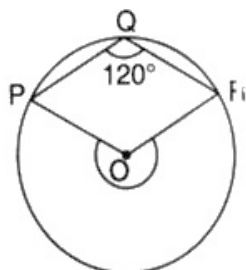


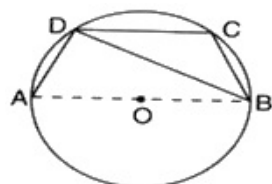
CBSE Test Paper 01

CH-10 Circles

1. What fraction of the whole circle is minor arc RP in the given figure?

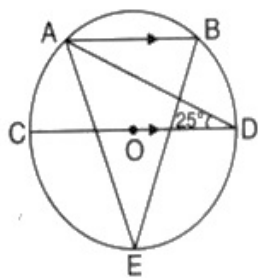


- a. $\frac{1}{4}$ of the circle
b. $\frac{1}{5}$ of the circle
c. $\frac{1}{3}$ of the circle
d. $\frac{1}{2}$ of the circle
2. Circle having same centre are said to be
- a. secant
b. chord
c. Concentric
d. circle
3. In the given figure, if $\angle ADC = 118^\circ$, then the measure of $\angle BDC$ is



- a. 32°
b. 38°
c. 28°
d. 22°
4. If a chord of a circle is equal to its radius, then the angle subtended by this chord in major segment is
- a. 30°
b. 90°
c. 45°
d. 60°

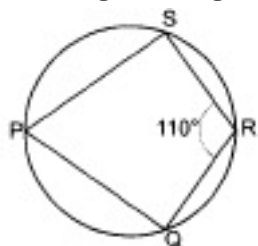
5. In the given figure, $AB \parallel CD$ and O is the centre of the circle. If $\angle ADC = 25^\circ$, then the measure of $\angle AEB$ is



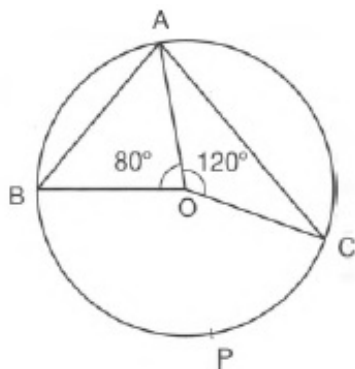
- 40°
 - 80°
 - 25°
 - 80°
6. Fill in the blanks:

The region between an arc and the two radii, joining the centre to the ends of the arc is called _____.

7. In the given figure, PQRS is a cyclic quadrilateral. If $\angle QRS = 110^\circ$, then find $\angle SPQ$.

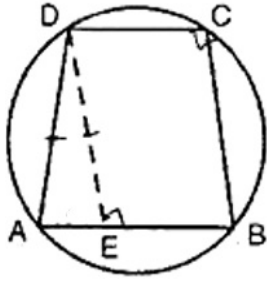


8. In the figure, A, B, C are three points on a circle such that the angles subtended by the chords AB and AC at the centre O are 80° and 120° respectively. Determine $\angle BAC$ and the degree measure of arc BPC.

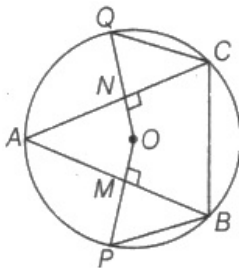


9. $AB = DC$ and diagonal AC and BD intersect at P in cyclic quadrilateral. Prove that $\triangle PAB \cong \triangle PDC$

10. If the non-parallel sides of a trapezium are equal, prove that it is cyclic.



11. Prove that the centre of the circle through A, B, C, D is the Point intersection of its diagonals.
12. A chord of a circle is equal to the radius of the circle. Find the angle subtended by the chord at a point on the minor arc and also at a point on the major arc.
13. In the given, $\triangle ABC$ is equilateral. Find $\angle BDC$ and $\angle BEC$
14. Two circles with centre O and O' intersect at two points A and B. A line PQ is drawn parallel to OO' through B intersecting the circles at P and Q. Prove that $PQ = 2OO'$.
15. In the adjoining figure, O is the centre of a circle. If AB and AC are chords of the circle such that $AB = AC$, $OP \perp AB$ and $OQ \perp AC$, then prove that $PB = QC$.



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Solution

1. (c) $\frac{1}{3}$ of the circle

Explanation: Complete the cyclic quadrilateral PQRS, with S being a point on a point on the major arc. Then $\angle S = 60^\circ$ (Opposite angles of a cyclic quadrilateral)

Then $Major\angle POR = 120^\circ$

Thus fraction the minor arc $= \frac{120^\circ}{360^\circ} = \frac{1}{3}$

2. (c) Concentric

Explanation: Concentric circles are those circle that are drawn with same point as centre but different radii.

3. (c) 28°

Explanation:

$$\angle ADB + \angle BDC = 118^\circ$$

$$90^\circ + \angle BDC = 118^\circ \Rightarrow \angle BDC = 28^\circ$$

4. (a) 30°

Explanation:

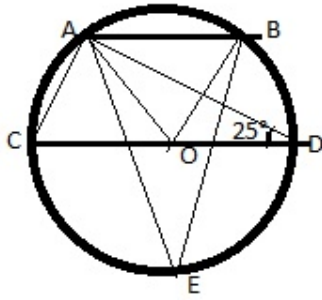
Since the chord is equal to the radius therefore, it will form an equilateral triangle inside the circle with the third vertex being the centre of the circle.

So the chord will make an angle of 60° at the centre. As the angle made by the chord at any other point of the circumference would be half.

So, we have that angle made at the major segment would be 30° .

5. (a) 40°

Explanation:



Here, $AB \parallel CD$ and $\angle ADC = 25^\circ$,

So, $\angle DAB = 25^\circ$, (opposite interior angles are equal)

Now, $\angle ADC = 25^\circ$, so, $\angle AOC = 50^\circ$ (Angle subtended by arc AC at centre is twice the angle subtended at circumference)

Similarly, $\angle DAB = 25^\circ$, So, $\angle DOB = 50^\circ$ (Angle subtended by arc BD at centre is twice the angle subtended at circumference)

$\angle AOB + \angle DOB + \angle AOC = 180^\circ$ (All lie in straight line)

$$\angle AOB = 180 - 50 - 50 = 80^\circ$$

Now, $\angle AEB = 40^\circ$ (Angle subtended by arc AB at centre is twice the angle subtended at circumference)

6. sector

7. $\angle QRS + \angle SPQ = 180^\circ$ (opposite angles of cyclic quadrilateral)

$$110^\circ + \angle SPQ = 180^\circ$$

$$\Rightarrow \angle SPQ = 180^\circ - 110^\circ = 70^\circ$$

8. Since arc BPC makes $\angle BOC$ at the centre and $\angle BAC$ at a point on the remaining part of the circle.

$$\therefore \angle BAC = \frac{1}{2} \angle BOC$$

$$\text{Now, } \angle BOC = 360^\circ - (120^\circ + 80^\circ) = 160^\circ$$

$$\therefore \angle BAC = \frac{1}{2} (\angle BOC)$$

$$\Rightarrow \angle BAC = \frac{1}{2} \times 160^\circ = 80^\circ$$

9. Proof:

In $\triangle PAB$ and $\triangle PDC$

$AB = DC$ (given)

$\angle ABP = \angle DCP$ [Angle in the same segment]

$\angle PAB = \angle PDC$ [Angle in the same segment]

$\triangle PAB \cong \triangle PDC$ [ASA criterion]

Therefore, triangle PAB is congruent to triangle PDC.

10. Given: A trapezium ABCD in which $AB \parallel CD$ and $AD = BC$.

To prove: The points A, B, C, D are concyclic.

Construction: Draw $DE \parallel CB$.

Proof: Since $DE \parallel CB$ and $EB \parallel DC$.

$\therefore$ EBCD is a parallelogram.

$\therefore DE = CB$ and $\angle DEB = \angle DCB$

Now $AD = BC$ and $DA = DE$

$\Rightarrow \angle DAE = \angle DEB$

But $\angle DEA + \angle DEB = 180^\circ$

$\Rightarrow \angle DAE + \angle DCB = 180^\circ$ [$\because \angle DEA = \angle DAE$ and $\angle DEB = \angle DCB$]

$\Rightarrow \angle DAB + \angle DCB = 180^\circ$

$\Rightarrow \angle A + \angle C = 180^\circ$

And angle sum property of quadrilateral, we get $\angle B + \angle D = 180^\circ$

Hence, ABCD is a cyclic trapezium.

11. Given: A cyclic rectangle ABCD in which diagonals AC and BD intersect at Point O

To Prove: O is the centre of the circle

Proof: ABCD is a rectangle

$AC = BD$

Now as the diagonals AC and BD are intersecting at O.

BD is the diameter of the circle (if angle made by the chord at the circle is right angle then the chord is the diameter)

$AO = OC$, $OB = OD$ (diagonals of a rectangle bisect each other and are equal)

$AO = OC = OB = OD$

BD is the diameter, therefore BO and OD are radius.

Thus, O is the centre of the circle.

Hence, centre of the circle circumscribing the cyclic rectangle ABCD is the point of

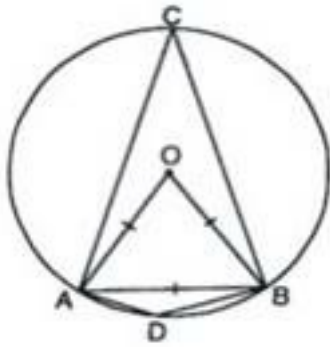
intersection of its diagonals.

A, B, C, D lie on the same circle

12. $OA = OB = AB$ | Given

$\therefore \triangle OAB$ is equilateral

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



$$\angle ACB = \frac{1}{2} \angle AOB$$

[The angle subtended by an arc at the centre is double the angle subtended by it at any point on the remaining part of the circle]

$$= \frac{1}{2} \times 60^\circ = 30^\circ$$

Now, $\therefore ADBC$ is a cyclic quadrilateral.

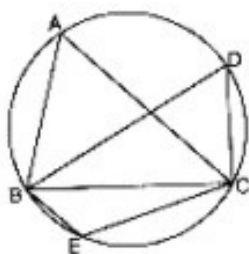
$\therefore \angle ADB + \angle ACB$ [The sum of either pair of opposite angles of a cyclic quadrilateral is 180°]

$$\Rightarrow \angle ADB + 30^\circ = 180^\circ$$

$$\Rightarrow \angle ADB = 180^\circ - 30^\circ$$

$$\Rightarrow \angle ADB = 150^\circ$$

13. Given: An equilateral triangle ABC.



Required: To find $\angle BDC$ and $\angle BEC$

Determination: $\therefore \triangle ABC$ is equilateral.

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

Now, $\angle BDC = \angle BAC$ [Angles in the same segment]

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

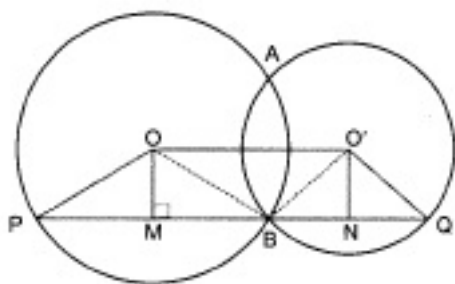
Again BECD is a cyclic quadrilateral

$$\therefore \angle BEC + \angle BDC = 180^\circ$$

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

$$= 180^\circ - 60^\circ = 120^\circ$$

14. **Construction:** Draw two circles having centres O and O' intersecting at points A and B. Draw a parallel line PQ to OO' Join OO', OP, O'Q, OM and O'N



To Prove: $PQ = 2OO'$

Proof: In $\triangle OPB$,

$$BM = MP \dots\dots\dots(i)$$

($\perp$ from the centre to the circle bisects the chord)

Similarly, in $\triangle O'BQ$,

$$BN = NQ \dots\dots\dots(ii)$$

($\perp$ from the centre to the circle bisects the chord)

Adding (i) and (ii),

$$BM + BN = PM + NQ$$

Adding $BM + BN$ to both the sides

$$BM + BN + BM + BN = BM + PM + NQ + BN$$

$$2BM + 2BN = PQ$$

$$2(BM + BN) = PQ \dots\dots\dots(iii)$$

Again,

$$OO' = MN \text{ [As } OO'NM \text{ is a rectangle]} \dots\dots\dots(iv)$$

$$\Rightarrow 2OO' = PQ$$

Henced proved.

15. **Given :-** AB and AC are two equal chords of circle with centre O. Also, $OP \perp AB$ at M and $OQ \perp AC$ at N.

To Prove :- $PB = QC$

Proof :- We know that, the perpendicular from the centre of a circle to a chord bisects the chord.

$$\therefore AM = MB = \frac{1}{2} AB [\because OP \perp AB]$$

$$\text{and } AN = NC = \frac{1}{2} AC [\because OQ \perp AC]$$

Since, it is given that $AB = AC$,

$$\therefore \frac{1}{2} AB = \frac{1}{2} AC$$

$$\Rightarrow AM = MB = AN = NC \dots(i) \text{ [from the above derived results]}$$

Now, in $\triangle PMB$ and $\triangle QNC$, we have

$$MB = NC \text{ [from Equation (i)]}$$

$$\angle PMB = \angle QNC \text{ [each } 90^\circ]$$

$$OM = ON \dots(ii)$$

$[\because \text{equal chords of a circle are equidistant from the centre}]$

$$OP = OQ \text{ [radii of same circle] } \dots(iii)$$

$$\Rightarrow OP - OM = OQ - ON \text{ [on subtracting Equation (ii) from Equation (iii)]}$$

$$\Rightarrow PM = QN$$

$\therefore$ By SAS congruence rule, we can write that, $\triangle PMB \cong \triangle QNC$

$$\Rightarrow PB = QC \text{ [as corresponding parts of the congruent triangles are equal]}$$

Hence Proved.