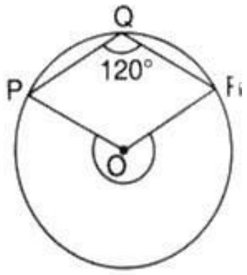
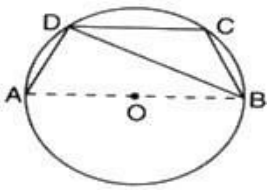
CBSE Test Paper 01

CH-10 Circles

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

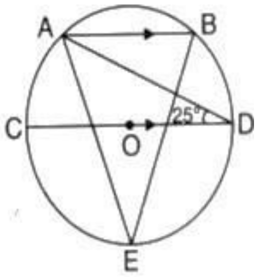


   a. $\frac{1}{4}$ of the circle
   b. $\frac{1}{5}$ of the circle
   c. $\frac{1}{3}$ of the circle
   d. $\frac{1}{2}$ of the circle
2. Circle having same centre are said to be
   a. secant
   b. chord
   c. Concentric
   d. circle
3. In the given figure, if $\angle ADC = 118^o$, then the measure of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



   a. 32^o
   b. 38^o
   c. 28^o
   d. 22^o
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^o
   b. 90^o
   c. 45^o
   d. 60^o

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

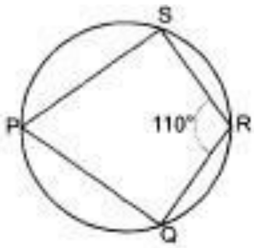


a. 40^o
b. 80^o
c. 25^o
d. 80^o

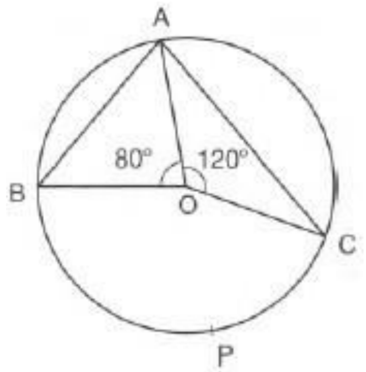
6. Fill in the blanks:

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 ∠QRS = 110°, then find ∠SPQ.

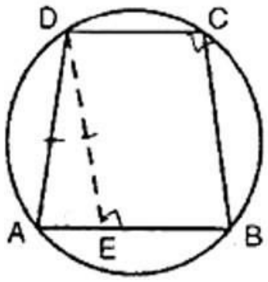


8. In the figure, A, B, C are three points on a circle such that the angles subtended by the chords AB and AC at the centre O are 80° and 120° respectively. Determine ∠BAC and the degree measure of arc BPC.



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

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



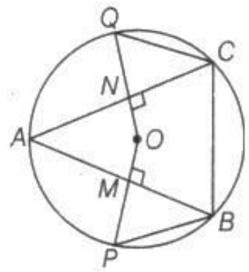
11. Prove that the centre of the circle through A, B, C, D is the Point intersection of its diagonals.

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 $\angle S = 60^0$ (Opposite angles of a cyclic quadrilateral)

   Then $Major \angle POR = 120^0$
   Thus fraction the minor arc $= \frac{120^0}{360^0} = \frac{1}{3}$

2. (c) Concentric

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

3. (c) 28^o

   Explanation:

   $\angle ADB + \angle BDC = 118^0$
   $90^0 + \angle BDC = 118^0 \Rightarrow \angle BDC = 28^0$

4. (a) 30^o

   Explanation:

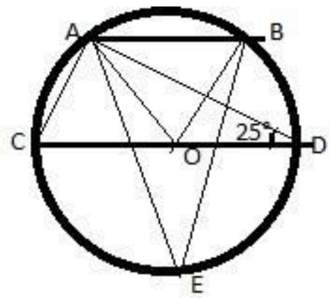
   Since the chord is equal to the radius therefore, it will form an equilateral triangle inside the circlewith the third vertex being the centre of the circle.

   So the chord will make an angle of 60^0 at the centre. As the angle made by the chord at any other point of the circumfrence would be half.

   So, we have that angle made at the major segment would be 30^0.

5. (a) 40^o

   Explanation:



Here, AB || CD and $\angle ADC = 25^o$,

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

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

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

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

$\angle AOB$ = 180 - 50 - 50 = 80°

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

6. sector

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

   110° + $\angle$SPQ = 180°

   $\Rightarrow \angle$SPQ = 180° - 110° = 70°

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

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

   Now, $\angle$BOC = 360° - (120° + 80°) = 160°

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

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

9. Proof:

   In ΔPAB and Δ PDC

   AB = DC (given)

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

$\angle PAB = \angle PDC$ [Angle in the same segment]
$\Delta PAB \cong \Delta PDC$ [ASA criterion]

Therfore,traingle PAB is congruent to traingle 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°
$\Rightarrow \angle$DAE + $\angle$DCB = 180°[$\because \angle$ DEA = $\angle$DAE and $\angle$DEB = $\angle$DCB]
$\Rightarrow \angle$DAB + $\angle$DCB = 180°
$\Rightarrow \angle$A + $\angle$C = 180°
And angle sum property of quadrilateral, we get $\angle$ B + $\angle$ D = 180°
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.

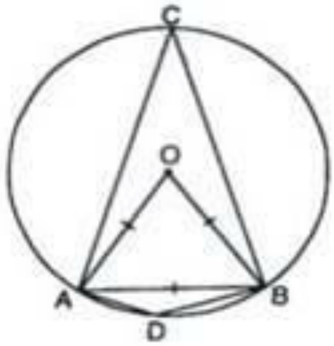
Hence,centre of the circle circumscribing the cyclic rectangle ABCD is the point of intersection of its diagonals.

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

12. OA = OB = AB |Given

$\therefore \triangle OAB$ is equilateral

$\therefore \angle AOB = 60^{o}$



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

[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]

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

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

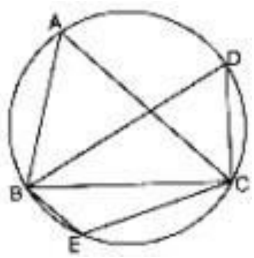
$\therefore \angle ADB + \angle ACB$ [The sum of either pair of opposite angles of a cyclic quadrilateral is 180^{o}]

$\Rightarrow \angle ADB + 30^{o} = 180^{o}$

$\Rightarrow \angle ADB = 180^{o} - 30^{o}$

$\Rightarrow \angle ADB = 150^{o}$

13. Given: An equilateral triangle ABC.



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

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

$\therefore \angle BAC = 60^{o}$

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

$\therefore \angle BDC = 60^o$

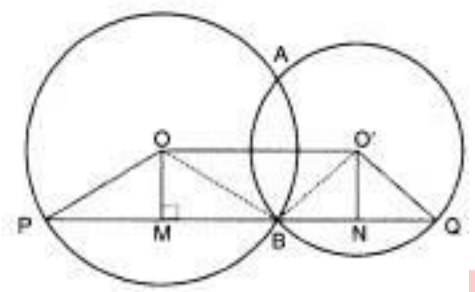
Again BECD is a cyclic quadrilateral

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

$\therefore \angle BEC = 180^o$

$= 180^o - 60^o = 120^o$

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 $\angle$OPB,

BM = MP .... (i)

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

Similarly, in $\triangle$ O'BQ,

BN = NQ .... (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 .... (iii)

Again,

OO' = MN [As OO' NM is a rectangle] .... (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]

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.... (i) [from the above derived results]

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

MB = NC [from Equation (i)]

$\angle$PMB = $\angle$QNC [each 90^o]

OM = ON ... (ii)

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

OP = OQ [radii of same circle]....(iii)

$\Rightarrow$ OP - OM = OQ - ON [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 [as corresponding parts of the congruent triangles are equal]

Hence Proved.