AO = \frac{2}{3} \times AD = \frac{2}{3} \times 9 = 6\text{cm}$

$OB = \frac{2}{3} \times BE = \frac{2}{3} \times 12 = 8\text{cm}$

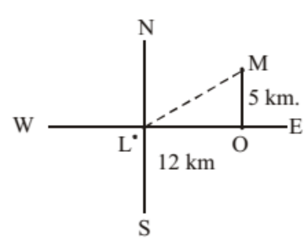
$AB = \sqrt{(AO)^2 + (OB)^2}$

$= \sqrt{(6)^2 + (8)^2}$

$= \sqrt{36+64}$

$= 10$ cm

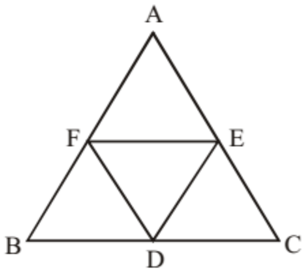
153. (d)



$LM = \sqrt{(OL)^2 + (MO)^2} = \sqrt{(12)^2 + (5)^2}$

$= \sqrt{144+25} = 13\text{km}.$

154. (d)



Area of $\square DEFB = BD \times ED$

Area of trapezium $\square CAFD = \frac{1}{2}(AC + FD) \times DE$

Here $AC = 2AE = 2FD$

$\square CAFD = \frac{1}{2} 3FD \times DE$

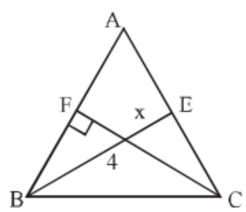
Now $\frac{\text{Area of } \|\square DEFB}{\text{Area of trapezium } \square CAFD} = \frac{BD \times DE}{\frac{3}{2} FD \times DE}$

$= \frac{BD \times ED}{\frac{3}{2} \times BD \times DE} = \frac{2}{3}$

155. (b) For Orthocentre $\angle BAC = 180 - \angle BOC$

$= 180 - 110 = 70°$

156. (a) From question, $AB = 6$ cm, $AC = 5$ cm, $CF = 4$



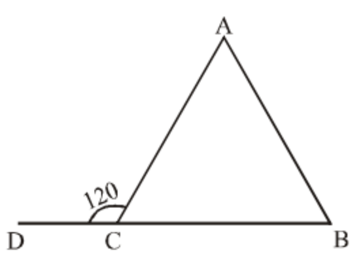
Area of $\Delta ABC = \frac{1}{2} AB \times FC = \frac{1}{2} AC \times BE$

$6 \times 4 = 5 \times x$ {where $BE = x$}

$\frac{24}{5} = x$

$x = 4.8$ cm.

157. (c) $\angle A + \angle B = \angle ACD$



$\angle A + \frac{1}{2}\angle A = 120°$

$\frac{3\angle A}{2} = 120$

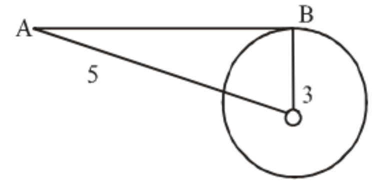
$\angle A = 80°$

158. (d) $OA^2 = OB^2 + BA^2$

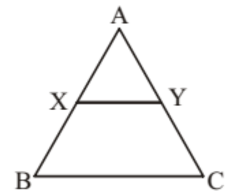
$AB^2 = 5^2 - 3^2$

$= 25 - 9 = 16$

$\therefore AB = 4$



159. (b)



In ΔABC $\because$ X and Y are midpoint of AB and AC

$\therefore XY = \frac{1}{2}BC$

$2XY = BC$

$BC + XY = 12$

$2XY + XY = 12$

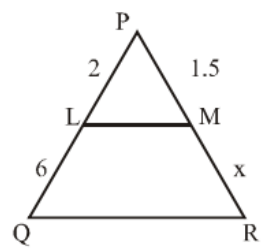
$3XY = 12$

$XY = 4$

$BC = 8$

Hence, $BC - XY = 8 - 4 = 4$ unit.

160. (b) By Thales theorem



$\frac{2}{6} = \frac{1.5}{x}$

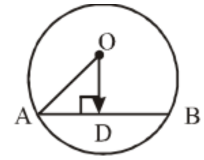
$x = 4.5$ cm

161. (b) $AB = 8, AD = 4, OA = 5$ cm

$OD^2 = 5^2 - 4^2 = 3^2$

$OA^2 = AD^2$

$OD = 3$



162. (c) In ΔABC

$\angle A + \angle B + \angle C = 180$

$\angle B = 180 - [\angle A + \angle C)$

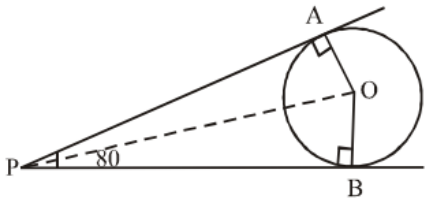
$= 180 - 140 = 40°$

$\angle A + 3\angle B = 180$

$\angle A = 180 - 3(40)°$

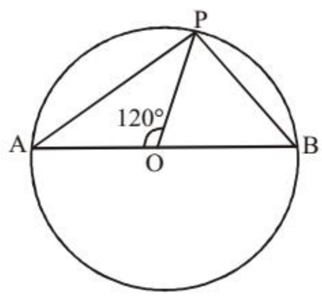
$= 180 - 120$
$= 60°$

163. (b) $\angle APB = 80°$
$\angle AOB = 180 - 80 = 100°$
$\angle AOP = \frac{100}{2} = 50°$



164. (b) $5 + 8 < 15$
$\therefore$ 5, 8, 15 cannot form a triangle.

165. (b) $\angle POA = 120°$
$\angle POA = \angle OPB + \angle PBO$



$\because$ OP = OB = radius
$\therefore \angle OPB = \angle PBO$
$2\angle PBO = 120°, \angle PBO = 60°$

166. (c) $\theta_1 = 30°$ $\quad\quad \theta_2 = \theta_2$
Arc $\ell_1 = 2\ell$ $\quad\quad \ell_2 = \ell$
$r_1 = r$ $\quad\quad r_2 = 3r$

Arc length $= 2\pi r \frac{\theta}{360°}$

$$\frac{\ell_1}{\ell_2} = \frac{2\pi r_1 \theta_1 / 360}{2\pi r_2 \theta_2 / 360}$$

$$\frac{2l}{l} = \frac{r}{3r}\frac{30}{\theta_2}$$

$$\theta_2 = \frac{30}{6} = 5°$$

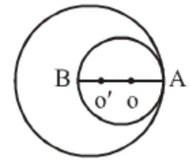
167. (b) As only 13, 12 and 5 follows Pythagorous theorem

168. (a) When three points are collinear then, we can not draw any circle that passes through these three points. Number of circle that passes through three non-collinear points is the same as number of ways of selecting three non-collinear points.

$$= {}^3C_3 = \frac{3!}{(3-3)!3!} = 1.$$

169. (b) Let two circles with centre O and O′ touches each other internally at pont A. radius of smaller circle OA = 6 cm radius of bigger circle O′A = r then OO′ = 3 cm

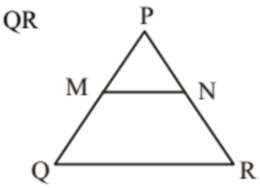
Then radius of bigger circle r = O′A
$= O'O + OA = 6 + 3 = 9$ cm



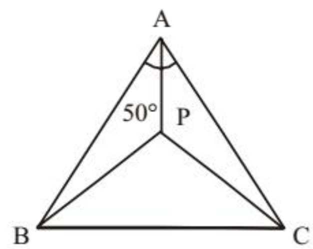
170. (b) In Given equilateral Δ, MN ∥ QR

$$\frac{PN}{PR} = \frac{MN}{QR} \Rightarrow \frac{PN}{MN} = \frac{PR}{QR}$$

PN = MN ($\because$ PR = QR)
$\therefore$ MN = 6 cm



171. (c)



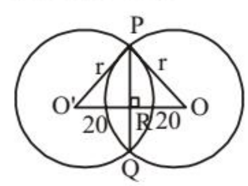
$\because \angle BAC = 50°$

$\because \angle BPC = 90° + \frac{\angle A}{2}$

$= 90° + \frac{50°}{2}$

$= 115°$

172. (a) $\because$ ΔPOR = right angle triangle
Let radius of the circle = r cm



PR = 15 cm
RO = 20 cm

$\therefore \quad PO = \sqrt{PR^2 + RO^2}$

$= \sqrt{(15)^2 + (20)^2}$

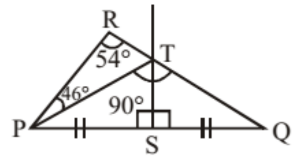
$= \sqrt{225 + 400}$

$= \sqrt{625} = 25$ cm

$\therefore$ Radius of circle = PO = 25 cm.

173. (a) $\angle MRP = \angle PQR = 46°$
$\therefore \angle y = 46°$
And, $\angle NRQ = m\angle QPR = 40°$
$\therefore \angle x = 40°$
$\angle x + \angle z + 46° = 180°$
$40° + \angle z + 46° = 180°$
$\therefore \angle z = 94°$
$\therefore$ Value of x, y and z = 40°, 46° and 94°

174. (b)



From the figure, $\angle PTQ = \angle PRT + \angle RPT$

$\therefore \angle PTQ = 54° + 46° = 100°$ {Exterior angle property}

Now, in ΔPTS and ΔQTQ,

TS = TS (common)

PS = SQ

and $\angle PST = \angle QST$

$\therefore PT = TQ \Rightarrow \angle TPS = \angle TQS$

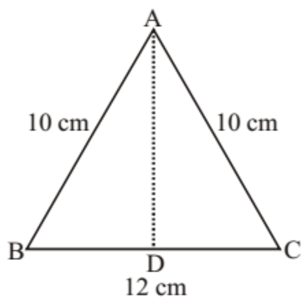
Again in ΔPTQ, $\angle TPS + \angle TQS + \angle PTQ = 180°$

$2\angle TQS + 100° = 180°$

$\therefore \angle TQS = \frac{80°}{2} = 40°$

Hence, $\angle PQR = \angle TQS = 40°$

175. (b)



Let ΔABC is a isosceles triangle with two equal sides

AB = AC = x cm

then $BC = \frac{6}{5}x$

Now, perimeter AB + BC + AC = 32

$x + \frac{6}{5}x + x = 32$

$\frac{16x}{5} = 32 \Rightarrow x = 10$ cm

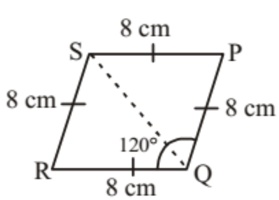
Again let AD is $\perp$ on side BC

then $BD = \frac{12}{2} = 6$ cm

$AD = \sqrt{(AB)^2 - (BD)^2} = \sqrt{(10)^2 - (6)^2} = 8$ cm

Area of $\Delta ABC = \frac{1}{2} \times AD \times BC = \frac{1}{2} \times 8 \times 12 = 48$ cm^2

176. (c) $\therefore \angle QRS = 180° - 120° = 60°$



$\angle RQS = \frac{1}{2}\angle RQP = 60°$

$\therefore$ ΔRQS is a equlateral triangle.

$\therefore$ RQ = QS = 8 cm

177. (b) From ΔBCD, $x = y + 48°$

$2x = 24 + 96°$ ...(i)

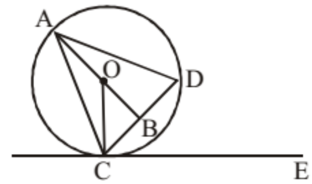
From ΔABC,

$2x = 2y + \angle CAB$ ...(ii)

from (i) and (ii)

$\angle CAB = 96°$

178. (c)



According to the question,

$\angle DCE = 45°$

From given figure,

$\angle CAB = \frac{45°}{2}$

OA = OC = radius

$\therefore \angle OAC = \angle OCA = \frac{45°}{2}$

In ΔAOC, $\angle AOC = 180° - \angle OAC - \angle OCA$

$= 180° - \frac{45°}{2} - \frac{45°}{2} - \frac{45°}{2} = 135°$

Again, $\angle AOB = \angle AOC + \angle COB$

$180° = 135° + \angle COB \Rightarrow \angle COB = 45°$

Now, In DOBC, $\angle OBC, \angle OCB = 180° - 90° - 45° = 45°$

$\therefore \angle OB = BC = 5\sqrt{2}$ cm

In ΔOBC, $(OC)^2 = (OB)^2 + (BC)^2$

$OC = \sqrt{(5\sqrt{2})^2 + (5\sqrt{2})^2} = 10$ cm

$\therefore AO = OC = 10$ cm

$AB = AO + OB = (10 + 5\sqrt{2})$ cm

In ΔABC, $AC = \sqrt{(AB)^2 + (BC)^2}$

$= \sqrt{(10 + 5\sqrt{2})^2 + (5\sqrt{2})^2}$

$= \sqrt{100 + 100 + 100\sqrt{2}} = 18.47 \approx 18.5$ cm

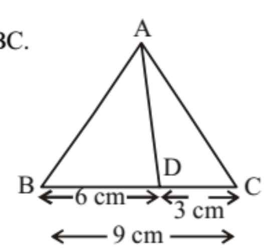
179. (b) Let AE is the height of ΔABC.

Then, required ratio

$= \frac{1}{2} \times 6 \times AE : \frac{1}{2} \times 3 \times AE$

$\Rightarrow 3 : 1.5$

$\Rightarrow 2 : 1.$

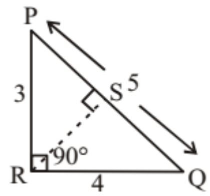


180. (a) From question,

PR = 3 cm and

RQ = 4 cm

then,



$$PQ = \sqrt{(3)^2 + (4)^2}$$

$$= \sqrt{9+16} = 5 \text{ cm}$$

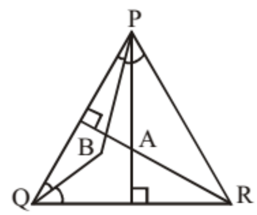
Now, ar (ΔPQR) =

$$\frac{1}{2} \times 3 \times 4 = \frac{1}{2} \times 5 \times RS$$

$$6 = \frac{5\ RS}{2}$$

$\therefore$ $RS = \frac{12}{5}$ cm

181. (c)



From question $\angle PBR = 105°$

We know that, point of intersection of angle bisector is the in center and point of intersection of altitude is orthocenter.

$$\angle PQR = (105° - 90°) \times 2 = 30°$$

$$\text{So, } \angle PBR = 90° + \frac{\angle Q}{2} = 105°$$

Now, $\angle PAR + \angle PQR = 180°$ (orthocenter property)

$$\angle PAR = 180° - 30° = 150°$$

182. (d) To get a point of intersection, two lines must passes through each other.

Maximum number of point of intersection made by 4 st lines = Number of ways of selecting 2 lines out of 4 lines

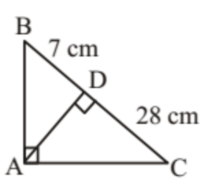
$$= {}^4C_2 = \frac{4 \times 3}{2} = 6$$

Hence, we can't get more than 6 point of intersections from 4st. lines.

183. (d) In ΔABC

$\because$ $\angle BAC = 90°$

$\because$ $(AD)^2 = BD \times DC$



$$AD^2 = 7 \times 28$$

$\therefore$ $AD = \sqrt{7 \times 28}$

$\therefore$ AD = 14 cm.

184. (b) According to question,

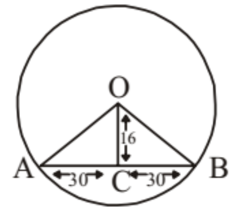
AC = 30 cm

OC = 16 cm

From ΔACO,

$$AO^2 = OC^2 + AC^2$$

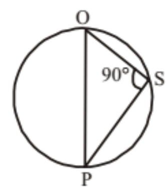
$\therefore$ $AO = \sqrt{(16)^2 + (30)^2}$



$$= \sqrt{256+900} = \sqrt{1156} = 34 \text{ cm}$$

$\therefore$ radius of circle AO = 34 cm.

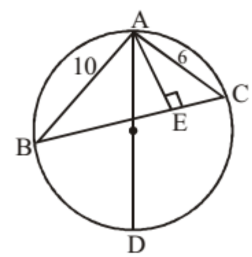
185. (b) $\angle PSO$ is a right angle (angle of semicircle)



Again when OS is perpendicular on chord PR and OS passes through the centre of circle PQR, then it must bisect the chord PR at S.

$\therefore$ PS = RS = 17 cm.

186. (b)



From question AB = 10 cm, AC = 6 cm and AE = 4 cm

$$\text{Now, Area of } \Delta ABC = \frac{1}{2} \times AE \times BC$$

$$= \frac{1}{2} \times 4 \times BC$$

$$= 2 \times BC$$

$$\text{By formula, circum radius } R = \frac{abc}{4 \times \text{Area of triangle}}$$

$$= \frac{10 \times 6 \times BC}{4 \times 2 \times BC} = 7.5 \text{ cm}$$

187. (b) A dodecagon is a shape with 12 sides and 12 vertices.

i.e. n = 12

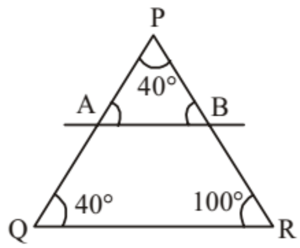
Sum of internal angle of a polygon of n sides

$= 2(n-2) \times 90°$

Here n = 12

$\therefore$ Sum of internal angles $= 2(12-2) \times 90° = 1800°$

188. (a)



In ΔPQR angles are in the ratio 2:2:5. So, sum of the angles $2x + 2x + 5x = 180°$

$9x = 180°$

$2x = 180°$

$x = 20°$

$\therefore$ angles are $40°, 40°, 100°$.

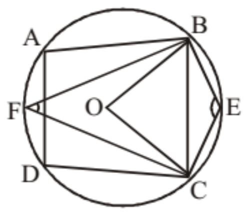
$\because$ $AB \parallel QR$

$\therefore$ and $\angle P = 40°, \angle Q = 40°, \angle R = 100°$

$$\left.\begin{array}{l}\angle A = \angle Q \\ \angle B = \angle R\end{array}\right\} \rightarrow \text{(corresponding angle)}$$

$\therefore$ Difference $\angle PBA$ and $\angle PAB = (100 - 40) = 60°$

189. (b)



$\angle BEC = 100°$ (given)

Quadrilateral BECF are cyclic

So, $\angle BEC + \angle BFC = 180°$

$100° + \angle BFC = 180°$

$\Rightarrow \angle BFC = 180° - 100° = 80°$

Now, $\angle BOC = 2 \times \angle BFC$ (Angle made by the same chord at the center)

$= 2 \times 80° = 160°$

In ΔOBC, $OB = OC$ (radius)

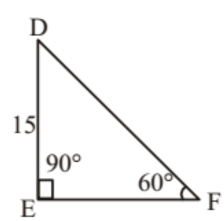
$\therefore \angle OBC = \angle OCB$

Now, $\angle BOC + \angle OBC + \angle OCB = 180°$

$160° + 2\angle OCB = 180°$

$$\Rightarrow \angle OCB = \frac{180° - 160°}{2} = 10°$$

190. (a) According to question,



$DE = 15, EF = ?$

$\angle DFE = 60°$

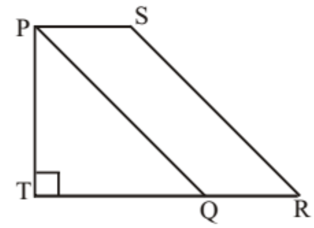
$\angle DEF = 90°$

$$\therefore \tan 60° = \frac{DE}{EF}$$

$$\frac{\sqrt{3}}{1} = \frac{15}{EF}$$

$$\therefore EF = \frac{15}{\sqrt{3}} = \frac{5 \times \sqrt{3} \times \sqrt{3}}{\sqrt{3}} = 5\sqrt{3}$$

191. (b)



From question, $PT = TQ = x$ (Let)

$$\text{Area} = \frac{1}{2} \times x \times x = 128$$

$x^2 = 128 \times 2 = 256$

$x = \sqrt{256} = 16$ cm

$$\text{Again, } PS = \frac{PT}{4} = \frac{16}{4} = 4 \text{ cm}$$

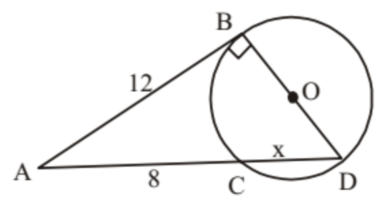
As $PQ \parallel RS$ and $PS \parallel QR$ (By symmetry)

$\therefore$ PQRS is a parallelogram with base (b) = 4 cm

height (h) = PT = 16 cm

Area = $b \times h = 4 \times 16 = 64$ cm^2

192. (c)



According to question,

$AB = 12$

$AC = 8$

$AD = 8 + x$

As, we know that

$(AB)^2 = AC \times AD$

$(12)^2 = 8 \times (8 + x)$

$$\therefore x = \frac{144}{8} = 10 \text{ cm}$$

ΔABD is a right angle because $\angle B = 90°$

By Pythagorean theorem,

$BD^2 + AB^2 = AD^2$

$BD^2 + AB^2 = AD^2$

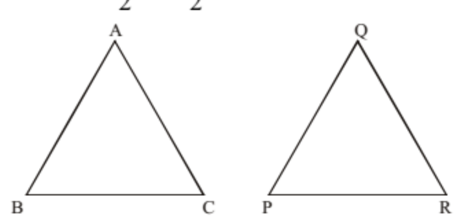
$BD^2 = (18)^2 - (12)^2$ {Here $AD = 8 + 10 = 18$ cm}

$= 324 - 144 = 180$

$\therefore BD = 6\sqrt{5}$ cm

$$\therefore \text{Radius} = \frac{BD}{2} = \frac{6\sqrt{5}}{2} = 3\sqrt{5} \text{ cm}$$

193. (c)



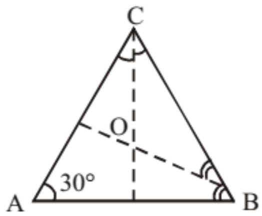
As $\Delta ABC \sim \Delta QPR$, then

$$\left(\frac{AB}{QP}\right)^2 = \left(\frac{BC}{PR}\right)^2 = \left(\frac{AC}{QR}\right)^2 = \frac{ar(\Delta ABC)}{ar(\Delta PQR)}$$

so, $\left(\frac{6}{PR}\right)^2 = \frac{9}{16}$

$\frac{6}{PR} = \frac{3}{4} \Rightarrow PR = \frac{6 \times 4}{3} = 8\text{cm.}$

194. (b)



In $\Delta ABC, \angle B + \angle C + 30° = 180°$

$\angle B + \angle C = 150°$

Now, In $\Delta BOC, \frac{\angle B}{2} + \frac{\angle C}{2} + \angle BOC = 180°$

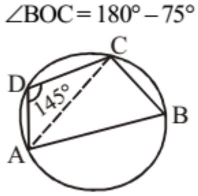
$\frac{1}{2}(\angle B + \angle C) + \angle BOC = 180°$

$= \frac{1}{2}(150°) + \angle BOC = 180°$

$= 75° + \angle BOC = 180°$

$\angle BOC = 180° - 75° = 105°$

195. (d)



As ABCD is a cyclic quadrilateral

$\therefore \angle B + \angle D = 180°$

$\angle B + 145° = 180°$

$\angle B = 180° - 145° = 35°$

Again as AB is a diameter.

$\therefore \angle ACB = 90°$

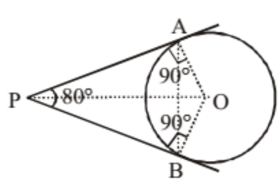
Now, In $\Delta ACB, \angle BAC + \angle ABC + \angle ACB = 180°$

$\angle BAC + 35° + 90° = 180°$

$\angle BAC = 180° - 90° - 35° = 55°.$

196. (b)

From tangent properties.



$\angle PAO = 90°$

and $\angle OPA = \frac{80°}{2} = 40°$

In $\Delta AOP, \angle AOP + \angle APO + \angle PAO = 180°$

$\angle AOP + 40° + 90° = 180°$

$\therefore \angle AOP = 180° - 130° = 50°$

$\angle AOB = 2 \times \angle AOP = 2 \times 50° = 100°$

Now, on Δ OAB, side AO = OB = radius

$\therefore \angle OAB = \angle OBA$

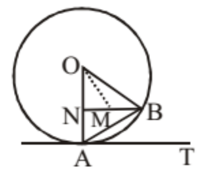
$\therefore \angle OAB + \angle OBA + \angle AOB = 180°$

$2\angle OAB + 100° = 180°$

$\angle OAB = \frac{180° - 100°}{2} = 40°$

197. (b) Ratio of $\frac{\angle AOC}{\angle OAC} = \frac{4}{1}$

198. (d)



As AT is a tangent $\therefore \angle OAT = 90°$

Again $\angle BAT = 45°$

$\therefore \angle OAB = 90° - 45° = 45°$

In Δ AOB, OA = OB,

$\therefore \angle OAB = \angle OBA = 45°$

then $\angle NOB = 180° - 45° - 45° = 90°$

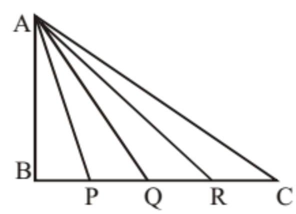
and Δ BON is also a right angle triangle.

Now, OM is a median of Δ BON,

$\therefore$ OM divide BN in two equal part

$\therefore BM = OM = 5$ cm

199. (a)



In ΔABC, AB = c, BC = a, and AC = b.

and $BP = PQ = QR = RC = \frac{a}{4}$.

Now, $(AP)^2 = (AB)^2 + (BP)^2 = c^2 + \left(\frac{a}{4}\right)^2$ ...(i)

$(AQ)^2 = (AB)^2 + (BQ)^2 = c^2 + \left(\frac{2a}{4}\right)^2$ ...(ii)

$(AR)^2 = (AB)^2 + (BR)^2 = c^2 + \left(\frac{3a}{4}\right)^2$ ...(iii)

from (i) + (ii) + (iii)

$(AP)^2 + (AQ)^2 + (AR)^2 = 3c^2 + \frac{a^2}{16} + \frac{4a^2}{16} + \frac{9a^2}{16}$

$= 3c^2 + \frac{14a^2}{16} = 3c^2 + \frac{7a^2}{8}$

Again from ΔABC, $b^2 = c^2 + a^2$

$c^2 = b^2 - a^2$

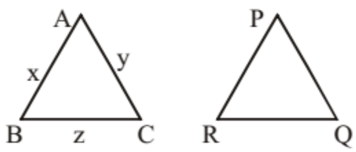
$\therefore AP^2 + AQ^2 + AR^2 = 3(b^2 - a^2) + \frac{7a^2}{8}$

$= 3b^2 - \left(3 - \frac{7}{8}\right)a^2$

$= 3b^2 - \frac{17}{8}a^2 = 3b^2 + 17.n.a^2$

Hence, $n = -\frac{1}{8}$.

200. (a)

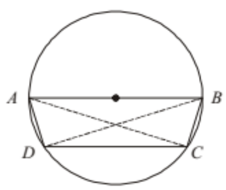


$\frac{\text{Area } \Delta ABC}{\text{Area } \Delta PQR} = \frac{16}{169} = \left(\frac{AC}{PQ}\right)^2$

$\therefore PQ = \sqrt{\frac{169}{16}}.(AC)$

$= \frac{13}{4}y.$

201. (d)



As AB is a diameter.

$\angle ACB = \angle ADB = 90°$

In ΔABC, $\angle BCA = 90°$

$\angle BAC = 40°$

$\therefore \quad \angle ABC = 180° - 90° - 40° = 50°$

and $ABCD$ is cyclic trapezium

so, $\angle ABC + \angle ADC = 180°$

$\therefore \quad \angle ADC = 180° - \angle ABC$

$= 180° - 50° = 130°$

and $\angle DCA = \angle BAC = 40°$ $\{\because AB \parallel CD\}$.

Now, In ΔACD, $\angle CAD = 180° - (\angle ADC + \angle ACD)$

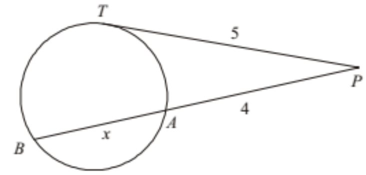
$= 180° - (130° + 40°) = 10°$

202. (c) $\Delta ABC \sim \Delta RQP \Rightarrow \frac{\text{Area of } \Delta ABC}{\text{Area of } \Delta RQP} = \left(\frac{BC}{PQ}\right)^2$

$\frac{BC}{PQ} = \left(\frac{9}{4}\right)^{1/2} \Rightarrow \frac{BC}{PQ} = \frac{3}{2}$

$PQ = \frac{2BC}{3} = \frac{2 \times 6}{3} = 4 \text{ cm}$

203. (a)



From circle properties

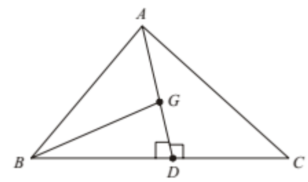
$PT^2 = PA \cdot PB$

$(5)^2 = 4 \times (x + 4)$

$x + 4 = \frac{25}{4} = 6.25$

$x = 6.25 - 4 = 2.25 \text{ cm}$

204. (c)



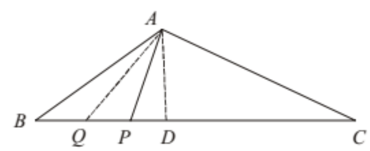
Let ΔABC is a equilateral triangle in which AD is a median.

Then, $\angle ADB = 90°$ $\{\because \Delta ABC \text{ is equilateral}\}$

Now, $\frac{\text{Area of } \Delta BDG}{\text{Area of } \Delta ABC} = \frac{\frac{1}{2} \times BD \times GD}{\frac{1}{2} \times BC \times AD}$

$= \frac{BD \times GD}{2 \times BD \times 3 \times GD} = \frac{1}{6}$

205. (b)



Here, $BC = BP + PC$

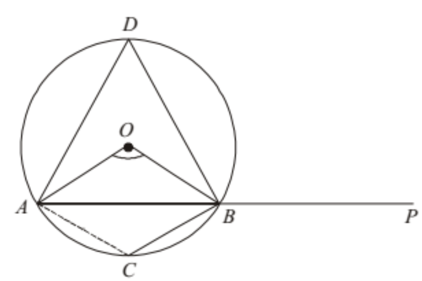
$= 4x + 11x = 15x$

and $BQ = PQ = 2x$

Let AD is the height of the ΔABC,

$\frac{\text{Area of } \Delta ABQ}{\text{Area of } \Delta ABC} = \frac{\frac{1}{2} \times AD \times 2x}{\frac{1}{2} \times AD \times 15x} = \frac{2}{15}$

206. (b)



Here, $OA = OB$ (radius of the circle).

$\therefore \angle OAB = \angle OBA$

In ΔOAB,

$\angle OAB + \angle OBA + \angle AOB = 180°$

$2 \times \angle OBA + 110° = 180°$

$\therefore \angle OBA = \dfrac{180 - 110}{2} = 35°$

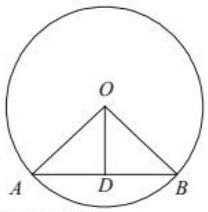
Here, $\angle ADB = \dfrac{\angle AOB}{2} = \dfrac{110}{2} = 55°$

Again from ADBC, $\angle D + \angle C = 180°$

$\angle C = 180° - 55° = 125°$

$\angle CBP = 180° - 125° = 55°$

207. (d)



Here, AB is a chord

$OA = OB = 17$cm (radius)

$OD = 8$cm

Form ΔADO

$AD = \sqrt{(AO)^2 - (OD)^2}$

$= \sqrt{(17)^2 - (8)^2} = 15$cm

Chord $AB = 2 \times 15 = 30$cm

208. (d) We have,

$\Delta ABC \sim \Delta NLM$

$\dfrac{\text{Area of } \Delta ABC}{\text{Area of } \Delta NLM} = \left(\dfrac{BC}{LM}\right)^2$

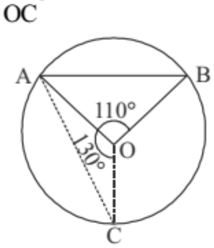
$\dfrac{4}{9} = \left(\dfrac{8}{LM}\right)^2$

$(LM)^2 = \dfrac{64 \times 9}{4} = 144$

$LM = \sqrt{144} = 12$ cm

209. (b) According to question,

$OA = OB = OC$



In ΔOAB

$\angle OAB + \angle OBA + \angle AOB = 180°$

$2\angle OAB = 180° - 110°$

$2\angle OAB = 70°$

$\angle OAB = 35°$

In ΔOAC,

$\angle OAC + \angle OCA + \angle AOC = 180°$

$2\angle OAC = 180° - 130°$

$\angle OAC = \dfrac{50°}{2} = 25°$

$\therefore \quad \angle BAC = 35° + 25° = 60°$

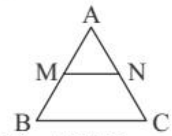
210. (c) Given, $MN \parallel BC$

The area of quadrilateral

$MBCN = 130\text{ cm}^2$

$AN : NC = 4 : 5$

$AC = 9$ cm



From given, we have, $\Delta ABC \sim \Delta AMN$

$\therefore \quad \dfrac{\text{Area } \Delta ABC}{\text{Area } \Delta AMN} = \left(\dfrac{AB}{AN}\right)^2 = \left(\dfrac{9}{4}\right)^2 = \dfrac{81}{16}$

$\Rightarrow \quad \text{Area } \Delta ABC = \dfrac{81}{16} \times \text{Area } \Delta AMN$ ...(i)

Given, triangle ABC is the sum of triangle AMN and quadrilateral MBCN.

We have, Area ΔABC = Area ΔAMN + Area $\square$MBCN

Using (i) and given area of quadrilateral.

We have,

using "x" as the area of ΔAMN

$130 + x = \dfrac{81}{16} \times x$

$130 = \dfrac{81x}{16} - x \Rightarrow 130 = \dfrac{65x}{16}$

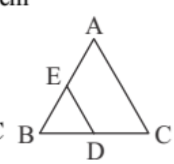
$\therefore \quad x = \dfrac{130 \times 16}{65} = 32$

$\therefore \quad$ Area of $\Delta AMN = 32\text{ cm}^2$

211. (a) Area of $\Delta ABC = 44\text{ cm}^2$

Area of $\Delta BDE = ?$

$\because \quad$ Area of ΔBDE



$= \dfrac{1}{4} \times$ Area of ΔABC

$= \dfrac{1}{4} \times 44 = 11\text{cm}^2$

212. (d) From the given figure

$AP = AB - PB = 15 - 9 = 6$ cm.

Again, from question AB and CD are two chords of the circle that intersect each other at point P.

$\therefore AP \times PB = CP \times PD$ (From theorem)

$\Rightarrow 6 \times 9 = 3 \times PD$

$\therefore PD = \dfrac{6 \times 9}{3} = 18$ cm.

213. (d) In ΔLMN, $LM \perp LN$

$\therefore \Delta LMN$ is a right angle triangle.

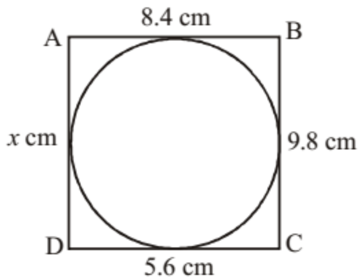
Also, $LM = LN = r$ (radius of the circle)

Now, area of the $\Delta LMN = \dfrac{1}{2} \times LM \times LN$

$\Rightarrow 36 = \dfrac{1}{2} \times r \times r \Rightarrow r^2 = 72.$

Area of the circle $= \pi(r^2) = \pi \times 72 = 72\pi.$

214. (b)



Let side AD is x cm.

By the theorem,

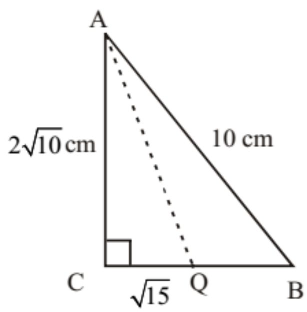
$$AB + CD = BC + AD$$

$$\Rightarrow 8.4 + 5.6 = 9.8 + x$$

$$\Rightarrow 14 = 9.8 + x$$

$$\Rightarrow x = 14 - 9.8 = 4.2 \text{ cm}$$

215. (c)



In triangle ABC,

$$BC^2 = AB^2 - AC^2$$

$$= 10^2 - (2\sqrt{20})^2 = 100 - 40$$

$$BC^2 = 60 \Rightarrow BC = 2\sqrt{15}$$

$$\therefore \quad CQ = \frac{1}{2}BC = \sqrt{15} \text{ cm}$$

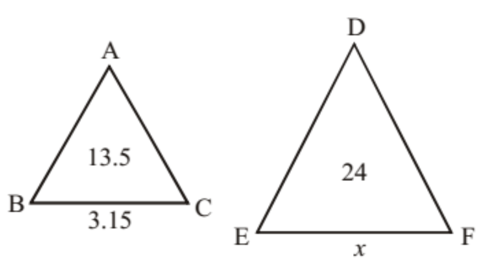
Now, in triangle ACQ,

$$AQ^2 = AC^2 + CQ^2$$

$$= (2\sqrt{10})^2 + (\sqrt{15})^2 = 40 + 15$$

$$AQ^2 = 55 \Rightarrow AQ = \sqrt{55} \text{ cm.}$$

216. (c)



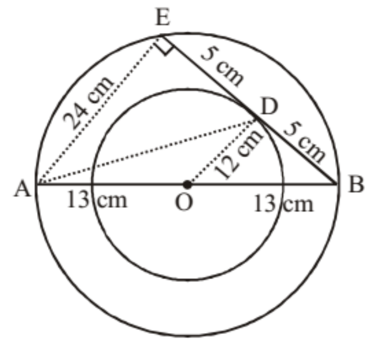
In similar triangle,

$$\frac{\text{Area of } \Delta ABC}{\text{Area of } \Delta DEF} = \frac{\text{Side (BC)}}{\text{Side (EF)}}$$

$$\Rightarrow \frac{13.5}{24} = \frac{3.15 \times 3.15}{x \times x}$$

$$\Rightarrow \frac{3}{4} = \frac{3.15}{x} \Rightarrow x = 4.2 \text{ cm}$$

217. (c)



In ΔODB,

$$BD^2 = OB^2 - OD^2$$

$$\Rightarrow BD^2 = 169 - 144$$

$$\Rightarrow BD^2 = 25$$

$$\Rightarrow BD = 5 \text{ cm}$$

$$\because \quad BD = DE$$

$$\therefore \quad DE = 5 \text{ cm}$$

and $\because$ ΔBDO and ΔBEA are similar triangles.

$$\therefore \quad AE = 24 \text{ cm}$$

Now in ΔAED,

$$AE^2 + DE^2 = AD^2$$

$$\Rightarrow 24^2 + 5^2 = AD^2$$

$$\Rightarrow 576 + 25 = AD^2$$

$$\Rightarrow AD^2 = 601$$

$$\Rightarrow AD = \sqrt{601}$$

$$\Rightarrow AD = 10\sqrt{6} = 10 \times 2.449$$

$$= 24.49 = 24.5 \text{ cm}$$

218. (b) The length of the common chord

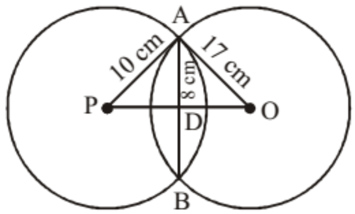
$$= 2 \times \sqrt{r^2 - \left(\frac{r}{2}\right)^2}$$

$$= 2 \times \sqrt{(8)^2 - (4)^2} = 2 \times \sqrt{64 - 16}$$

$$= 2 \times \sqrt{48} = 2 \times \sqrt{16 \times 3} = 2 \times 4\sqrt{3}$$

$$= 8\sqrt{3} \text{ cm}$$

219. (d)



In Triangle ADP,

AD = 8 cm, AP = 10 cm

$PD^2 = AP^2 - AD^2$

$\Rightarrow PD^2 = 100 - 64$

$\Rightarrow PD^2 = 36$

$\Rightarrow PD = 6$ cm

In triangle ADO,

AO = 17 cm, AD = 8 cm

$OD^2 = AO^2 - AD^2$

$\Rightarrow 17^2 - 8^2$

$\Rightarrow 289 - 64$

$\Rightarrow OD^2 = 225$

$\Rightarrow OD = 15$ cm

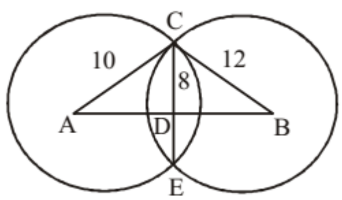
$\therefore$ Perimeter of the triangle OAP

$= AP + PO + AO$

$= 10 + (6 + 15) + 17$

$= 10 + 21 + 17 = 48$ cm.

220. (b)



In ΔACB

$AD^2 = AC^2 - CD^2$

$AD^2 = 10^2 - 8^2 = 100 - 64$

$AD^2 = 36 \Rightarrow \boxed{AD = 6 \text{ cm}}$

In ΔBCD

$BD^2 = BC^2 - CD^2$

$BD^2 = 12^2 - 8^2$

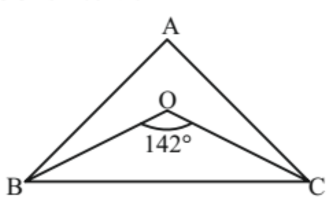
$BD^2 = 144 - 64 = 80$

$BD = 4\sqrt{5}$ cm

Distance between centres $= 6 + 4\sqrt{5}$ cm

221. (c) $\angle BOC = 142°$

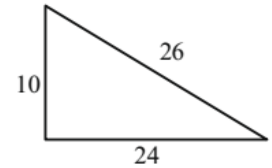
$\angle BOC$ is incentre



$$90° + \frac{\angle A}{2} = 142$$

$\angle A = 104°$

222. (c)



Area of triangle $= \frac{1}{2} \times 10 \times 24 = 120$

$$\text{Area of 3 sectors} = \frac{22}{7} \times \frac{4.2 \times 4.2}{4} + \frac{22}{7} \times \frac{4.2 \times 4.2}{6} + \frac{22}{7} \times \frac{4.2 \times 4.2}{12}$$

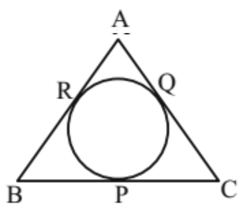
$$= \frac{22}{7} \times 8.82 = 27.72$$

Excluding portion $= 120 - 27.72 = 92.28$

223. (a) AQ = AR

BP = BR

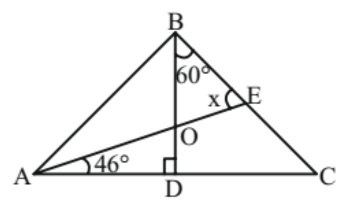
CP = CQ {Tangents from some point are equal}



Peimeter of $\Delta ABC = 2[AQ + CP + BR]$

$= 2[3.5 + 4.5 + 7] = 2 \times 15 = 30$ cm

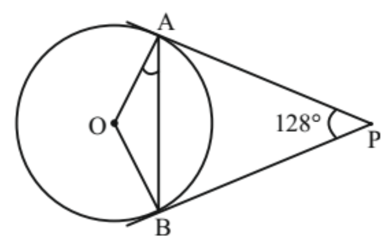
224. (d)



$\angle AOD = 180° - 90° - 46° = 44°$

$x = 180° - 60° - 44° = 76°$

225. (d)



$\angle AOB = 180° - 128° = 52°$

$$\angle OAB = \frac{180° - 52°}{2}$$

$= 64°$ {OA = OB = radius}