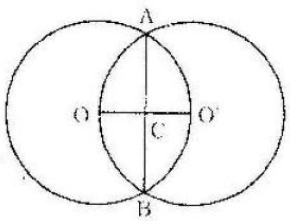
Simple Circle and Tangent Solution

1	B	9	b	17	b	25	d	33	C	41	B
2	B	10	A	18	a	26	c	34	D	42	B
3	a	11	C	19	b	27	B	35	B	43	C
4	a	12	d	20	d	28	c	36	A	44	d
5	D	13	B	21	A	29	b	37	D	45	c
6	A	14	a	22	*	30	b	38	d		
7	B	15	b	23	a	31	B	39	C		
8	*	16	d	24	d	32	*	40	B		

1.

(2)



OC = 2cm
OA = 4cm

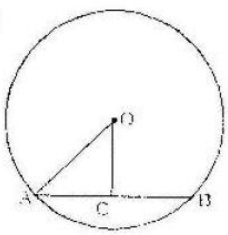
$\therefore$ AC = $\sqrt{4^2 - 2^2} = \sqrt{16-4}$

$= \sqrt{12} = 2\sqrt{3}$

$\therefore$ AB = $4\sqrt{3}$ cm

2.

(2)



AC = CB = 4 cm
OC = 3 cm

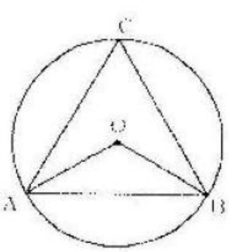
$\therefore$ OA = $\sqrt{OC^2 + CA^2}$

$= \sqrt{3^2 + 4^2}$

$= \sqrt{9+16} = \sqrt{25} = 5$ cm

3.

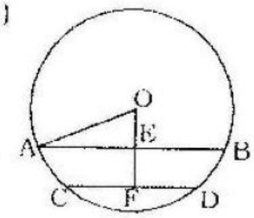
(1)



AO = OB = AB
$\therefore$ $\angle AOB = 60°$
$\therefore$ $\angle ACB = 30°$

4.

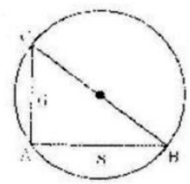
(1)



Let OE = x cm

$\therefore$ OF = $(x+1)$ cm
OA = OC = r cm
AE = 4 cm; CF = 3 ...
From ΔOAE,
$OA^2 = AE^2 + OE^2$
$\Rightarrow r^2 = 16 + x^2$
$\Rightarrow x^2 = r^2 - 16$
From ΔOCF,
$(x+1)^2 = r^2 - 9$
By equation (ii) – (i),
$(x+1)^2 - x^2 = r^2 - 9 - ...$
$\Rightarrow 2x + 1 = 7 \Rightarrow x = 3...$
$\therefore$ From equation (i),
$9 = r^2 - 16 \Rightarrow r^2 = 25$
$\Rightarrow r = 5$

5.



$\angle BAC = 90°$
$\therefore$ BC is the diameter ...
cle.

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

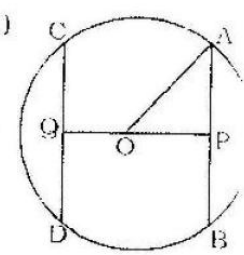
$= \sqrt{8^2 + 6^2} = \sqrt{64 + 3...}$

$= \sqrt{100} = 10$ cm

So that Radius of the circle =5.

6.

(1)



AB = CD
OP = OQ
From Δ OAP,

OP = $\sqrt{OA^2 - AP^2} = \sqrt{5... }$

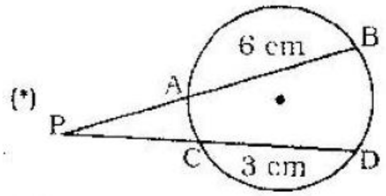
$= \sqrt{25-16}$

$= \sqrt{9} = 3$cm.

$\therefore$ QP = 2 × OP = 6 cm.

7. (B) The largest chord of a circle is its diameter.

8. (*)



AB = 6 cm; CD = 3 cm

PD = 5 cm; PB = ?

PA × PB = PC × PD

$\Rightarrow (PB - 6)\, PB = 2 \times 5$

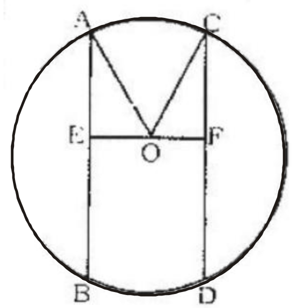
$\Rightarrow PB^2 - 6PB - 10 = 0$

$\Rightarrow PB = \dfrac{6 \pm \sqrt{36+40}}{2}$

$= \dfrac{6 \pm \sqrt{76}}{2}$

$= \dfrac{6 + 8.7}{2} \approx 7.35$

9. (b)



AB=24

AE=EB=12 cm.

$OE = \sqrt{OA^2 - AE^2}$

$= \sqrt{15^2 - 12^2}$

$= \sqrt{225 - 144} = \sqrt{81}$

= 9 cm

$\therefore OF = 21 - 9 = 12$ cm

$\therefore CF = \sqrt{15^2 - 12^2} = 9$ cm

$\therefore CD = 2 \times 9 = 18$ cm

10. (A)

$OE \perp AB$ and $OF \perp CD$

AE=EB=5 cm

CF=FD=12 cm

AO=OC=13 cm

AO=OC=13 cm

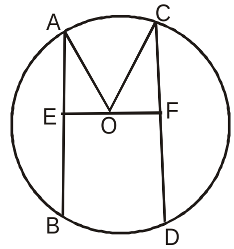
From Δ AOE

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

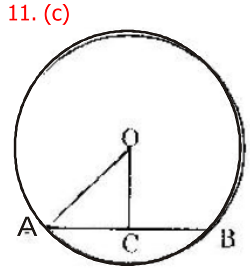
From Δ COF

$OF = \sqrt{13^2 - 12^2} = \sqrt{25} = 5$

EF=OE+OF=17 cm.



11. (c)



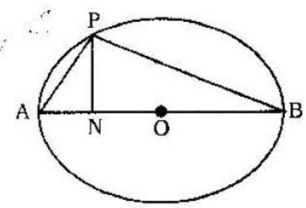
AC = BC = 4 cm.

OC = 3 cm.

$\therefore OA = \sqrt{AC^2 + OC^2}$

$= \sqrt{16+9} = \sqrt{25} = 5$ cm

12. (d)



AB = 14 cm, PB = 12 cm

$\angle APB = 90°$

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

$= \sqrt{(14+12)(14-12)}$

$= \sqrt{26 \times 2} = \sqrt{52}$

$ON = x \therefore AN = 7 - x$; $BN = 7 + x$

$\therefore$ From Δ PAN, $PN^2 = AP^2 - AN^2$

$= 52 - (7 - x)^2$

$\therefore$ From Δ PNB,

$PN^2 = (12)^2 - (7 + x)^2$

$\therefore 52 - (7 - x)^2 = 144 - (7 + x)^2$

$\Rightarrow 52 - (49 - 14x + x^2) = 144 - (49 + 14x + x^2)$

$\Rightarrow 52 - 49 + 14x - x^2 = 144 - 49 - 14x - x^2$

$\Rightarrow 28x = 144 - 52 = 92$

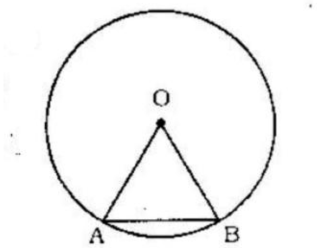
$\Rightarrow x = \dfrac{92}{28} = \dfrac{23}{7}$

$\therefore BN = 7 + x$

$= 7 + \dfrac{23}{7} = \dfrac{49+23}{7} = \dfrac{72}{7}$

$= 10\dfrac{2}{7}$ cm

13. (b)

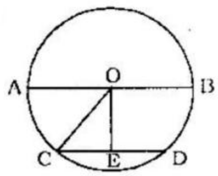


$OA = OB = AB$

$\therefore \Delta OAB$ is an equilateral triangle.

$\therefore \angle AOB = 60°$

14. (a)



OC = radius = 10 cm

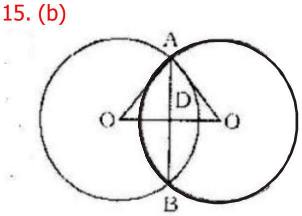
$CE = ED = 6$ cm

$\therefore OE = \sqrt{OC^2 - CE^2}$

$= \sqrt{10^2 - 6^2} = \sqrt{100-36}$

$= \sqrt{64} = 8$ cm

15. (b)



$OD = \sqrt{15^2 - 12^2}$

$= \sqrt{225-144}$

$= \sqrt{81} = 9$

$O'D = \sqrt{13^2 - 12^2}$

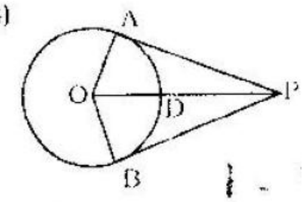
$= \sqrt{169-144} = \sqrt{25} = 5$

$OO' = 9 + 5 = 14$ cm

[illegible] $= 72° = 72 \times \frac{\pi}{180}$ radians

16.

(4)



$OA = OB = r$

$OP = 2r$

$AP = PB$

$= \sqrt{4r^2 - r^2} = \sqrt{3}r$

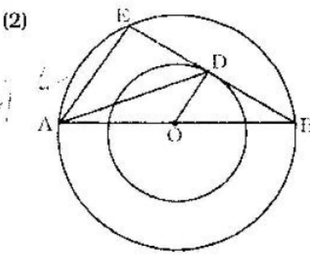
$\sin APO = \frac{OA}{OP} = \frac{r}{2r} = \frac{1}{2}$

$\angle APO = 30°$

$\therefore \angle APB = 60°$

17. (b)

(2)



$\angle ODB = 90°$

$OD = 8$ cm

$OB = 13$ cm

$\therefore BD = \sqrt{13^2 - 8^2}$

$= \sqrt{169-64}$

$= \sqrt{105}$ cm

$AE = 16$ cm; $\angle AED = 90°$

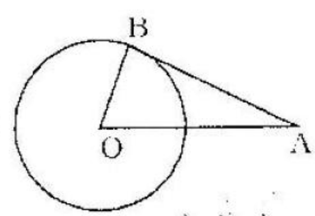
$AD = \sqrt{AE^2 + DE^2}$

$AD = \sqrt{256+105} = \sqrt{361}$

$= 19$ cm

18.

(1)



$\angle OBA = 90°$

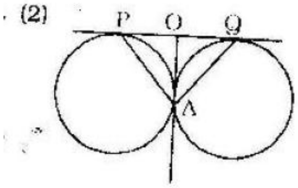
$OA = 5$, $OB = 4$

$\therefore AB = \sqrt{OA^2 - OB^2}$

$= \sqrt{25-16} = \sqrt{9} = 3$ cm

19.

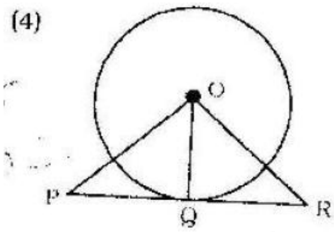
(2)



AO is perpendicular to PQ.
OA = OP = OQ.
$\angle OPA = \angle OAP = \angle OQA = 45^\circ$
$\therefore \angle PAQ = 90^\circ$

20.

(4)



$QR = \sqrt{OR^2 - \ldots}$

$= \sqrt{5^2 - 4^2} = \ldots$

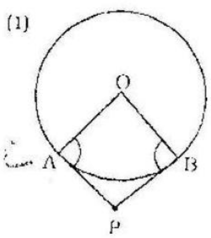
$= \sqrt{9} = 3$ cm

$\therefore PR = PQ + QR$

$= \frac{16}{3} + 3 = \frac{25}{3}$ cm

21.

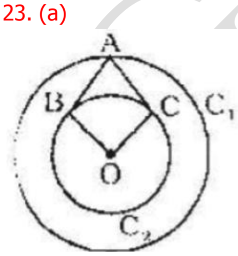
(1)



$\angle OAP = \angle OBP = 90^\circ$
$\angle AOB + \angle APB = 180^\circ$
$\Rightarrow 5\angle APB + \angle APB = 180^\circ$
$\Rightarrow 6\angle APB = 180^\circ$
$\Rightarrow \angle APB = 30^\circ$

22.

23. (a)



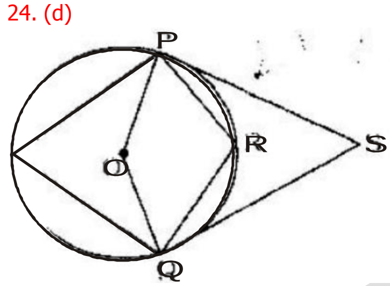
AB=AC=tangents from the same point
OB=OC=3 cm
OA=12 cm
$\angle ABO = 90^\circ$
so that AB= $\sqrt{12^2 - 3^2} = \sqrt{15 \times 9} = 3\sqrt{15}$

$\Delta OAB = \frac{1}{2} OB \times AB$

$= \frac{1}{2} \times 3 \times 3\sqrt{15} = \frac{9\sqrt{15}}{2}$

so that Area of OABC = $9\sqrt{15}$ sq.cm.

24. (d)

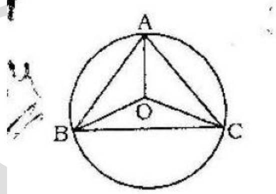


$\angle OPS = \angle OQS = 90^\circ$
$\angle PSQ = 20^\circ$;
$\angle POQ = 160^\circ$
$\angle PTQ = 80^\circ$
PRQT is a concyclic quadrilateral.
$\angle PRQ = 180^\circ - 80^\circ$
$= 100^\circ$

25. (d)

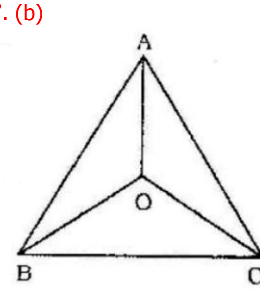
26.

(3) $\because \angle BAC = 85^\circ$
$\angle BOC = 2 \times 85^\circ = 170^\circ$



$\therefore \angle OBC = \angle OCB = 5^\circ$
$\therefore \angle OCA = \angle OAC = 75^\circ - 5^\circ$
$= 70^\circ$

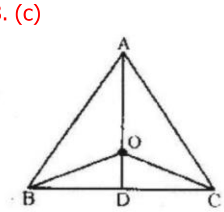
27. (b)



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

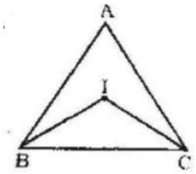
$= 90^\circ + 15^\circ = 105^\circ$

28. (c)



BO is the internal bisector of $\angle B$
$\angle ODB = 90^\circ$; $\angle BOD = 15^\circ$
$\angle OBD = 180^\circ - 90^\circ - 15^\circ = 75^\circ$
$\angle ABC = 2 \times 75^\circ = 150^\circ$

29. (b)



$\angle IBC = \frac{1}{2} \angle ABC = 30°$

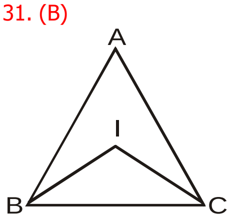
$\angle ICB = \frac{1}{2} \angle ACB = 25°$

$\therefore \angle BIC = 180° - 30° - 25°$
$= 125°$

30. (b) In radius = side/ $2\sqrt{3}$

$3 = \frac{\text{side}}{2\sqrt{3}} \Rightarrow \text{side} = 3 \times 2\sqrt{3} = 6\sqrt{3}$

31. (B)

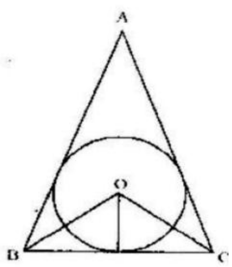


$\angle IBC = \frac{1}{2}\angle ABC = 65/2 = 32.5^0$

$\angle ICB = \frac{1}{2}\angle ACB = 55/2 = 27.5^0$

$\therefore \angle BIC = 180^0 - 32.5^0 - 27.5^0 = 120^0$

32.

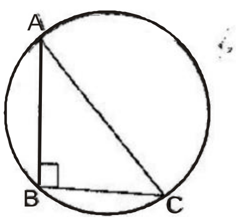


$\angle BOC = 90° + \frac{A}{2}$

$\Rightarrow 110 = 90° + \frac{A}{2}$

$\Rightarrow A = 2 \times 20 = 40°$

33. (c) The right bisectors of sides meet at a pint called circumcentre.
34. (d) In an equilateal triangle centroid, incentre etc. ie at the same point.
35. (b)



$3^2 + 4^2 = 5^2$

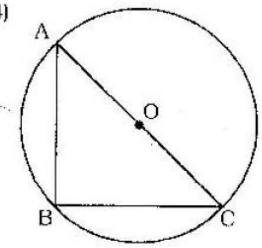
triangle ABC is a right angled triange.

$\angle$ ABC =90º = angle at the circumceference
diameter of cirle =5 cm
circum radius =2.5

36. (a)
OA=OB=OC
$\angle$ BID= $\angle$ ABC
$\Rightarrow x = y$
$\angle BOD = 2\ \angle BAD$

$\therefore \frac{z + x}{y} = \frac{3y}{y} = 3$

37.
. (4)



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

$= \sqrt{15^2 + 20^2} = \sqrt{225 + 400}$

$= \sqrt{625} = 25$ cm.

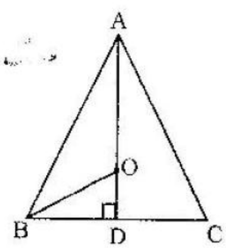
$\angle ABC = 90°$

$\therefore$ AC = diameter

$\therefore$ Circum radius (OA) = $\frac{25}{2}$

= 12.5 cm.

38. (d)
(4)



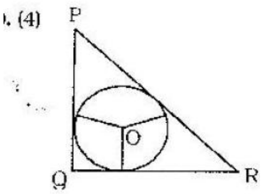
Circum-radius of equilateral triangle = $\frac{2}{3}$ × height

$\therefore 8 = \frac{2}{3}$ × height

$\therefore$ Height = $\frac{8 \times 3}{2}$ = 12 cm.

39.

. (4)



$PR^2 = PQ^2 + PR^2$

$= 3^2 + 4^2 = 25$

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

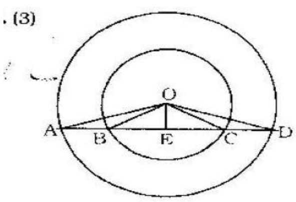
$= 5$ cm

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

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

40.

. (3)



BE = EC = 6 cm, OB = 10 cm,

OA = 17 cm

From ΔOBE,

$OE = \sqrt{OB^2 - BE^2}$

$= \sqrt{10^2 - 6^2} = \sqrt{16 \times 4} = 8$ cm

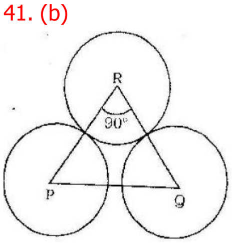
From ΔOAE,

$AE = \sqrt{OA^2 - OE^2}$

$= \sqrt{17^2 - 8^2} = \sqrt{25 \times 9} = 15$ cm

$\therefore$ AD = 2AE = 2 × 15 = 30 cm

41. (b)



$\angle PRQ = 90°$

$PR = 2 + x$

$PQ = 17$

$RQ = 9 + x$

$\therefore\ PQ^2 = PR^2 + RQ^2$

$\Rightarrow 17^2 = (2 + x)^2 + (9 + x)^2$

$\Rightarrow 289 = 4 + 4x + x^2 + 81 + 18x$
x^2

$\Rightarrow 289 = 2x^2 + 22x + 85$

$\Rightarrow 2x^2 + 22x + 85 - 289 = 0$

$\Rightarrow 2x^2 + 22x - 204 = 0$

$\Rightarrow x^2 + 11x - 102 = 0$

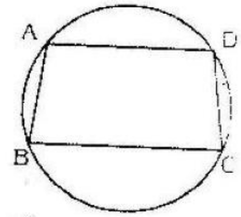
$\Rightarrow x^2 + 17x - 6x - 102 = 0$

$\Rightarrow x(x + 17) - 6(x + 17) = 0$

$\Rightarrow (x - 6)(x + 17) = 0$

$\Rightarrow x = 6$ as $x \neq -17$

42. (b)

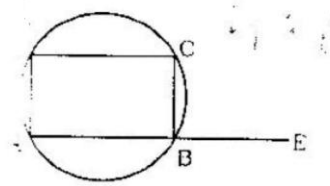


$\angle ABC + \angle CDA = 18C$

$\therefore\ \angle CDA = 180° - 70° = .$

$\therefore\ \angle BCD = 180° - 110 =$

43. (c)



$\angle ABC + \angle ADC = 180°$

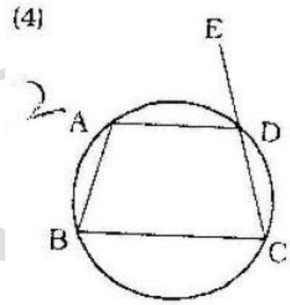
$\angle CBE = 50°$

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

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

44. (d)

(4)



$\angle ABC + \angle CDA = 180°$

$\Rightarrow\ \angle CDA = 180° - 72° = 108°$

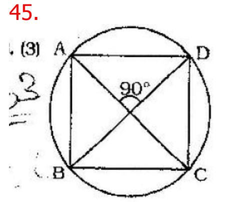
AD ∥ BC

$\angle BCD = \angle ADE = \angle ABC = 72°$

. 3)

45.

. (3)



$\angle B + \angle D = 180°$

$\angle A + \angle C = 180°$

$\angle BAC = \angle BCA$

$\angle DAC = \angle DCA$

$\therefore\ \angle DAB = \angle DCB = 90°$

$\angle DAC = \theta$

$\therefore\ \angle ADE = 90° - \theta = \angle CDE$

$\therefore\ \angle ABC = 180° - 2(90° - \theta)$

$= 180° - 180° + 2\theta = 2\theta$