CBSE Test Paper 05

CH-10 Circles

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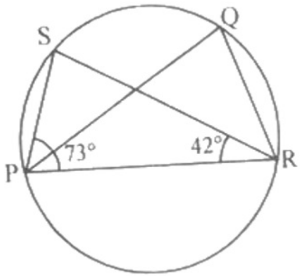
1. In the figure, if $\angle$SPR = 73°, $\angle$SRP = 42° then $\angle$PQR is equal to :



   a. 74°

   b. 76°

   c. 70°

   d. 65°

2. Greatest chord of a circle is called its

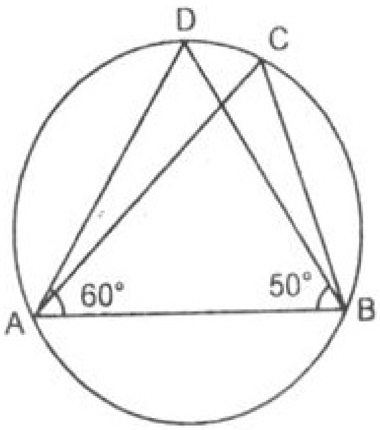
   a. chord

   b. diameter

   c. secant

   d. radius

3. In the figure, if $\angle DAB = 60^o$, $\angle ABD = 50^o$, then $\angle ACB$ is equal to :



a. 80^o

b. 60^o

c. 50^o

d. 70^o

4. The sum of either pair of opposite angle of cyclic quadrilateral is

a. 270°

b. 360°

c. 90°

d. 180°

5. Two point on a circle makes the

a. diameters

b. Diameter

c. chord

d. secant

6. Fill in the blanks:

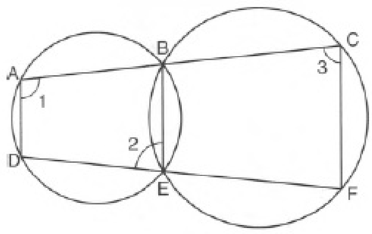
A line segment joining two points on the circumference of the circle is called a ________.

7. Fill in the blanks:

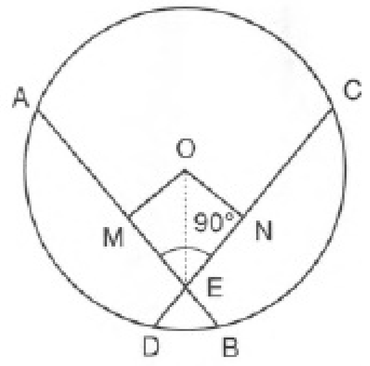
A point whose distance from the centre of a circle is less than its radius, lies on________ of the circle

8. Two circles intersect in A and B and AC and AD are respectively the diameters of the circles. Prove that C, B, D are collinear.

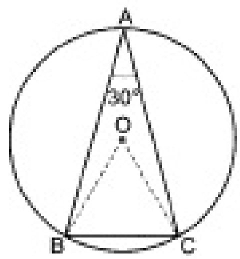
9. In the figure, A, B, C, and D, E, F are two sets of collinear points. Prove that AD II CF.



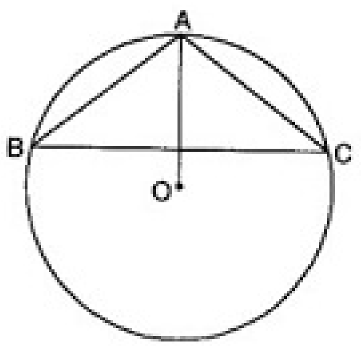
10. In the figure, equal chords AB and CD of a circle with centre O, cut at right angles at E. If M and N are the mid-points of AB and CD respectively, prove that OMEN is a square.



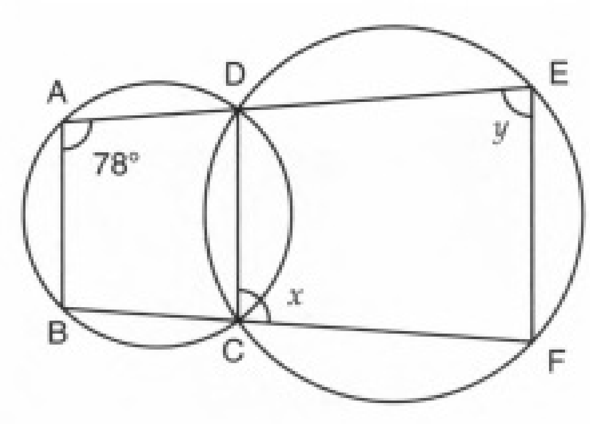
11. In given figure, ∠BAC = 30. Show that BC is equal to the radius of the circumcircle of △ABC whose centre is O.



12. In figure $\overline{AB} \cong \overline{AC}$ and O is the centre of the circle. Prove that OA is the perpendicular bisector of BC.



13. In Fig., ∠BAD = 78°, ∠DCF = x° and ∠DEF = y°. Find the values of x and y.



14. AB and CD are two parallel chords of a circle whose diameter is AC. Prove that AB = CD.

15. AC and BD are chords of a circle which bisect each other. Prove that

    i. AC and BD are diameters,
    ii. ABCD is a rectangle.

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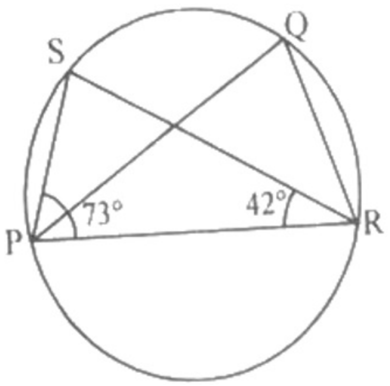
Solution

1. (d) 65°

   Explanation:

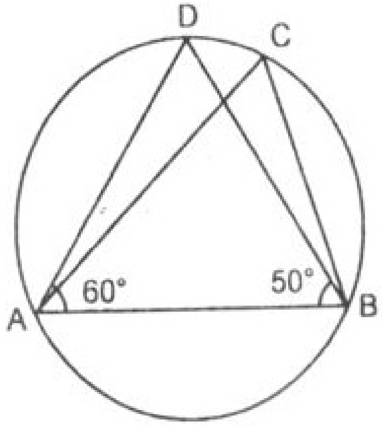
   $\angle$PQR = $\angle$PSR = 180° - 73° - 42° = 65°

2. (b) diameter

   Explanation: Since diameter is the longest segment that can be drawn in a circle(touching the circle at both ends), therefore it is the longest possible chord also.

3. (d) 70^o

   Explanation:

   In, $\triangle$ABD

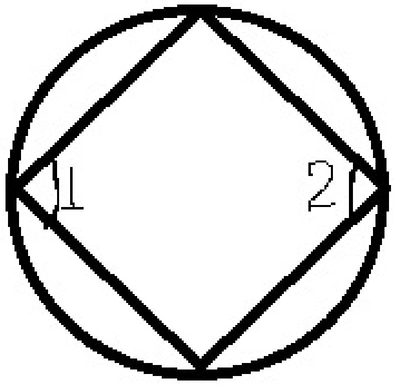
   $\angle D = 180^o - \angle A - \angle B$

   $= 180^o - 110^o = 70^o$

Since angles made by same chord at any point of circumference are equal so,
$\angle ACB = \angle ADB = 70^0$

4. (d) 180°

   Explanation:



   As per theorem,
   The sum of either pair of opposite angles of a cyclic quadrilateral is 180° .
   Here, $\angle 1 + \angle 2 = 180^\circ$

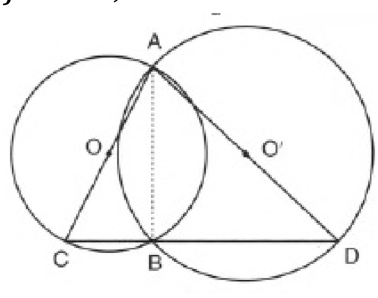
5. (c) chord

   Explanation: A chord is the line joining any two points on the circle.

6. chord

7. interior

8. Join CB, BD and AB. Since the angle in a semi-circle is a right angle.



   Therefore, AC is a diameter of the circle with the centre at O.
   $\therefore \angle ABC = 90^0$
   Also, AD is a diameter of the circle with centre at O'
   $\therefore \angle ABD = 90^0$
   Adding (i) and (ii), we get

$\angle ABC + \angle ABD = 90° + 90°$

$\Rightarrow \angle ABC + \angle ABD = 180°$

$\Rightarrow$ CBD is a straight line.

Hence, C, B, D are collinear.

9. In order to prove that AD || CF, it is sufficient to prove that

$\angle 1 + \angle 3 = 180°$

Since ABED is a cyclic quadrilateral

$\therefore \angle 1 + \angle 2 = 180°$ ....(i)

Now, BCFE is a cyclic quadrilateral and in a cyclic quadrilateral, an exterior angle is equal to the opposite interior angle.

$\therefore \angle 2 = \angle 3$ ....(ii)

From (i) and (ii), we get

$\angle 1 + \angle 3 = 180°$

Hence, AD || CF

10. Since M and N are the mid-points of AB and CD respectively

$\therefore \angle OMB = \angle OND = 90^{o}$

$\Rightarrow \angle OME = \angle ONE = 90^{o}$

Since equal chords of a circle are equidistant from the centre.

$\therefore$ OM = ON

Thus, in $\triangle OME$ and $\triangle ONE$, we have

OM = ON

$\angle OME = \angle ONE$ [Each equal to 90°]

and, OE = OE [Common]

$\therefore \triangle OME \cong \triangle ONE$

$\Rightarrow$ ME = NE

Thus, in quadrilateral OMEN, we have

OM = ON, ME = NE and $\angle OME = \angle ONE = 90°$

Hence, it is a square.

11. From the given figure, we have

$\angle BOC = 2\angle BAC$ [because angle subtended by chord at center = 2 (angle subtended by it on the circumference)]

$\angle$BOC = 2 $\times$ 30° = 60°

Also, OC = OB   (Radii of the same circle)

$\therefore \angle$OCB = $\angle$OBC

In $\triangle$OBC, we have

$\angle$OBC + $\angle$OCB + $\angle$BOC = 180°

$\angle$OBC + $\angle$OBC + 60° = 180°

$\Rightarrow$ 2 $\angle$OBC = 120° $\Rightarrow$ $\angle$OBC = 60°

So, $\angle$OBC = $\angle$OCB = $\angle$BOC = 60°

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

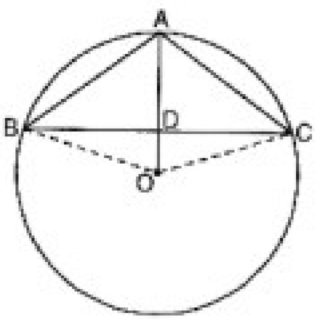
$\therefore$ OB = BC = OC

Hence, BC is equal to the radius of the circumcircle.

12. Given: In figure, $\overline{AB} \cong \overline{AC}$ and O is the centre of the circle.

To prove: OA is the perpendicular bisector of BC.

Construction : Join OB and OC.



Proof : $\because$ $\overline{AB} \cong \overline{AC}$ |Given

$\therefore$ chord AB = chord AC |$\because$ If two arcs of a circle are congruent, then their corresponding chords are equal

$\therefore \angle AOB = \angle AOC$ ..... (1) |$\because$ Equal chords of a circle subtend equal angles at the centre

In $\triangle OBD$ and $\triangle OCD$

$\angle DOB = \angle DOC$ |From (1)

OB = OC |Radii of the same circle

OD = OD |Common

$\therefore \triangle OBD \cong \triangle OCD$ |SAS

$\therefore \angle ODB = \angle ODC$ .... (2) |c.p.c.t

and BD = CD .... (3) |c.p.c.t

But $\angle BDC = 180^\circ$ | $\because$ BC is a line

$\therefore \angle ODB + \angle ODC = 180^\circ$

$\Rightarrow \angle ODB + \angle ODB = 180^\circ$

$\Rightarrow 2\angle ODB = 180^\circ$ |From (2)

$\Rightarrow \angle ODB = 90^\circ$

$\therefore$ From (2),

$\angle ODB = \angle ODC = 90^\circ$....... (4)

In view of (3) and (4), OA is the perpendicular bisector of BC.

13. We have, $\angle$BAD = 78^o, $\angle$DCF = x^o, and $\angle$DEF = y^o

    Since, ABCD is a cyclic quadrilateral.

    Then, $\angle$BAD + $\angle$BCD = 180^o

    $\Rightarrow$ 78^o + $\angle$BCD = 180^o

    $\Rightarrow$BCD = 180^o - 78^o = 102^o

    Now, $\angle$BCD + $\angle$DCF = 180^o [Linear pair of angles]

    $\Rightarrow$ 102^o + x^o = 180^o

    $\Rightarrow$ x = 180^o - 102^o = 78^o

    Since, DCFE is a cyclic quadrilateral

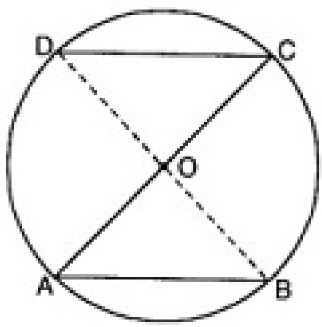
    Then, x + y = 180^o

    $\Rightarrow$ 78^o + y = 180^o

    $\Rightarrow$ y = 180^o - 78^o = 102^o

14. Given: AB and CD are two parallel chords of a circle whose diameter is AC.

    To prove: AB = CD



Construction: Join BD

Proof: In $\triangle$OAB and $\triangle$ OCD

OA = OC [Radii of the same circle]

OB = OD [Radii of the same circle]

$\angle$AOB = $\angle$COD [Vert. opp. angles]

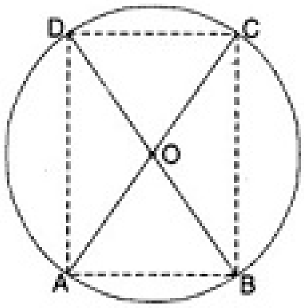
$\therefore$ $\triangle$OAB $\cong$ $\triangle$OAB [SAS]

AB = CD [c.p.c.t]

15. AC and BD are chords of a circle that bisect each other.

To prove :

Construction: Join AB, BC, CD and DA.



Proof :

i. AC and BD are diameters
ii. ABCD is a rectangle
iii. $\because$ $\angle$A = 90^{o} [$\because$ Angle in a semi-circle is 90^{o}]

$\therefore$BD is a diameter

$\because$ $\angle$D = 90^{o}

AC is a diameter [$\because$ Angle in a semi-circle is 90^{o}]

Thus AC and BD are diameters
iv. Let the chords AC and BD intersect each other at O. Join AB, BC, CD and DA.

In $\triangle$OAB and $\triangle$OCD

OA = OC [Given]

OB = OD [Given]

$\angle$AOB = $\angle$COD [Vert. opp. $\angle$s]

$\therefore$ $\triangle$OAB $\cong$ $\triangle$OCD [SAS]

$\therefore$ AB = CD [c.p.c.t]

$\Rightarrow$ AB $\cong$ CD --- (1)

Similarly, we can show that

$\overline{AD} \cong \overline{CB}$ --- (2)

Adding (1) and (2), we get

$\overline{AB} + \overline{AD} \cong \overline{CD} + \overline{CB}$

$\Rightarrow \overline{BAD} \cong \overline{BCD}$

$\Rightarrow$ BD divides the circle into two equal parts (each a semi-circle) and the angle of a semi-circle is 90^o.

$\therefore \angle A = 90^o$ and $\angle C = 90^o$

Similarly, we can show that

$\angle B = 90^o$ and $\angle D = 90^o$

$\therefore \angle A = \angle B = \angle C = \angle D = 90^o$

$\Rightarrow$ ABCD is a rectangle.