

INTRODUCTION TO CIRCLES

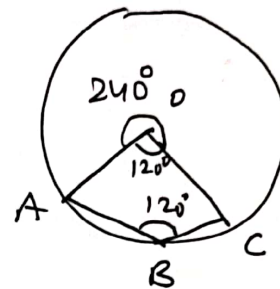
Class: IX, Mathematics

(A)

TEACHING TASK

01. Ex $\angle AOC = 2 \times 120^\circ$
 $= 240^\circ$

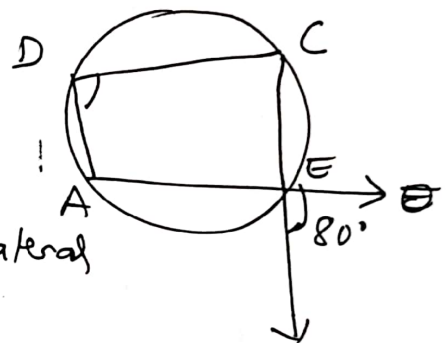
$\therefore \angle AOC = 360^\circ - 240^\circ$
 $= 120^\circ$



Ans: A

02. $\angle AEC = 80^\circ$ (Vertical opp. Angles.)

$\therefore \angle ADC = 100^\circ$ Since opp. angles of cyclic quadrilateral are supplementary



Ans: C

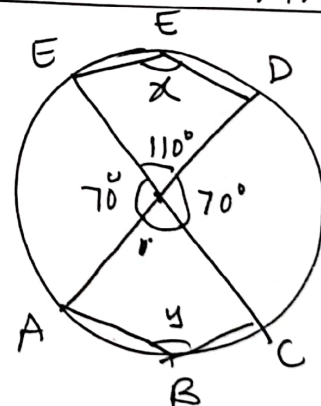
03. from figure

$70^\circ + 110^\circ + 70^\circ = 250^\circ$

$\therefore \angle y = \frac{1}{2}(250^\circ) = 125^\circ$

Similarly $\angle x = 125^\circ$

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



Ans: D

04. $\angle ADE - \angle ABC = 15^\circ$

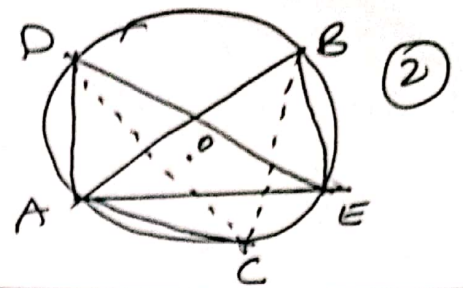
$(\angle ADC + \angle CDE) - \angle ABC = 15^\circ$

$\Rightarrow \angle ABC + \angle CDE - \angle ABC = 15^\circ$

$$\therefore \angle CDE = 15^\circ$$

$$\angle CDE = \angle CAE$$

$$\therefore \angle CAE = 15^\circ$$



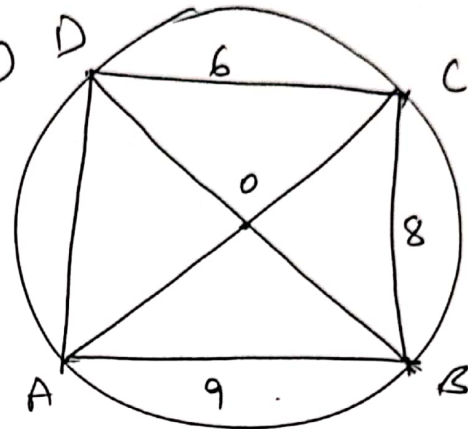
05

$$\triangle AOB \sim \triangle COD$$

(AAA Similarity)

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

$$\frac{9}{6} = \frac{AO}{OC} \rightarrow \text{①}$$



$$\triangle BOC \sim \triangle AOD$$

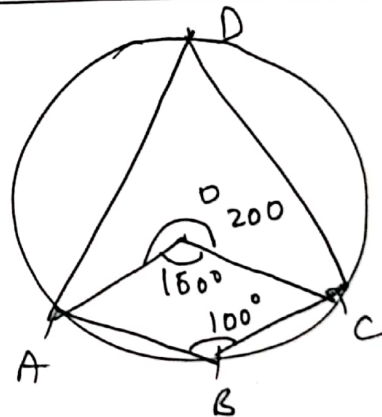
(AAA Similarity)

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

$$\Rightarrow \frac{8}{AD} = \frac{6}{9} \Rightarrow AD = 12 \text{ cm}$$

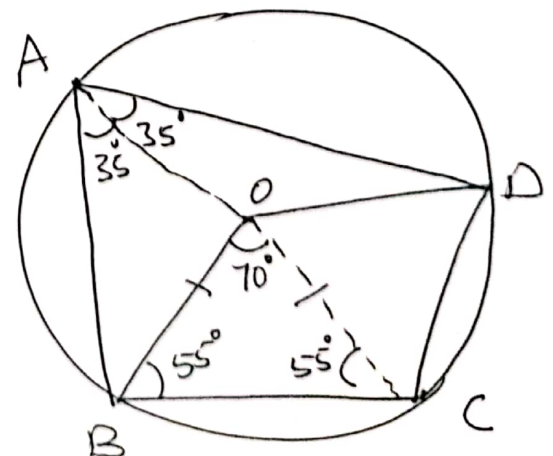
Ans: C

06. from figure
it is clear
 $\angle ABC = 100^\circ$



Ans: A

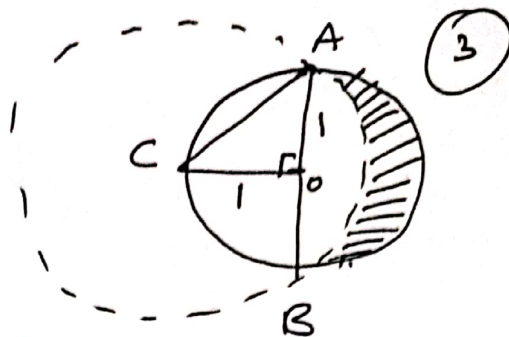
07.
from figure
 $\angle BAC = 35^\circ$



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

$r = 1$

Radius of bigger circle
 $= \sqrt{1^2 + 1^2} = \sqrt{2}$



Area of Shaded region

$=$ Area of Smaller circle $-($ area of smaller

Semicircle $-($ area of right angled ΔC) $-($ area of sector of larger circle (with sector angle 90°)

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

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

$$= 1 \text{ Sq units}$$

Ans: C

09

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

$$\therefore x = 40^\circ$$

$$y + y + 135^\circ = 180^\circ$$

$$\therefore y = \frac{45^\circ}{2}$$

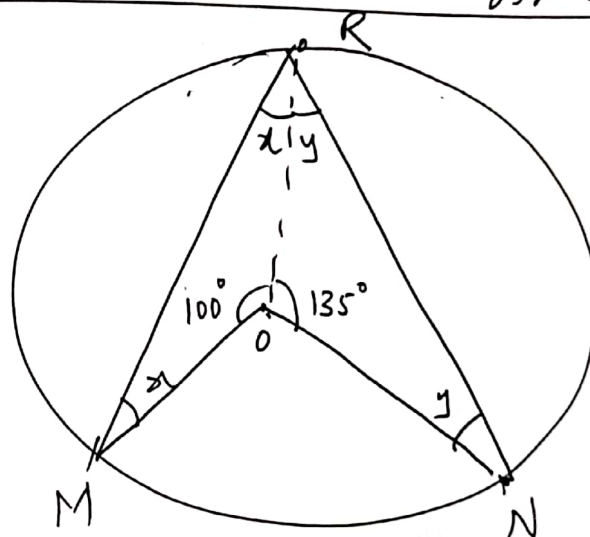
Now

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

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

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

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



Ans: D

10.

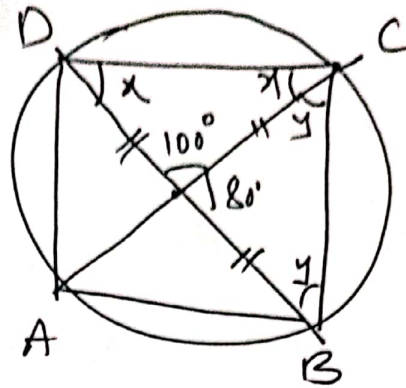
$$x + x + 100^\circ = 180^\circ$$

$$\Rightarrow x = 40^\circ$$

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

$$\Rightarrow y = 50^\circ$$

$$\begin{aligned} \therefore \angle DCB &= x + y \\ &= 40^\circ + 50^\circ \\ &= 90^\circ \end{aligned}$$



(4)

11.

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

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

$$= 55^\circ$$

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

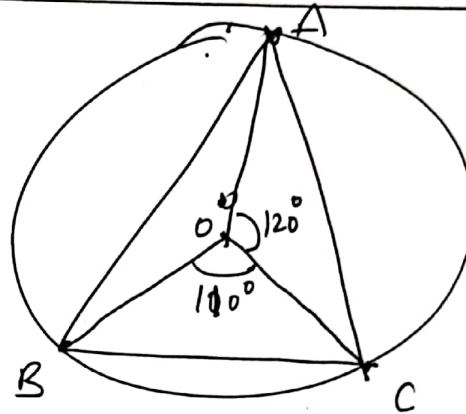
$$= \frac{1}{2} \times 120^\circ$$

$$= 60^\circ$$

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

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

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

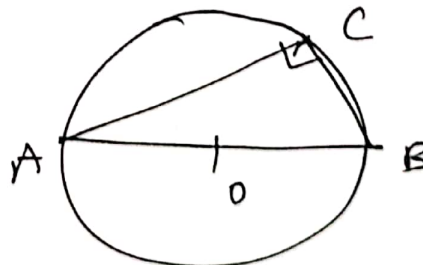


Ans: B

12.

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

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



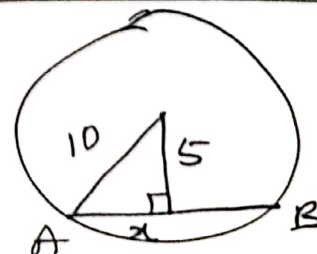
Ans: A, B

13

$$x^2 + 5^2 = 10^2$$

$$\therefore x = \sqrt{75} =$$

$$\therefore AB = 2\sqrt{75} = 10\sqrt{3} = 17.32 \text{ (Tone)}$$



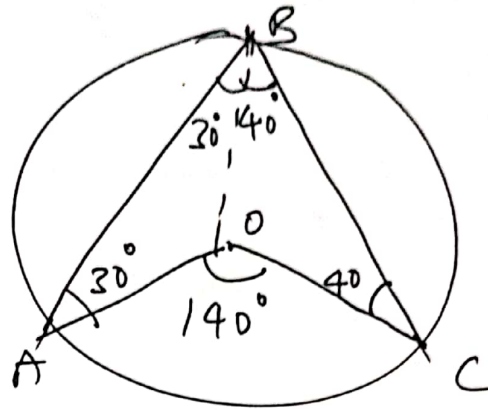
Statement I: Conceptual (True)

Ans. A

(5)

14. Statement I:

$$\therefore \angle AOC = 140^\circ \text{ (False)}$$

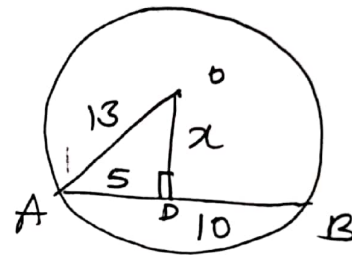


Statement II: Conceptual (True)

Ans. D

15. $x^2 + 5^2 = 13^2$

$$\Rightarrow x = 12 \text{ cm}$$

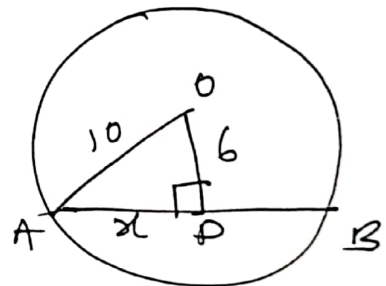


Ans. B

16. $x^2 + 6^2 = 10^2$

$$\Rightarrow x = 8$$

$$\therefore AB = 2 \times 8 = 16 \text{ cm}$$



Ans. D

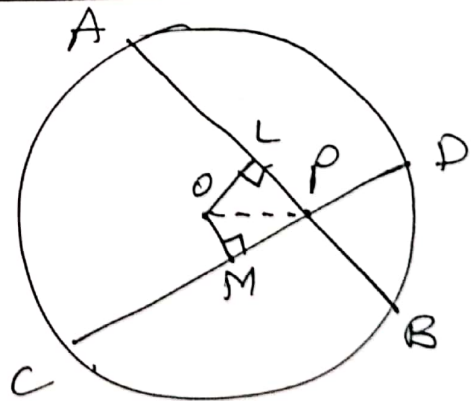
17. Since $AB = CD$

$$\Rightarrow OL = OM \text{ (Theorem)}$$

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

$$\therefore \angle OPL = \angle OPM$$

$$AP = CP$$



Ans. C

18. $\angle OPL = \angle OPM$

Ans. D

19

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

$\therefore AD = DB$

We have $OD \parallel AC$

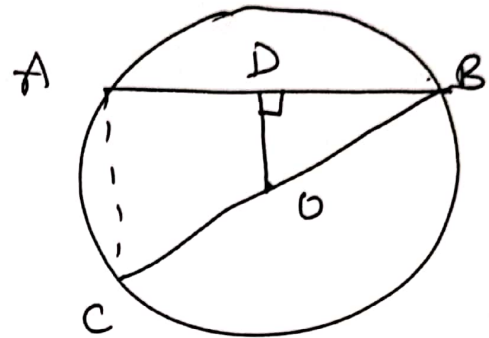
Also $OD = \frac{1}{2} AC$

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

$$\Rightarrow AC = 12 = 3k$$

$$= 3 \times 4 = 12 \text{ cm}$$

$$\therefore r = 4$$



Ans: 4

20

$$\text{ext } \angle AOC = 360^\circ - 100^\circ$$

$$= 260^\circ$$

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

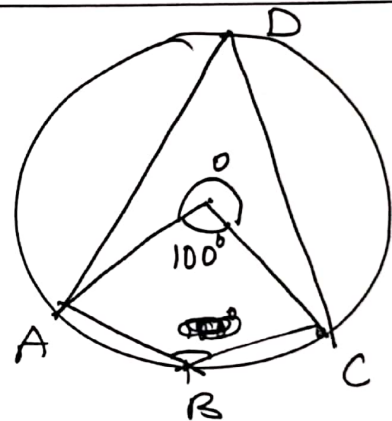
$$= 130^\circ$$

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

$$= 50^\circ$$

$$\therefore \frac{\angle ABC - \angle ADC}{80} = \frac{130^\circ - 50^\circ}{80^\circ} = \frac{80^\circ}{80^\circ} = 1$$

Ans: 1



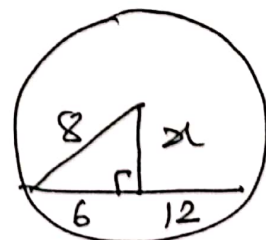
21

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

$$\Rightarrow x^2 = 64 - 36$$

$$\Rightarrow x = 28$$

$$\Rightarrow x = \sqrt{28} = 5.291 \text{ cm}$$



(i) $a^2 + 15^2 = 17^2$

$$\begin{aligned} a^2 &= 17^2 - 15^2 \\ &= 32 \times 2 \\ &= 64 \end{aligned}$$

$a = 8$

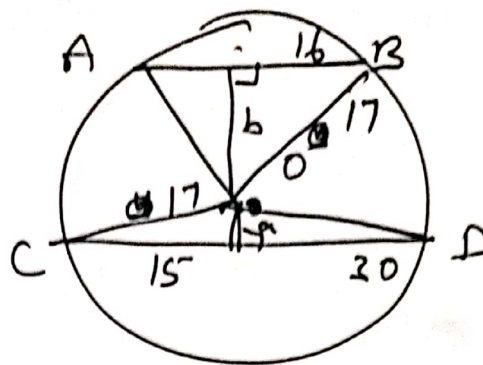
Also $b^2 + 8^2 = 17^2$

$$b^2 = 17^2 - 8^2$$

$$b^2 = 25 \times 9$$

$b = 15$

Now $a + b = 8 + 15 = 23 \text{ cm}$



(ii) $x^2 + 4^2 = 6^2$

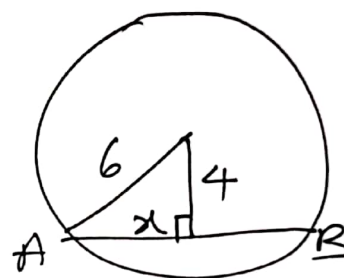
$$x^2 = 36 - 16$$

$$x^2 = 20$$

$$x = \sqrt{20}$$

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

$$= 8.94$$



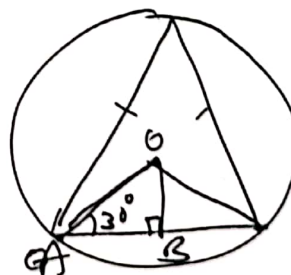
(iv) $\sin 30^\circ =$

$$\cos 30^\circ = \frac{AB}{AO}$$

$$\Rightarrow \cos 30^\circ = \frac{\left(\frac{9}{2}\right)}{r}$$

$$\Rightarrow \frac{\sqrt{3}}{2} = \frac{9}{2r} \Rightarrow r = \frac{9}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$$

$$r = 3\sqrt{3} = 5.196 \quad \text{Ans. } 5.196$$

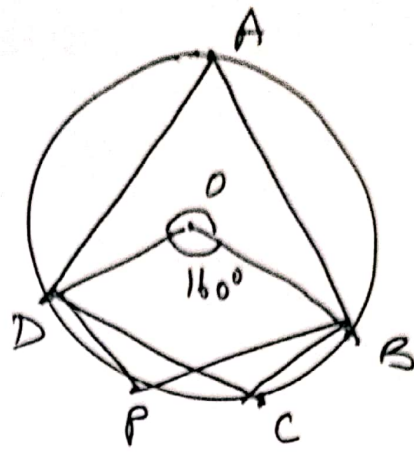


22

(i) $\text{ext } \angle BOD = 360^\circ - 160^\circ$
 $= 200^\circ$

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

$\therefore \angle BCD = \angle BPD = 100^\circ$



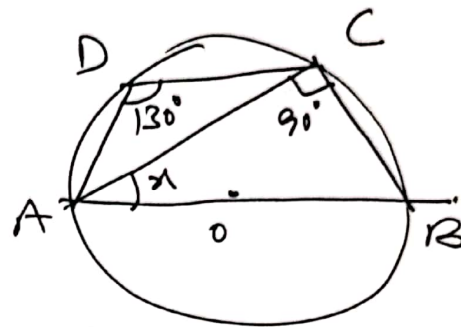
(ii) ABCD is a cyclic quadrilateral

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

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

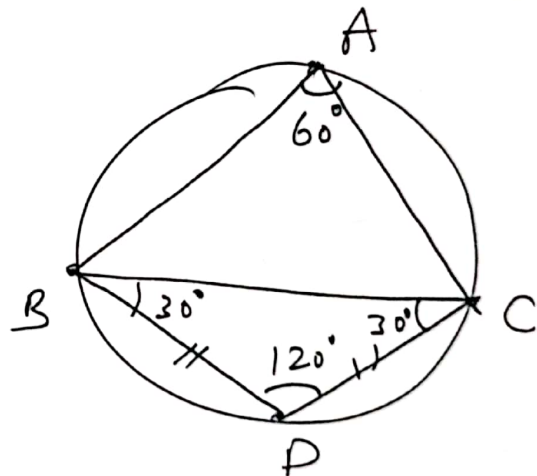
$\Rightarrow \angle B = 50^\circ$

$\therefore \angle x = 40^\circ$



(iii)

$\angle BAC = 60^\circ$

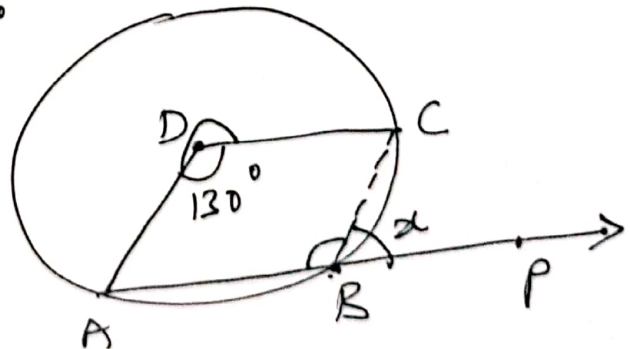


(iv) $\text{ext } \angle ADC = 360^\circ - 130^\circ$
 $= 230^\circ$

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

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

$\therefore x = 65^\circ$

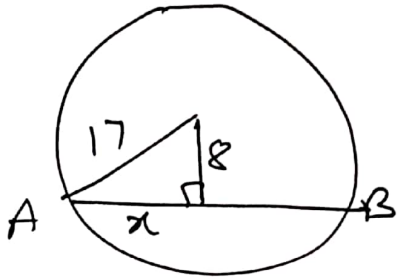
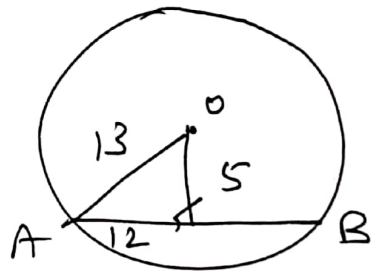


Ans: 5, 8, P, 9

LEARNERS TASK

9

Ques's

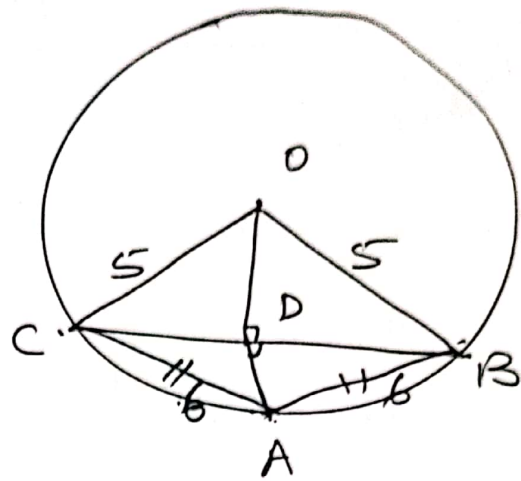
01.	Conceptual	Ans: B
02.	Conceptual	Ans: B
03.	Conceptual	Ans: B
04.	Conceptual	Ans: B
05.	Conceptual	Ans: A
06.	$\begin{aligned}x^2 + 8^2 &= 17^2 \\x^2 &= 17^2 - 8^2 \\x^2 &= 25 \times 9 \\x &= 5 \times 3 \\x &= 15 \\ \therefore AB &= 2x = 30\text{cm}\end{aligned}$	 Ans: A
07.	$AB = 24\text{cm}$	 Ans: A
08.	Conceptual	Ans: C
09.	Conceptual	Ans: B
10.	Radius = $3\sqrt{3}\text{cm}$	Ans: C

JEEMAINS LEVEL

01.

01.

(10)



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 $AB = AC$

$\Rightarrow OA \perp BC$

$\Rightarrow OE \perp BC$

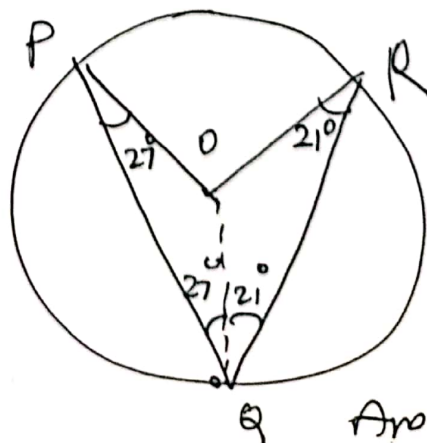
clearly $\angle OEA = 180^\circ - (90^\circ + 20^\circ)$
 $= 70^\circ$

Ans: D

04

$\therefore \angle POR = 27^\circ + 21^\circ$
 $= 48^\circ$

$\therefore \angle POR = 2 \times 48^\circ$
 $= 96^\circ$



Ans: B

05. from figure $OA = OC$

(11)

$$\angle A = \angle C$$

$$\text{clearly } x = 70^\circ$$

Ans: C

06. from figure

$$\angle PRS = \angle PQS = 60^\circ$$

$$\therefore \angle SPR = 60^\circ$$

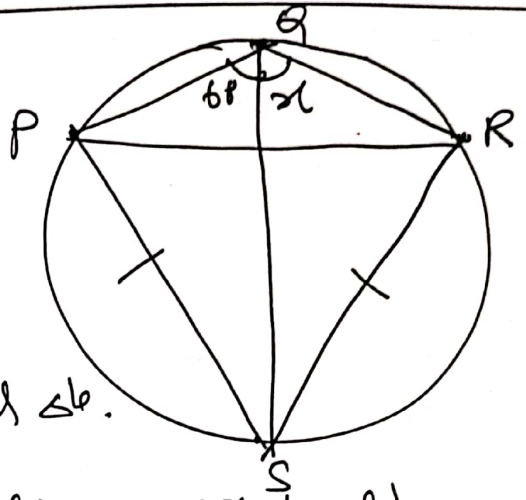
$\therefore \triangle PRS$ is an equilateral $\triangle$.

$$\therefore \angle S + \angle Q = 180^\circ \quad (\text{cyclic quadrilateral})$$

$$60^\circ + (60^\circ + x) = 180^\circ$$

$$\Rightarrow x = 60^\circ$$

Ans: B



07. $\angle x - \angle y = 58^\circ$ let $\angle x > \angle y$

$$\angle x + \angle y = 180^\circ$$

$$2\angle x = 238$$

$$\therefore \angle x = 119$$

$$\Rightarrow \angle y = 61^\circ$$

Ans: D

08. from figure $\angle a = 2x$

$$\angle b = \frac{360^\circ - a}{2}$$

$$= \frac{360^\circ - 2x}{2}$$

$$\therefore \angle b = 180^\circ - x$$

$$a : b = 2 : 5$$

$$2x : 180^\circ - x = 2 : 5$$

$$\frac{2x}{180-x} = \frac{2}{5}$$

$$\Rightarrow 5x = 180 - x$$

$$\Rightarrow 6x = 180^\circ$$

$$\Rightarrow x = 30^\circ$$

Ans. C

09. Conceptual

Ans. B

10. Conceptual

Ans. A

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

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

$$\text{clearly } x + 25^\circ + y = 180^\circ$$

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

$$\Rightarrow y = 65^\circ$$

Ans. A, D

12. We have

$$\angle B + \angle C = 90^\circ$$

$$\text{Given } \Rightarrow 10x + 17 + 15y - 7 = 90^\circ$$

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

$$\Rightarrow 2x + 3y = 16$$

clearly $x = 5, y = 2$ satisfies this equation

Ans. A, D



13. Statement I: —

(13)

Statement II: Conceptual (True)

Ans: —

14. Statement I: —

Statement II: Conceptual (True)

Ans: —

15. $z = 2Lx$

Ans: C

16. $\angle BAC = x$
 $= \frac{1}{2} \angle Z$, b
 $\angle OBC = y$
 $=$

from figure

$$x + y + z = 180^\circ$$

$$z + 2y = 180^\circ$$

$$2Lx + 2Ly = 180^\circ$$

$$x + y = 90^\circ$$

$$\angle BAC + \angle OBC = 90^\circ$$

Ans: D

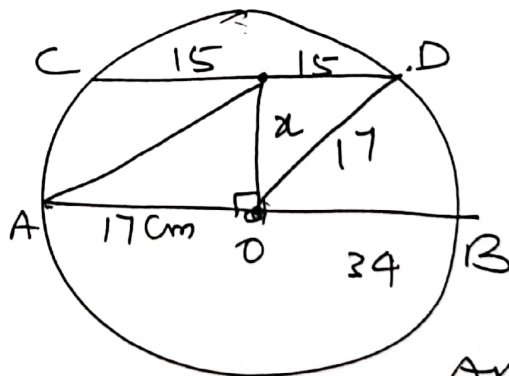
17. Conceptual

Ans: B

18. Conceptual

Ans: A

19. In the figure
 $x^2 + 15^2 = 17^2$
 $\therefore x = 8 \text{ cm}$



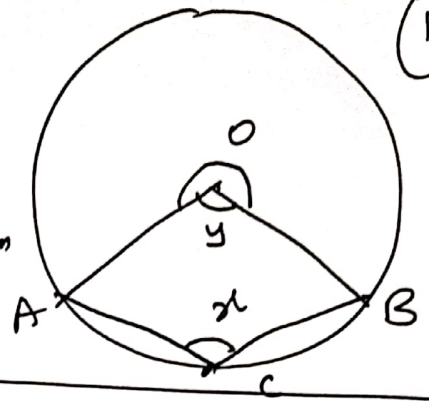
Ans: 8

20. from figure
 $\angle ADC = 100^\circ$
 $\therefore \angle ABC = 80^\circ$
 $\therefore \frac{x^\circ}{50} = 2$
 $x^\circ = 100^\circ$

Ans: 2

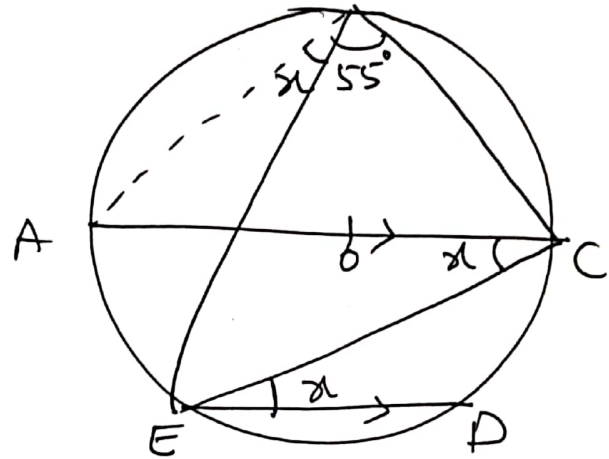
2) (i) Ext $\angle AOB = 360^\circ - y$
 We have $360^\circ - y = 2x$
 $\Rightarrow y + 2x = 360^\circ$
 $\Rightarrow x + 2x = 360^\circ$
 $\therefore x = 120^\circ$

In parallelogram
 $\angle x = 114$

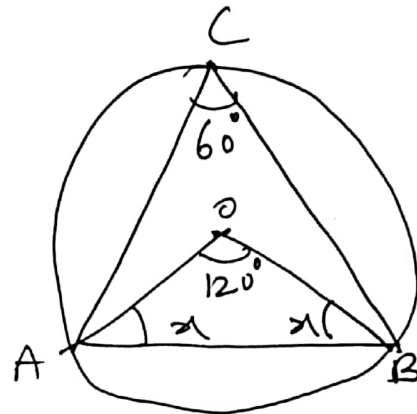


(ii)

$x + 55^\circ = 90^\circ$
 $\therefore x = 35^\circ$



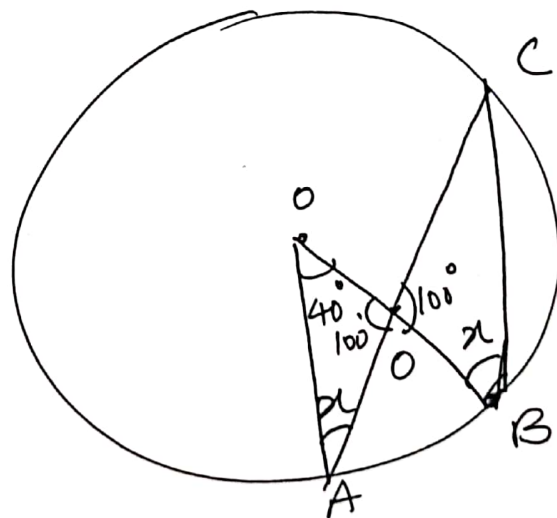
(iii) : $\angle AOB = 30^\circ$



(iv)

from figure

$40^\circ + 100^\circ + x^\circ = 180^\circ$
 $\therefore x^\circ = 40^\circ$



Ans: —, 9, 8, —

22

a) Sum of the interior angles of a

(15)

$$\text{Septagon} = (n-2) \times 180^\circ$$

$$= (7-2) \times 180^\circ$$

$$= 900^\circ$$

$$\text{Each angle} = \frac{900^\circ}{7}$$

$$\text{from figure} = x^\circ = \frac{1}{2} \left(\frac{900^\circ}{7} \right) = \frac{900^\circ}{14}$$

$$= 128 \frac{4}{7}$$

$$\text{b) Ext } \angle AOC = 360^\circ - 130^\circ$$

$$= 230^\circ$$

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

c) from figure

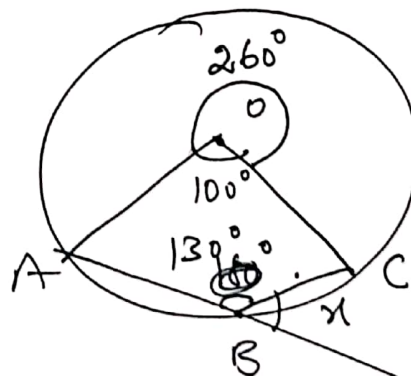
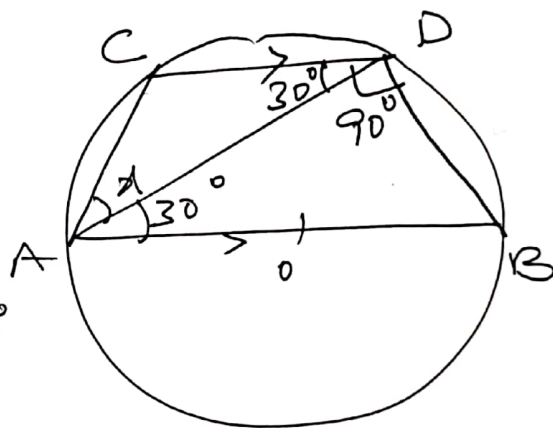
$$\angle A + \angle D = 180^\circ$$

$$(\angle x + 30^\circ) + (30^\circ + 90^\circ) = 180^\circ$$

$$\therefore \angle x = 30^\circ$$

$$\text{d(iv)} : 130^\circ + x^\circ = 180^\circ$$

$$\therefore x = 50^\circ$$



$\Rightarrow$ THE END $\Leftarrow$

Ans: q, p, s, t