EXERCISE 10.3

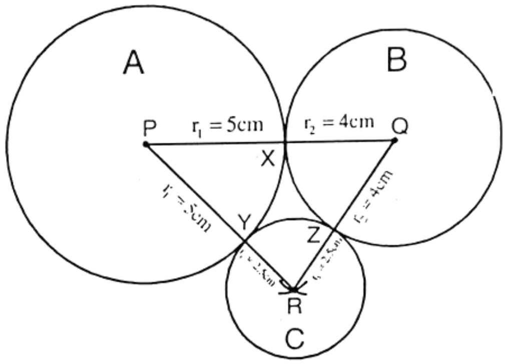
Q.1 Two circles with radii 5cm and 4cm touch each other externally. Draw another circle with radius 2.5cm touching the first pair, externally.

Solution:

Radius of Circle A = $r_1 = 5cm$

Radius of Circle B = $r_2 = 4cm$

Radius of Circle C = $r_3 = 2.5cm$



Steps of construction:

Step 1: Draw a line segment $m\overline{PQ}$ $5cm + 4cm = 9cm$ long.

Step 2: Take 'P' as a centre and draw a circle of radius 5cm.

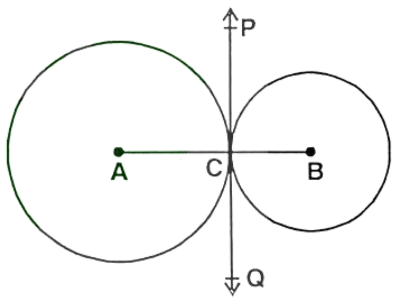
Step 3: Take 'Q' as a centre and draw a circle of radius 4cm, which intersects the circle of radius 4cm at point x.

Step 4: Take P as a centre and draw an arc of radius $(5cm + 2.5cm = 7.5cm)$

Step 5: Take Q as a centre and draw an arc of radius $(4cm + 2.5cm = 6.5cm)$, which intersects the previous arc at point R.

Step 6: Take R as centre and draw a circle of radius 2.5cm which touches externally the circles of centre P and Q at the points Y and Z respectively.

Q.2 If the distance between the centres of two circles is the sum or the difference of their radii they will touch each other.



Given: Two circles with centre A and B. $\overline{AC}$ and $\overline{BC}$ are radial segments of these circles such that $m\overline{AB} = m\overline{AC} + m\overline{BC}$ or

To Prove: Both circle touch each other.

Construction: Join A to B. Draw a tangent $\overleftrightarrow{PQ}$ of circle A at point C i.e. $m\angle PCA = 90^\circ$

Proof:

Statements	Reasons
$m\overline{AB} = m\overline{AC} + m\overline{BC}$ ....(i)	Given
Points A, C and B are collinear such that C is between A and B.	From (i)
$m\angle PCA + m\angle PCB = 180^\circ$ ....(ii)	Supplementary angles
As $m\angle PCA = 90^\circ$ ....(iii)	Construction
$\therefore m\angle PCB = 90^\circ$ ....(iv)	From (ii) and (iii)
$\overline{PC} \perp \overline{BC}$ at C i.e. $\overleftrightarrow{PQ}$ is $\perp$ $\overline{BC}$ at C	From (iv)
$\overleftrightarrow{PQ}$ is also a tangent of circle B	
$\overleftrightarrow{PQ}$ is common tangent of both circles. i.e.	
Both circles have a common point C.	
Thus both circles touch each other at a point C.	
Similarly the same results can be proved when distance between the centers of two circles is equal to the difference of their radii	