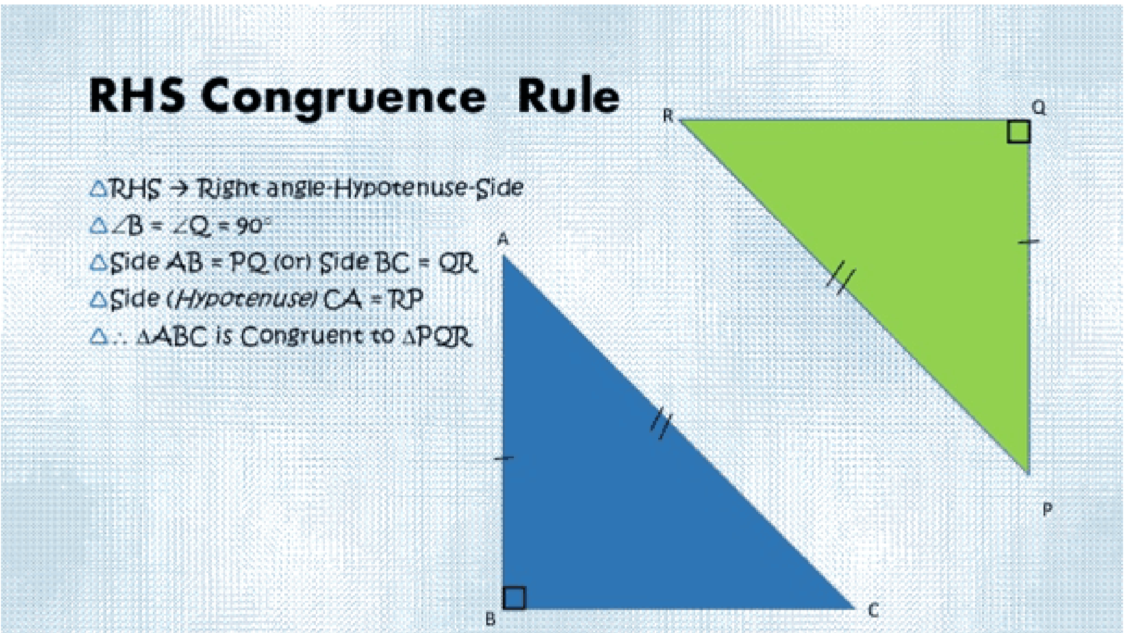
NCERT Class 9 Solutions: Circles (Chapter 10) Exercise 10.4 – Part 1



Q-1 Two circles of radii $5cm$ and $3cm$ intersect at two points and the distance between their centres is $4cm$. Find the length of the common chord.

Solution:

Given, two circles with radius $5cm$ and $3cm$.

- $OA = 5cm$, $AC = 3cm$ and $OC = 4cm$.
- Also , $AB = 2AD$ (as we proved above)
- Let DC be .

In ΔAOD ,

- $OA^2 = OD^2 + AD^2$
- $OA^2 = (OC - DC)^2 + AD^2$ $(\because OC = OD + DC)$
- $5^2 = (4 - x)^2 + AD^2$
- $25 = 16 - 8x + x^2 + AD^2$
- $AD^2 = 9 + 8x - x^2$ ... equation (1)

In ΔADC ,

- $AC^2 = AD^2 + DC^2$
- $3^2 = AD^2 + x^2$
- $AD^2 = 9 - x^2$ ... equation (2)

Equating (1) and (2) ,

- $AD^2 = AD^2$
- $\Rightarrow 9 + 8x - x^2 = 9 - x2$
- $\Rightarrow 8x = 0$
- $\Rightarrow x = 0$

Putting the value of in (1) we get,

- $AD^2 = 9 - 0^2$
- $AD^2 = 9$
- $AD = 3cm$

Therefore, length of the chord $AB = 2AD = 2 \times 3 = 6cm$

Q-2 If two equal chords of a circle intersect within the circle; prove that the segments of one chord are equal to corresponding segments of the other chord.

Solution:

- Given, PQ and SR are chords intersecting at T and $PQ = SR$
- To prove, $PT = TR$ And $ST = TQ$

Construction, draw perpendicular bisectors of PQ and SR. Line from the center which bisects a chord is perpendicular to the chord.

- OM bisects $PQ\,(OM \perp PQ)$
- ON bisects $SR\,(\text{ON} \perp SR)$

As $PQ = SR$

- $PM = NR$ ... equation (1)
- Because M and N are midpoints of PQ and SR, $MQ = SN$ ... equation (2)

In $\triangle OMT$ and $\triangle ONT$

- $\angle OMT = \angle ONT$ (perpendiculars)
- $OT = OT$ (common line)
- $OM = \text{ON}$ ($PQ =$ ₹ and thus equidistant from the centre)
- $\Delta OMT \cong \Delta ONT$ By Right Angle Hypotenuse congruence condition.
- $MT = TN$ by Corresponding Parts of Congruent Triangles … equation (3)

From (1) and (2) we get,

- $MQ = SN$
- $\Rightarrow PM + MT = NR + TN$ (since we are adding equal parts (MT and TN) to equal quantities what we get according to Euclid is also equal)
- Therefore, $PT = TR$

Again,

- $MQ = SN$
- $MQ - MT = SN – TN$ (since we are subtracting equal parts (MT and TN) from equal quantities what is left according to Euclid is also equal)
- $TQ = ST$