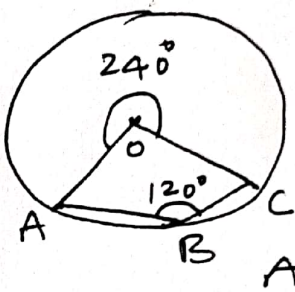
FOUNDATION+

Class: IX, MATHEMATICS

5. INTRODUCTION TO CIRCLES

TEACHING TASK (JEE MAINS)

01. Exterior $\angle AOC = 2 \times 120^\circ$
$= 240^\circ$
$\therefore \angle AOC = 360^\circ - 240^\circ$
$= 120^\circ$

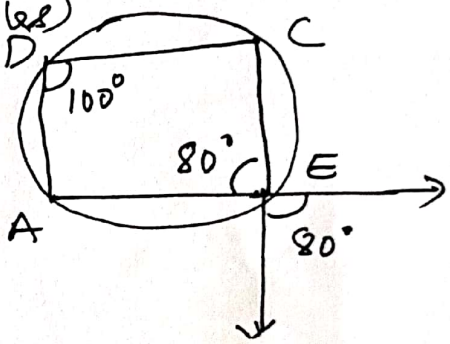


Ans: A

02 $\angle AEC = 80^\circ$ (Vertically opp. angles)

$\therefore \angle ADC = 100^\circ$

(opp. angles of cyclic quadrilaterals)

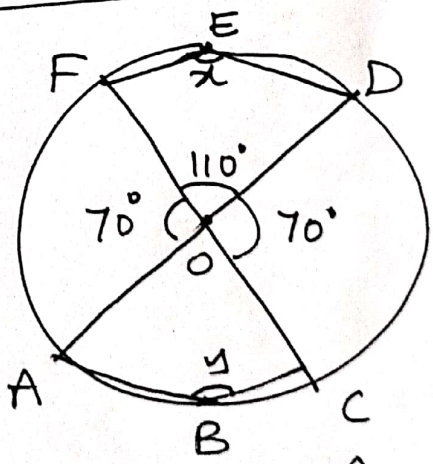


Ans: C

03 From figure
$70^\circ + 110^\circ + 70^\circ = 250^\circ$
$\therefore \angle y = \frac{1}{2}(250^\circ) = 125^\circ$

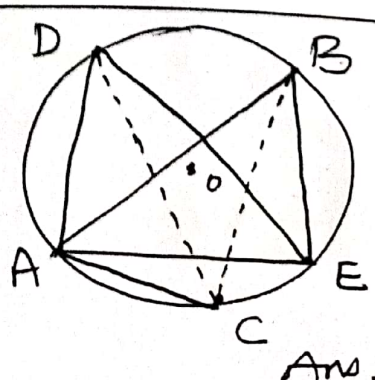
Similarly $\angle x = 125^\circ$

$\therefore \angle x + \angle y = 250^\circ$



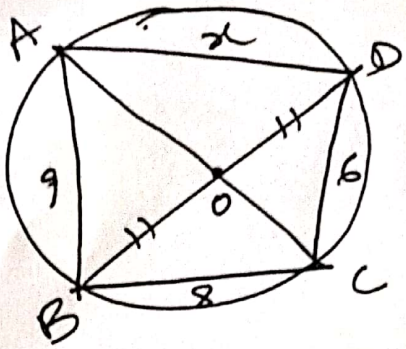
Ans: D

04 Given $\angle ADE - \angle ABC = 15^\circ$
$\Rightarrow (\angle ADC + \angle CDE) - \angle ABC = 15^\circ$
$\Rightarrow \angle ABC + \angle CDE - \angle ABC = 15^\circ$
$\therefore \angle CDE = 15^\circ$
$\Rightarrow \angle CAE = 15^\circ$



Ans: C

05 AC and BD are two chords. Let they intersect at O.



(2)

We have, $AO \cdot OC = BO \cdot OD$

$\triangle AOB \sim \triangle COD$

$\Rightarrow \frac{AB}{DC} = \frac{AO}{OC}$

$\Rightarrow \frac{9}{6} = \frac{AO}{OC} \rightarrow (1)$

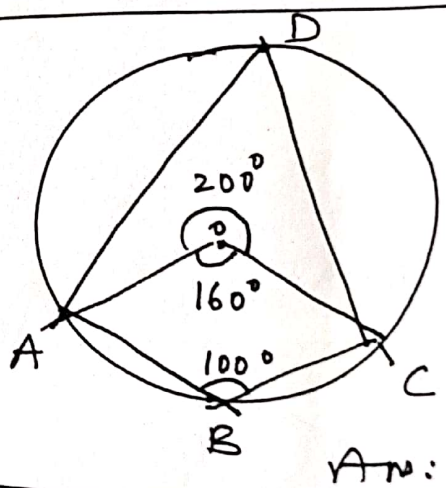
Similarly $\triangle BOC \sim \triangle AOD$

$\Rightarrow \frac{BC}{AD} = \frac{OC}{OA}$

$\Rightarrow \frac{8}{AD} = \frac{6}{9} \Rightarrow AD = 12cm$ Ans: C

06. From Figure

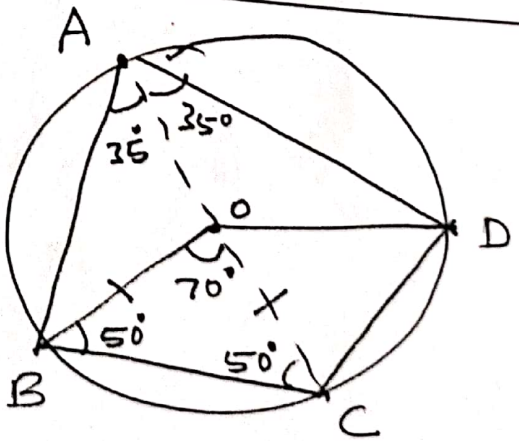
$\therefore \angle ABC = 100^\circ$



Ans: A

07. From figure

$\angle BAC = 35^\circ$



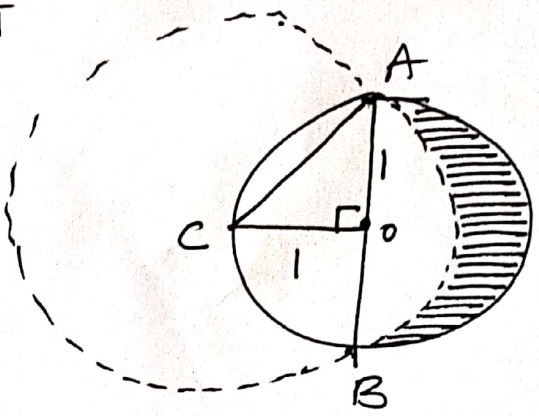
Ans: A

08 Area of circle $= \pi r^2 = \pi$

$\Rightarrow \boxed{r = 1}$

Radius of bigger circle

$= \sqrt{1^2 + 1^2} = \sqrt{2}$



Area of shaded region

= Area of smaller circle − [Area of smaller semi circle − area of right angled $\triangle$le] − area of Sector of Larger circle.

$= \pi - \left[\frac{\pi}{2} - \frac{1}{2} \cdot \sqrt{2} \cdot \sqrt{2}\right] - \frac{90^\circ}{360^\circ} \times \pi (\sqrt{2})^2$

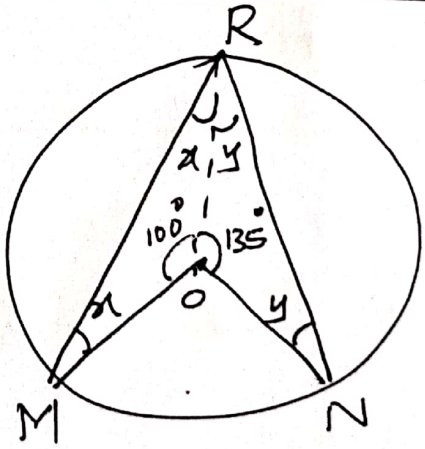
$= \pi - \left[\frac{\pi}{2} - 1\right] - \frac{\pi}{2}$

$= 1$ Sq. units

Ans. C

09 $x + x + 100^\circ = 180^\circ \Rightarrow x = 40^\circ$

$y + y + 135^\circ = 180^\circ \Rightarrow y = \frac{45^\circ}{2}$



Now,

$\frac{1}{2} \angle ORN + \frac{1}{4} \angle ORM$

$= \frac{1}{2}\left(\frac{45^\circ}{2}\right) + \frac{1}{4}(40^\circ)$

$= 11\frac{1}{4}^\circ + 10^\circ$

$= 21\frac{1}{4}^\circ$

Ans. D

10. $x + x + 100^\circ = 180^\circ$

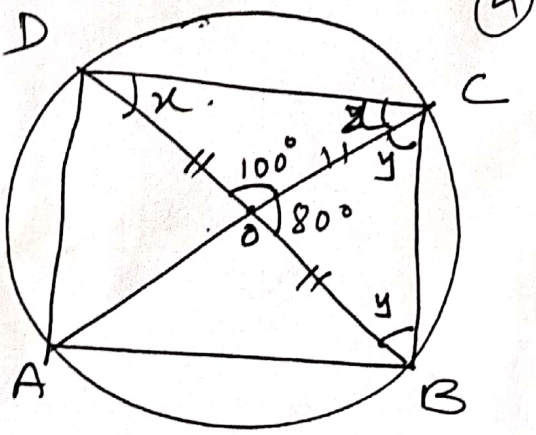
$\Rightarrow x = 40^\circ$

$y + y + 80^\circ = 180^\circ$

$\Rightarrow y = 50^\circ$

$\therefore \angle DCB = x + y$

$= 40^\circ + 50^\circ = 90^\circ$



Ans. C

JEE ADVANCED

11 $\angle A = \frac{1}{2} \angle BOC$

$= \frac{1}{2} \times 110^\circ = 55^\circ$

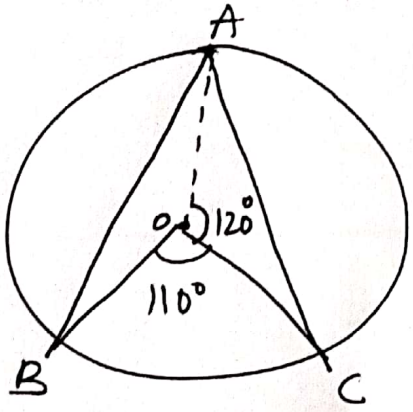
$\angle B = \frac{1}{2} \angle COA$

$= \frac{1}{2} \times 120^\circ = 60^\circ$

$\therefore \angle A + \angle B + \angle C = 180^\circ$

$\Rightarrow 55^\circ + 60^\circ + \angle C = 180^\circ$

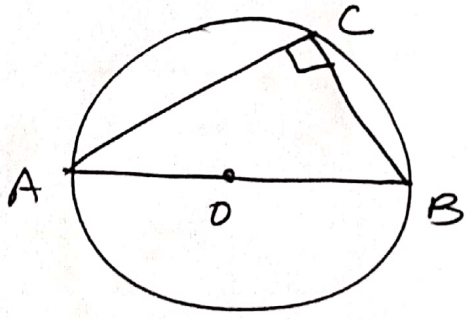
$\Rightarrow \angle C = 65^\circ$



Ans. A, B, C

12. $\angle ACB = 90^\circ$

$\therefore \angle AOB = 180^\circ$

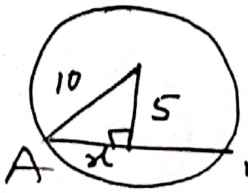


Ans. A, B

13 Statement I: $x^2 + 5^2 = 10^2 \Rightarrow x = \sqrt{75}$

$\therefore AB = 2\sqrt{75} = 10\sqrt{3}$

$= 17.32$ (Approx)



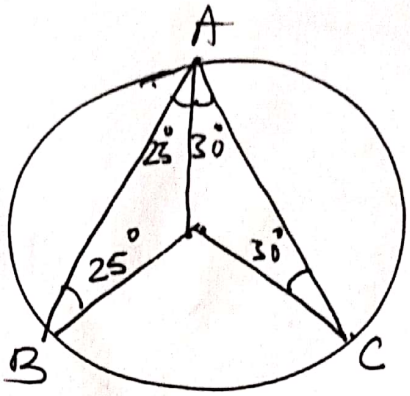
Statement II: Conceptual (True)

Ans. A

14. Statement I:

$\therefore \angle BAC = 25^\circ + 30^\circ$

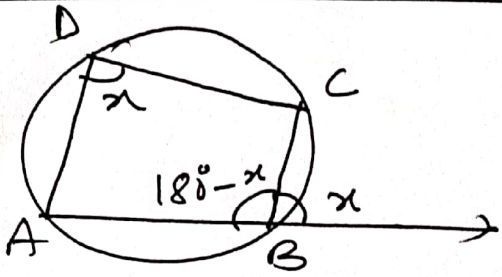
$= 55^\circ$ (True)



Statement II: Conceptual (True)

Ans: A

15 Assertion:



$\therefore$ True

Reason: Conceptual (False)

Ans: C

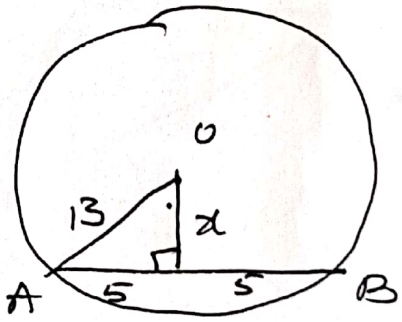
16 Assertion: Conceptual (True)

Reason: Conceptual (False)

Ans: C

17 $x^2 + 5^2 = 13^2$

$\Rightarrow x = 12$ cm

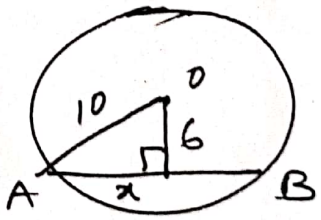


Ans: B

18 $x^2 + 6^2 = 10^2$

$\Rightarrow x = 8$

$\therefore AB = 2 \times 8 = 16$ cm



Ans: D

19

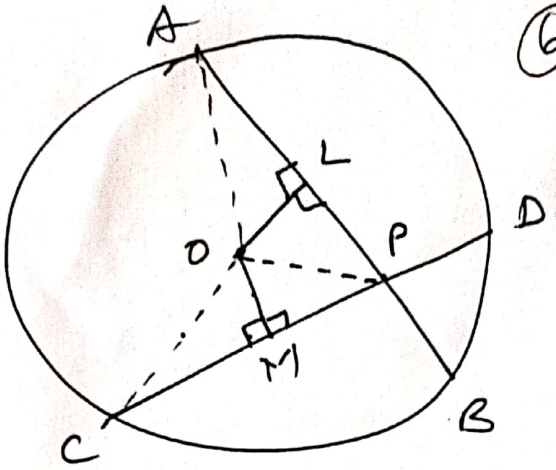
19. Since $AB = CD$

$\Rightarrow OL = OM$ (Theorem)

$\triangle OLP \cong \triangle OMP$ (RHS)

$\therefore \angle OPL = \angle OPM$

$\Rightarrow$ ~~AP = CP~~ $LP = MP \rightarrow (1)$



Similarly $\triangle ALO \cong \triangle CMO$ (RHS)

$\Rightarrow AL = CM \rightarrow (2)$

$(1)+(2) \Rightarrow AL + LP = CM + MP$

$\Rightarrow AP = CP$

Ans: C

~~18~~ 20 $\angle OPL = \angle OPM$ Since $\triangle OLP \cong \triangle OMP$

Ans: D

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21 $\overline{OD}$ bisects $\overline{AB}$

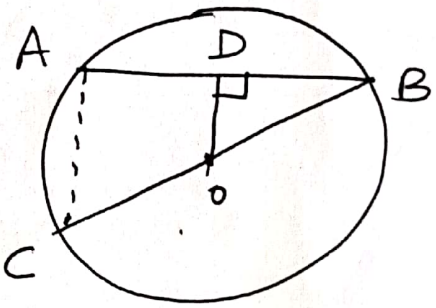
i.e $AD = DB$

We have $OD \parallel AC$

Also, $OD = \frac{1}{2} AC$

$\Rightarrow 6 = \frac{1}{2} AC$

$\Rightarrow AC = 12 = 3K \Rightarrow K = 4$



Ans: 4

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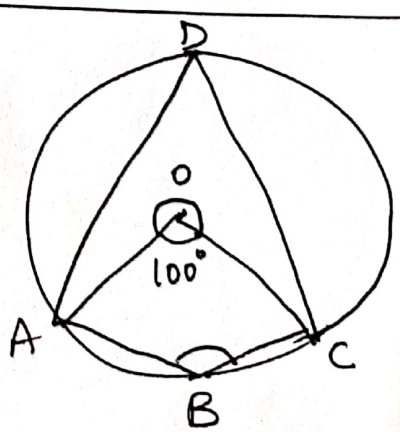
22. exterior $\angle AOC = 360^\circ - 100^\circ = 260^\circ$

$\therefore \angle ABC = \frac{1}{2} \times 260^\circ = 130^\circ$

$\angle ADC = \frac{1}{2} \times 100^\circ = 50^\circ$

$\therefore \frac{\angle ABC - \angle ADC}{80^\circ} = \frac{130^\circ - 50^\circ}{80^\circ}$

$= \frac{80^\circ}{80} = 1$

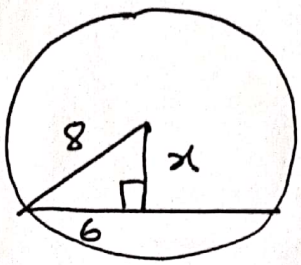


Ans. 1

23 i) $x^2 + 6^2 = 8^2$

$\Rightarrow x^2 = 28$

$\Rightarrow x = \sqrt{28} = 5.291$ cm (r)



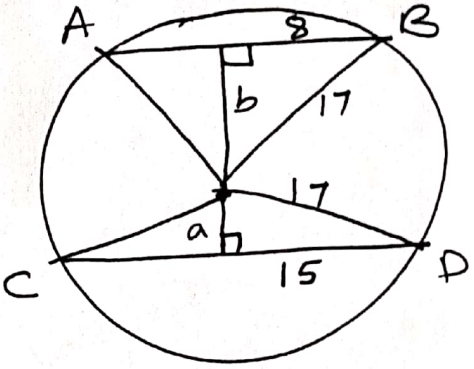
ii) $a^2 + 15^2 = 17^2$

$\Rightarrow a = 8$

Also, $b^2 + 8^2 = 17^2$

$\Rightarrow b = 15$

Now, $a + b = 23$ cm (P)

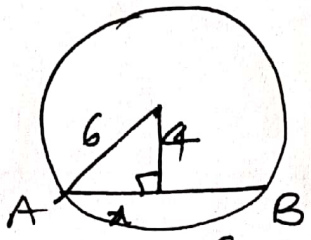


iii) $x^2 + 4^2 = 6^2$

$\Rightarrow x = \sqrt{20}$

$\therefore AB = 2\sqrt{20} = 4\sqrt{5}$

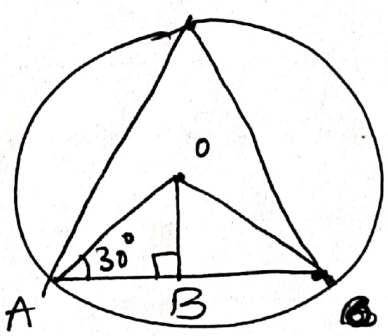
$= 8.94$ (S)



iv) $\cos 30^\circ = \frac{AB}{OA}$

$\Rightarrow \frac{\sqrt{3}}{2} = \frac{\left(\frac{9}{2}\right)}{r}$

$\Rightarrow r = 3\sqrt{3} = 5.196$ (Q)

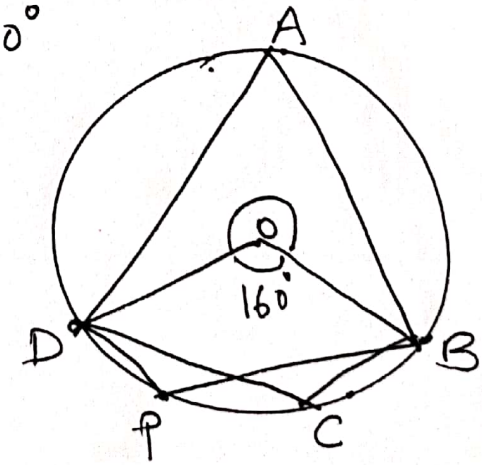


Ans: r, P, S, Q

24 (i) exterior $BOD = 360^\circ - 160^\circ = 200^\circ$

$\therefore \angle BCD = \frac{1}{2} \times 200^\circ = 100^\circ$

$\therefore \angle BCD = \angle BPD = 100^\circ$ (S)



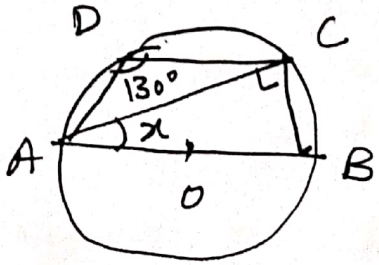
ii) ABCD is a cyclic quadrilateral

$\therefore \angle B + \angle D = 180^\circ$

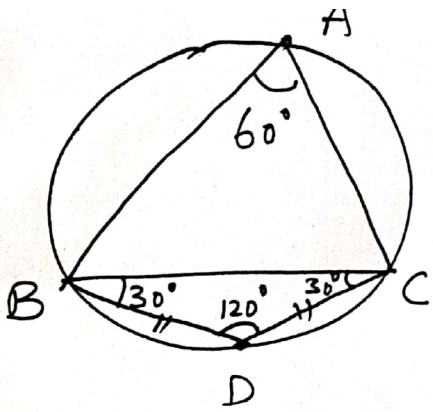
$\Rightarrow \angle B + 130^\circ = 180^\circ$

$\Rightarrow \angle B = 50^\circ$

$\therefore \angle x = 40^\circ$ (r)



iii) $\therefore \angle BAC = 60^\circ$ (P)



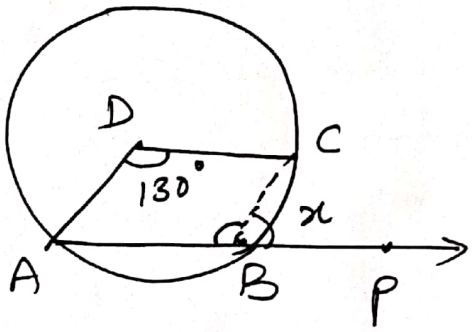
iv) exterior $\angle ADC = 360^\circ - 130^\circ$

$= 230^\circ$

$\therefore \angle ABC = \frac{1}{2} \times 230^\circ = 115^\circ$

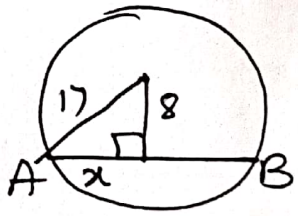
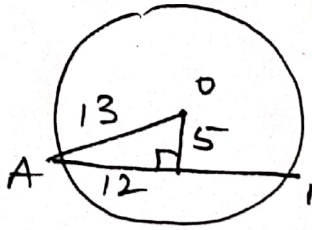
$\therefore x + 115^\circ = 180^\circ$

$\Rightarrow x = 65^\circ$ (Q)

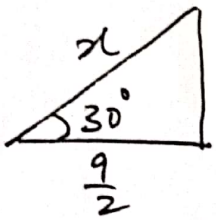


Ans: S, R, P, Q

LEARNERS TASK (CUQ'S)

01	Conceptual	Ans.: B
02	Conceptual	Ans B
03	Conceptual	Ans.: B
04	Conceptual	Ans: B
05	Conceptual	Ans: A
06	$x^2 + 8^2 = 17^2 \Rightarrow x = 15$ $AB = 2 \times 15 = 30cm$	 Ans. A
07	$AB = 2 \times 12 = 24cm$	 Ans: D
08	Conceptual	Ans: C
09	Conceptual	Ans.: B

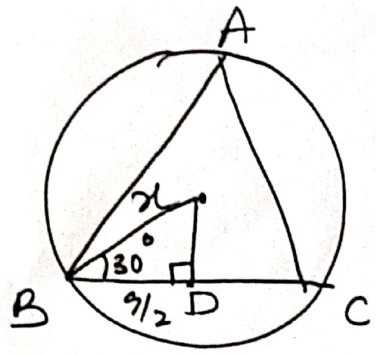
10 From figure



$\cos 30^\circ = \frac{(\frac{9}{2})}{x}$

$\Rightarrow \frac{\sqrt{3}}{2} = \frac{9}{2x}$

$\Rightarrow x = \frac{9}{\sqrt{3}} = 3\sqrt{3}$ cm



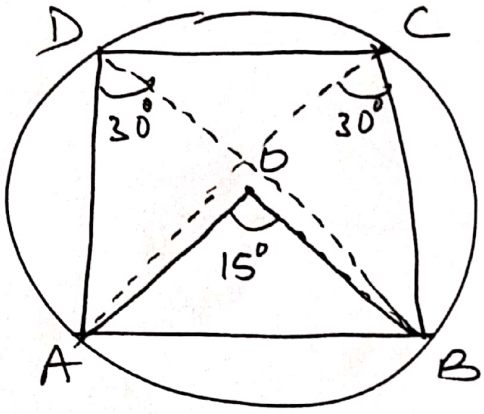
Ans: C

JEEMAINS LEVEL

01. $\angle AOB = 15^\circ$

$\therefore \angle ACB = \angle ADB = 2 \times 15^\circ = 30^\circ$

$\therefore \angle ACB - \angle ADB = 0^\circ$



Ans: A

02 Sum of the interior angles of a regular pentagon $= (n-2) \times 180^\circ$

$= (5-2) \times 180^\circ = 540^\circ$

Each interior angle $= \frac{540^\circ}{5} = 108^\circ$

$\therefore$ From figure $= x = \frac{108^\circ}{2} = 54^\circ$

Ans. B

03 Since $AB = AC$

$\Rightarrow OA \perp BC$

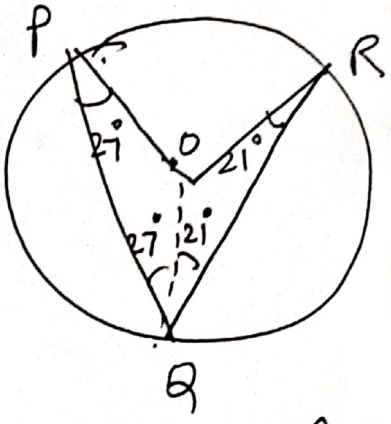
$\Rightarrow OE \perp BC$

clearly $\angle OEA = 180^\circ - (90^\circ + 20^\circ)$

$= 70^\circ$

Ans: D

04. $\angle PQR = 27^\circ + 21^\circ$
$= 48^\circ$
$\therefore \angle POR = 2 \times 48^\circ$
$= 96^\circ$

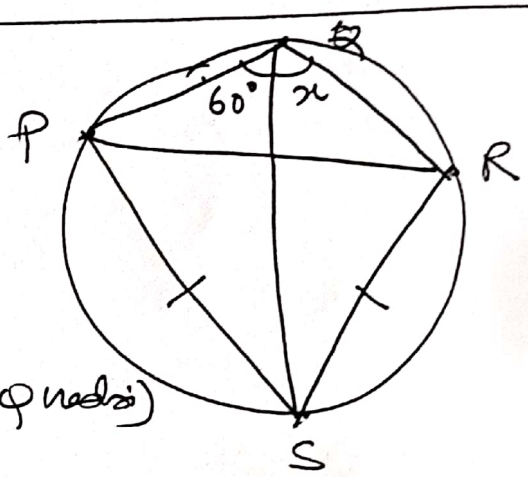


Ans: B

05 From figure $OA = OC$
$\Rightarrow \angle A = \angle C$
clearly $x = 70^\circ$

Ans: C

06 From figure
$\angle PRS - \angle PQS = 60^\circ$
$\therefore \angle QPR = 60^\circ$
$\therefore \triangle PRS$ is an equilateral $\triangle^{le}$
$\therefore \angle S + \angle Q = 180^\circ$ (cyclic quads)
$\Rightarrow 60^\circ + (60^\circ + x^\circ) = 180^\circ$
$\Rightarrow x = 60^\circ$



Ans: B

07 Let $\angle x > \angle y$
$\angle x - \angle y = 58^\circ$
$\angle x + \angle y = 180^\circ$
$2\angle x = 238^\circ$
$\Rightarrow \angle x = 119^\circ$
$\therefore \angle y = 61^\circ$

Ans: D

08 From figure, $\angle a = 2x$
$\angle b = \frac{360^\circ - a}{2}$
$= \frac{360^\circ - 2x}{2}$
$= 180^\circ - x$

$a : b = 2 : 5$
$2x : 180^\circ - x = 2 : 5$
$\Rightarrow (2x) 5 = 2(180^\circ - x)$
$\Rightarrow x = 30^\circ$

Ans: C

09. Conceptual — Ans: B

10 Conceptual — Ans.. A

JEE ADVANCED

11. If $\overline{BOC}$ is the diameter of the circle then, the circle will pass through the points A, B and C

$\therefore x = \frac{1}{2} \angle BOC = \frac{1}{2} \times 180^\circ = 90^\circ$

clearly $x + 25^\circ + y = 180^\circ$

$\Rightarrow 90^\circ + 25^\circ + y = 180^\circ$

$\Rightarrow y = 65^\circ$

Ans. A, D

12 We have $\angle B + \angle C = 90^\circ$

$\Rightarrow 10x + 7 + 15y - 7 = 90^\circ$

$\Rightarrow 10x + 15y = 80^\circ$

$\Rightarrow 2x + 3y = 16$

clearly, $x = 5, y = 2$ satisfies this eqn.

Ans.. A, D

13. Statement I: Conceptual (True)

Statement II: Conceptual (True)

Ans.. A

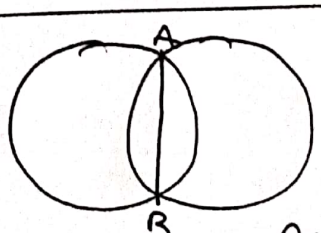
14. Statement I: Conceptual (True)

Statement II: Conceptual (True)

Ans. A

15. Assertion: Conceptual (True)

Reason: Conceptual (False)



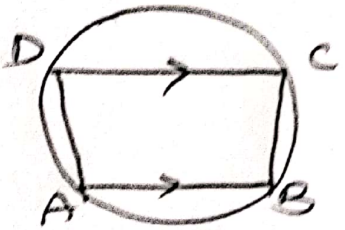
Ans.. C

16. Assertion: Conceptual (True)
Reason: Conceptual (True)
Ans: A

17. $\angle z = 2\angle x$
Ans: C

18 From figure $y + y + z = 180^\circ$
$\Rightarrow 2y + z = 180^\circ$
$\Rightarrow 2y + 2x = 180^\circ$
$\Rightarrow x + y = 90^\circ$
$\Rightarrow \angle BAC + \angle OBC = 90^\circ$
Ans: D

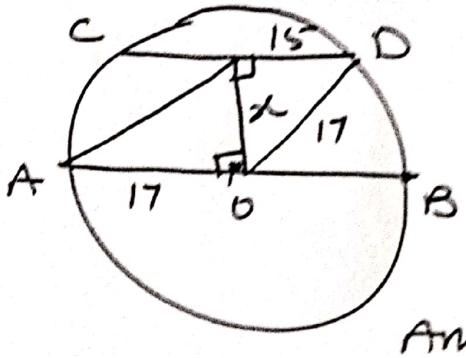
19. Conceptual: The statements B, C, D are false statements



Ans: B, C, D

20 conceptual
Ans: A

21. From the figure
$x^2 + 15^2 = 17^2$
$\Rightarrow x = 8$



Ans: 8

22 From the figure
$\angle ADC = 100^\circ$
$\angle ABC = 80^\circ$
$\therefore x = 100^\circ$
$\frac{x}{50} = \frac{100^\circ}{50} = 2$
Ans: 2

23 a) Diameter (q)
b) Supplementary (r)
c) Congruent (s)
d) Concyclic (p)
Ans: q, r, s, p

24) a) Points on the same circle (p)
b) cyclic quadrilateral (q)
c) Not concyclic (r)
d) Concyclic (s) Ans: p, q, r, s

⇒ THE END ⇐