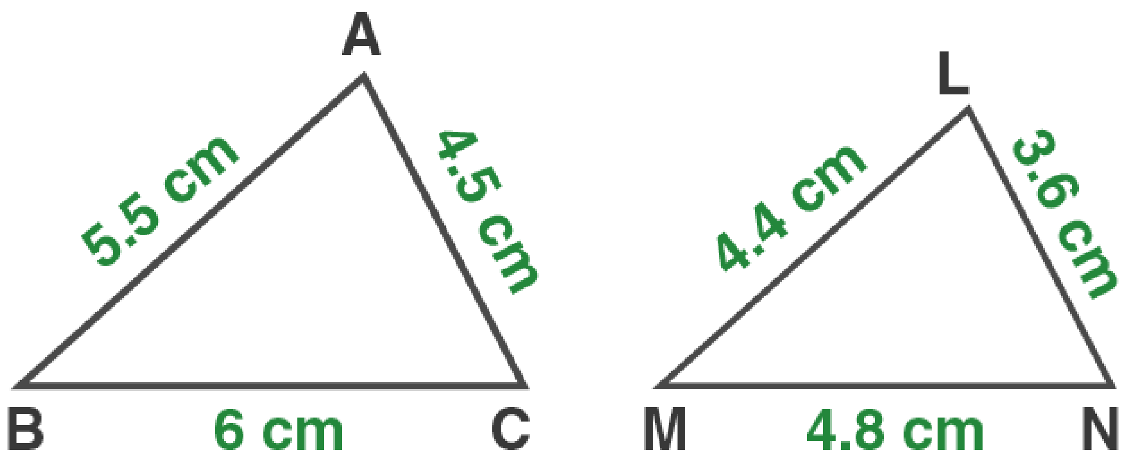
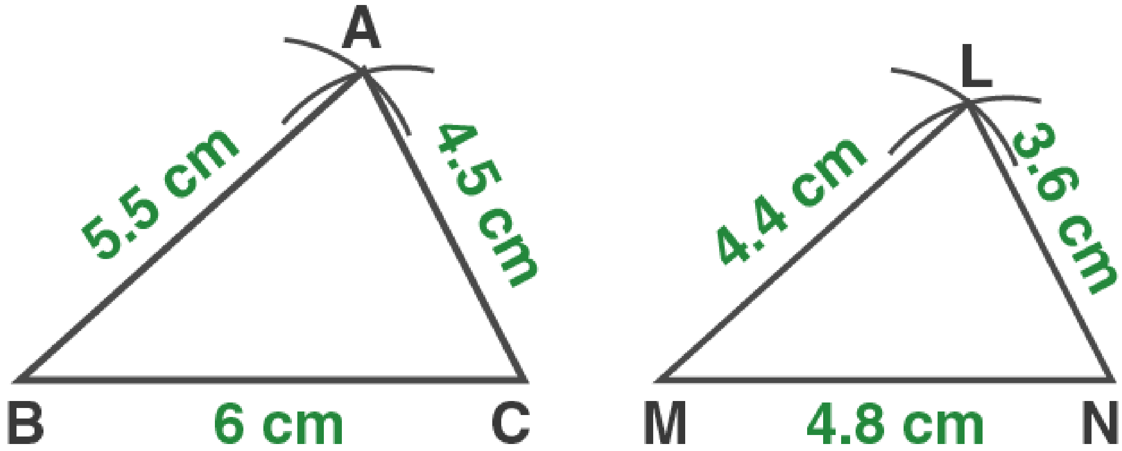
Practice Set 4.1 Page 96

1. △ ABC ~ △ LMN. In △ ABC, AB = 5.5 cm, BC = 6 cm, CA = 4.5 cm. Construct △ ABC and △LMN such that BC /MN = 5/ 4 .

Solution:
Rough figure is shown below.



Given △ABC and △ LMN are similar.
∴ their corresponding sides are proportional.
∴AB/LM = BC/MN = AC/LN
Given BC/MN = 5/4
∴ AB/LM = BC/MN = AC/LN = 5/4
As the sides AB, BC and AC are known we can find lengths of sides LM,MN and LN.
Given AB = 5.5 , BC = 6 , CA = 4.5
Substitute values of AB, BC and CA
5.5/LM = 6/MN = 4.5/LN = 5/4
5.5/LM = 5/4
∴LM = 5.5×4/5 = 4.4 cm
6/MN = 5/4
∴MN = 6×4/5 = 4.8 cm
4.5/LN = 5/4
∴LN = 4.5×4/5 = 3.6 cm
Now construct △LNM such that LM = 4.4 cm, MN = 4.8 cm and LN = 3.6cm.



2. △ PQR ~ △ LTR. In △ PQR, PQ = 4.2 cm, QR = 5.4 cm, PR = 4.8 cm. Construct △ PQR and △ LTR, such that PQ/ LT = 3/4 .

Solution:

Given △PQR and △LTR are similar.

∴Corresponding angles will be equal.

∴∠PRQ ≅ ∠LRT

Given PQ/LT = 3/4

PQ/LT = QR/TR = PR/LR [Corresponding sides of similar triangles]

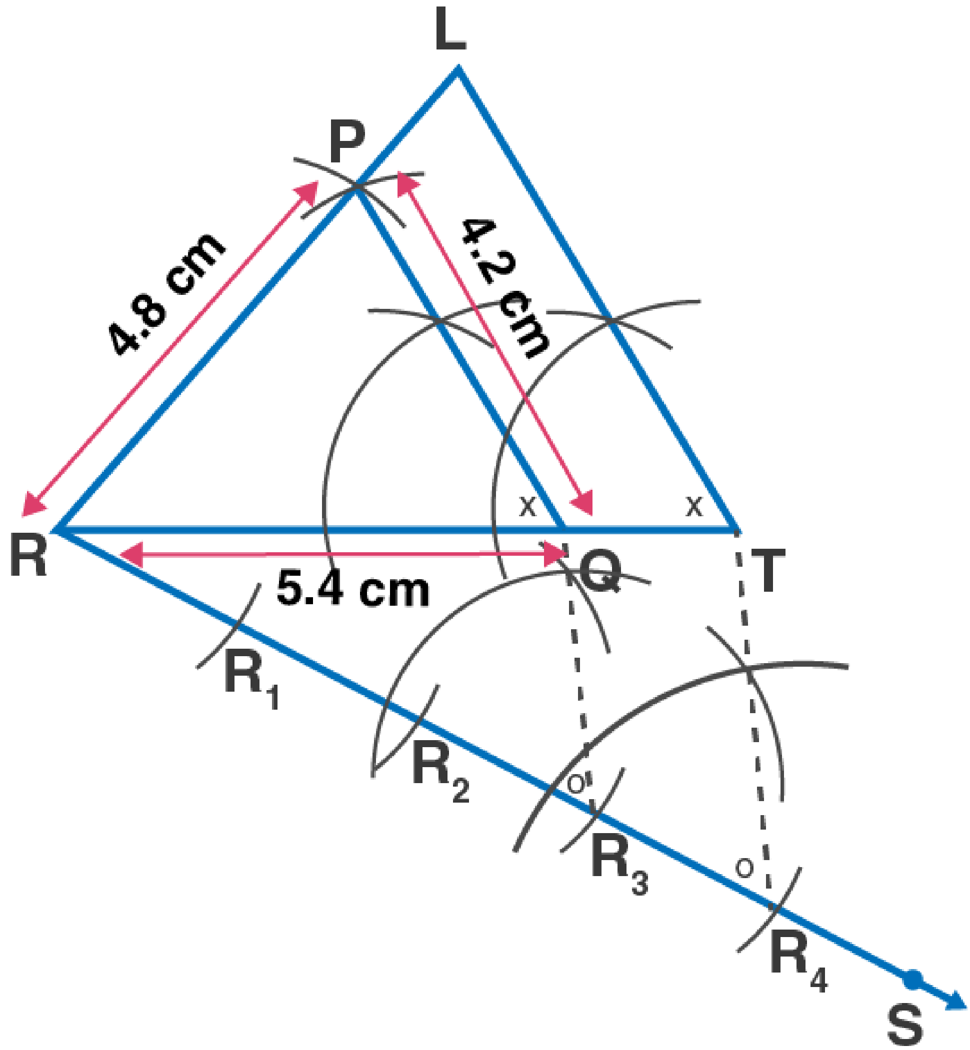
∴ PQ/LT= QR/TR = PR/LR = 3/4

∴Sides of △LTR are longer than corresponding sides of △PQR.

Steps of construction:

1. Draw ΔPQR such that PQ = 4.2 , QR = 5.4 , and PR = 4.8. Draw ray RS making an acute angle with side RQ.
2. Taking convenient distance on the compass, mark 4 points R_1, R_2, R_3, and R_4, such that $RR_1 = R_1R_2 = R_2R_3 = R_3R_4$.
3. Join QR_3. Draw a line parallel to QR_3 passing through R_4 to intersects ray RQ at T.
4. Draw a line parallel to side PQ through T. Name the point where parallel line intersect ray RP as L.

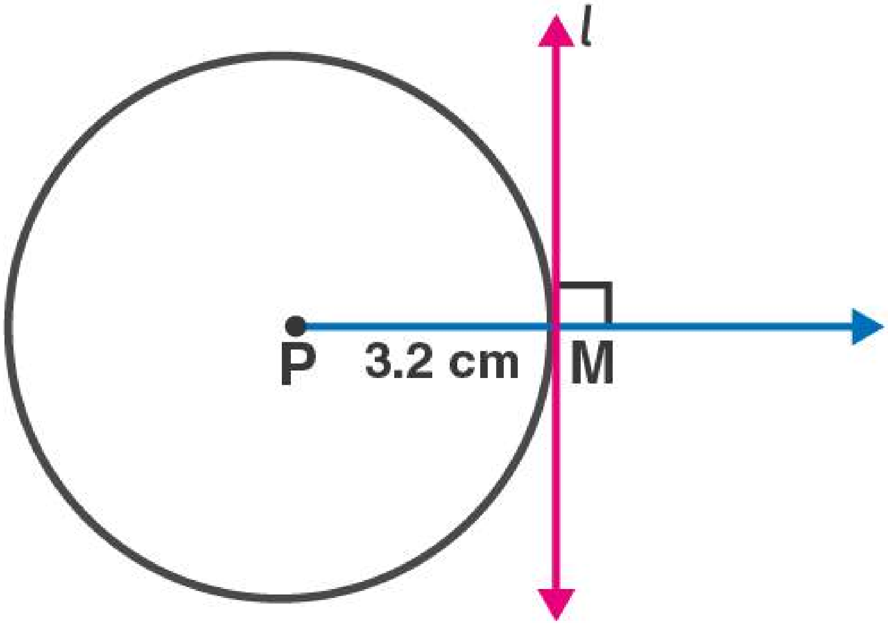
ΔLTR is the required triangle similar to ΔPQR.


L
P
4.8 cm
4.2 cm
R
x
x
Q
T
5.4 cm
R1
R2
R3
R4
S

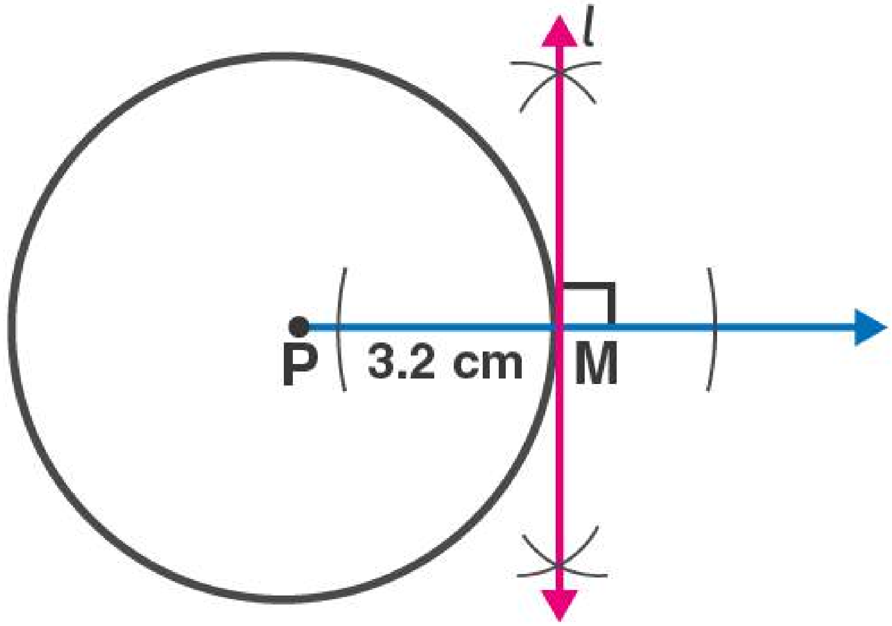
Practise Set 4.2 Page 98

1. Construct a tangent to a circle with centre P and radius 3.2 cm at any point M on it.

Solution:
Rough figure is shown below.

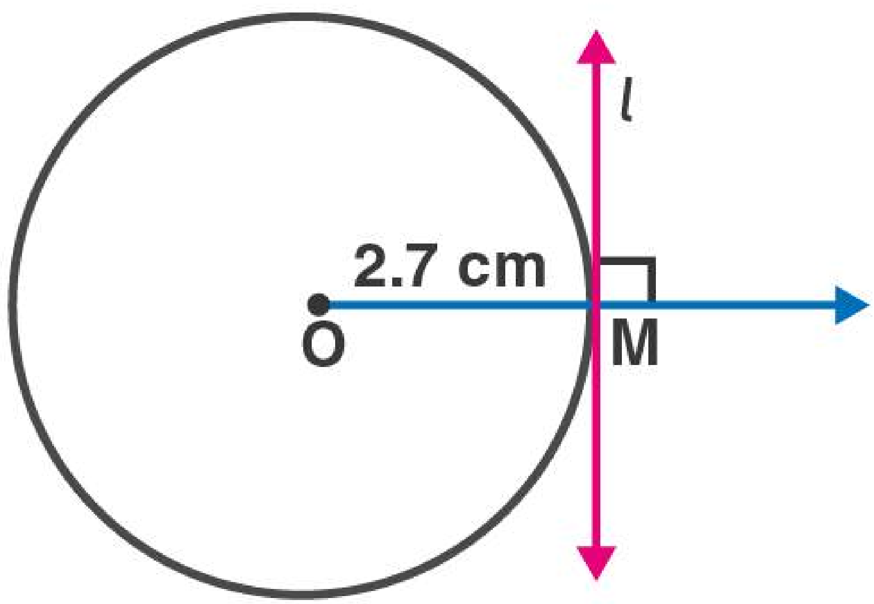


We use the property that a line perpendicular to the radius at its outer end is a tangent to the circle.
Construction Steps:
1.Draw a circle of radius 3.2 cm with centre P. Take any point M on the circle.
2. Draw ray PM.
3. Draw line l perpendicular to ray PM through point M.
4. Line l is the required tangent to the circle at point 'M'.



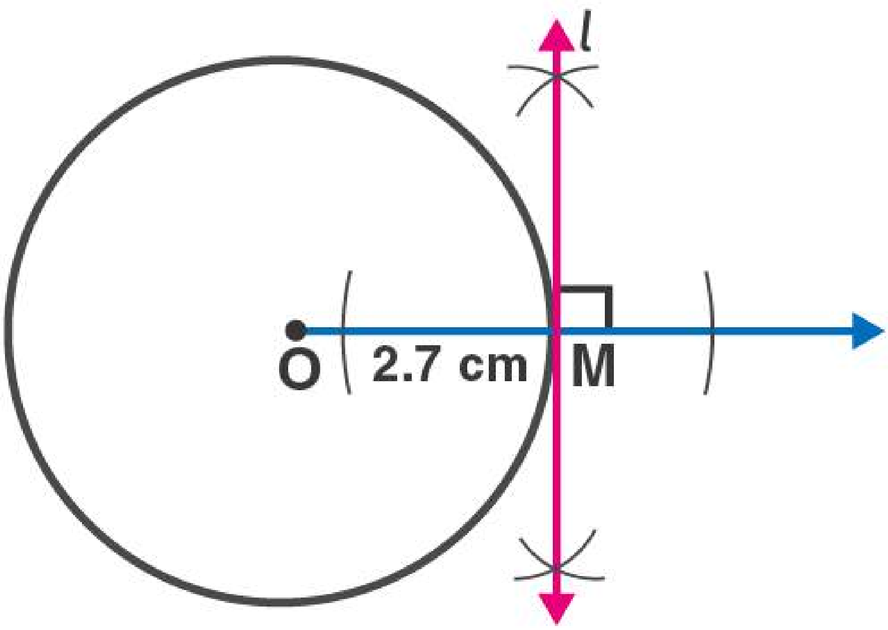
2. Draw a circle of radius 2.7 cm. Draw a tangent to the circle at any point on it.

Solution:
Rough figure is shown below.



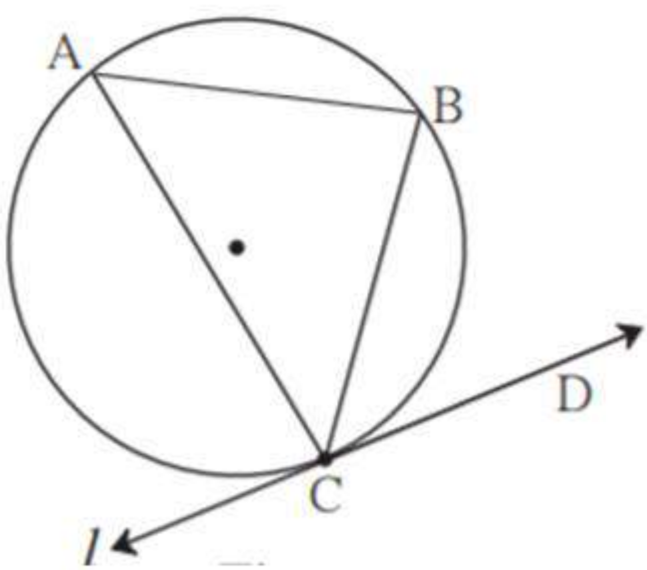
We use the property that a line perpendicular to the radius at its outer end is a tangent to the circle.
Construction Steps:
1.Draw a circle of radius 2.7 cm with centre O. Take any point M on the circle.

2. Draw ray PM.
3. Draw line l perpendicular to ray PM through point M.
4. Line l is the required tangent to the circle at point ‘M’.



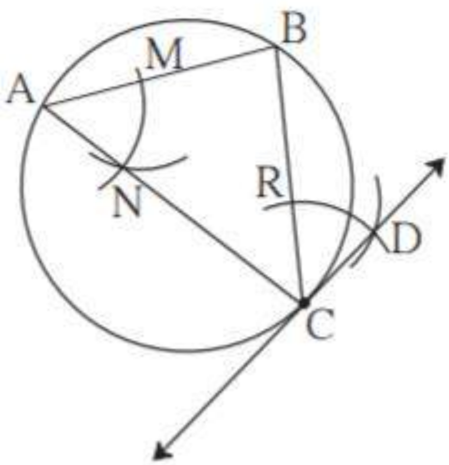
3. Draw a circle of radius 3.6 cm. Draw a tangent to the circle at any point on it without using the centre.

Solution:



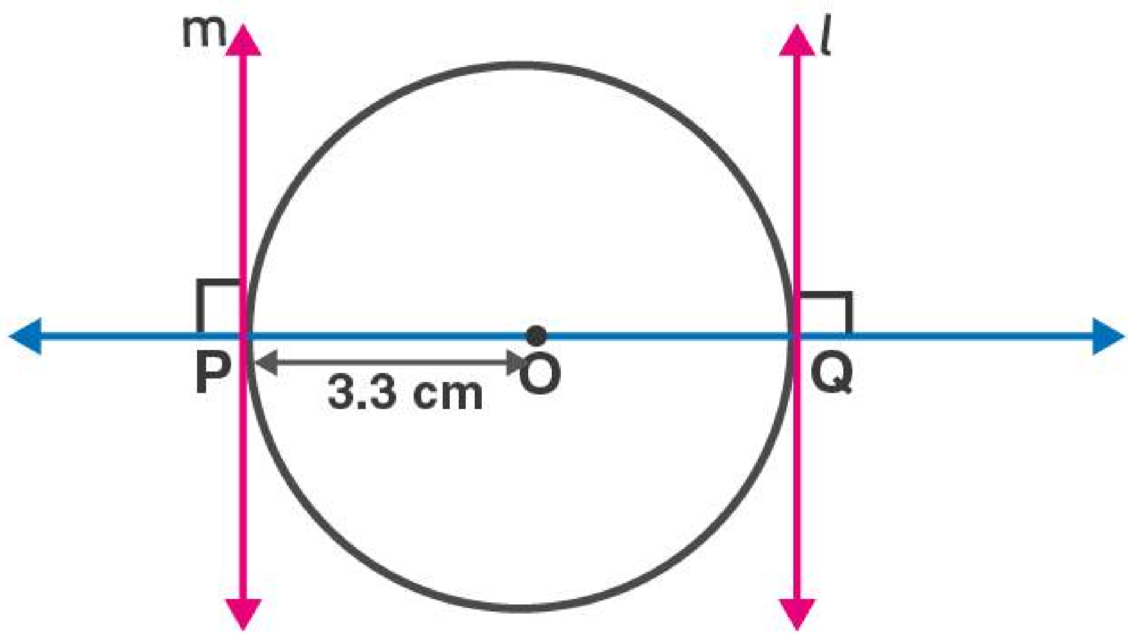
Analysis: As shown in the above figure, let line l be the tangent to the circle at point C. Line CB is a chord and ∠ CAB is an inscribed angle. Now by tangent- secant angle theorem, ∠CAB ≅ ∠BCD.
By converse of tangent- secant theorem, if we draw the line CD such that, ∠CAB ≅ ∠BCD, then it will be the required tangent.

Construction steps:
(1) Draw a circle of a radius 3.6 cm. Take any point C on it.
(2) Draw chord CB and an inscribed ∠ CAB .
(3) With the centre A and any convenient radius draw an arc intersecting the sides of ∠BAC in points M and N.
(4) Using the same radius and centre C, draw an arc intersecting the chord CB at point R.
(5) Taking the radius equal to d(MN) and centre R, draw an arc intersecting the arc drawn in the previous step. Let D be the point of intersection of these arcs. Draw line CD. Line CD is the required tangent to the circle.

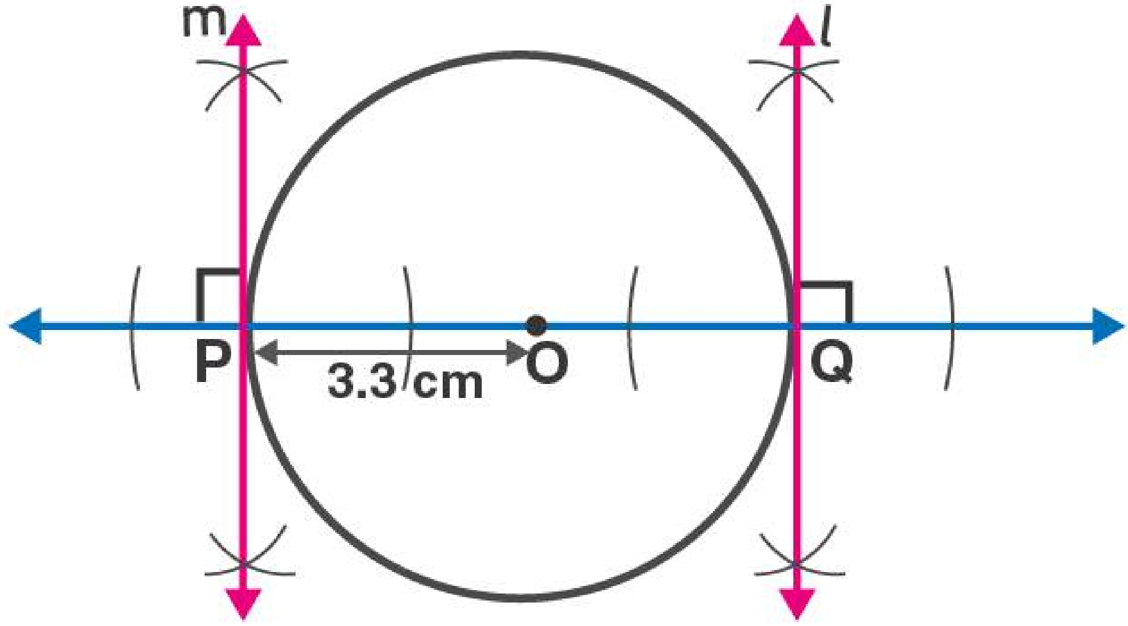


4. Draw a circle of radius 3.3 cm Draw a chord PQ of length 6.6 cm. Draw tangents to the circle at points P and Q. Write your observation about the tangents.

Solution:
Rough figure is given below.



Since tangent is perpendicular to radius, OP⊥ line *l* .
Also OQ⊥ line m.
The perpendicular line segments to OP and OQ at point P and Q will give the required tangents at P and Q.
Given radius = 3.3 cm.
∴Diameter = 3.3 ×2 = 6.6cm.
So chord PQ is the diameter of the circle.
∴The tangents are parallel to each other.


m
l
P
3.3 cm
O
Q

Problem Set 4 Page 99

1. Select the correct alternative for each of the following questions.
(1) The number of tangents that can be drawn to a circle at a point on the circle is ....
(A) 3 (B) 2 (C) 1 (D) 0

Solution:
The number of tangents that can be drawn to a circle at a point on the circle is 1.
Hence option C is the answer.

(2) The maximum number of tangents that can be drawn to a circle from a point outside it is ....
(A) 2 (B) 1 (C) one and only one (D) 0

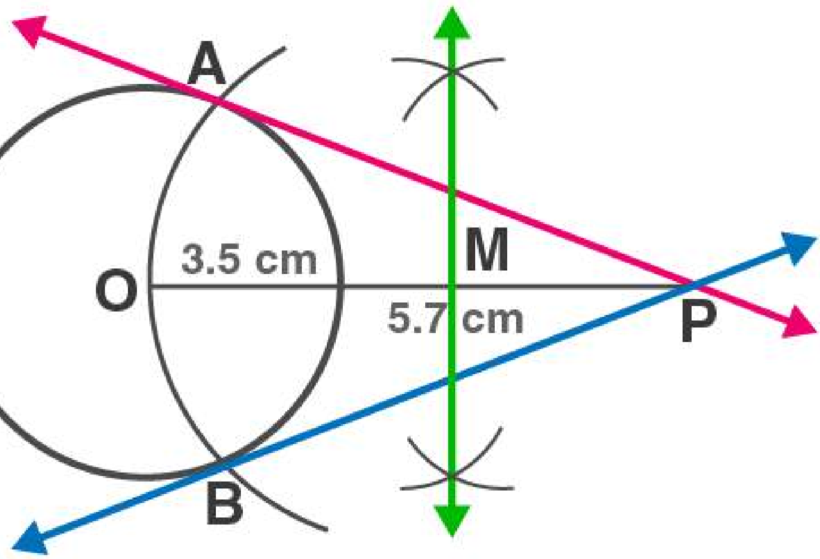
Solution:
The maximum number of tangents that can be drawn to a circle from a point outside it is 2.
Hence option A is the answer.

(3) If △ABC ~ △PQR and AB /PQ = 7 /5 , then ....
(A) △ ABC is bigger. (B) △ PQR is bigger. (C) Both triangles will be equal. (D) Cannot be decided.

Solution:
Since △ABC similar to △PQR , corresponding sides are proportional.
∴AB/PQ = BC/QR = AC/PR
Given AB/PQ = 7/5
⇒AB =(7/5) PQ
∴Side AB is 7/5 times PQ. So △ABC is bigger.
Hence Option A is the answer.

2. Draw a circle with centre O and radius 3.5 cm. Take point P at a distance 5.7 cm from the centre. Draw tangents to the circle from point P.

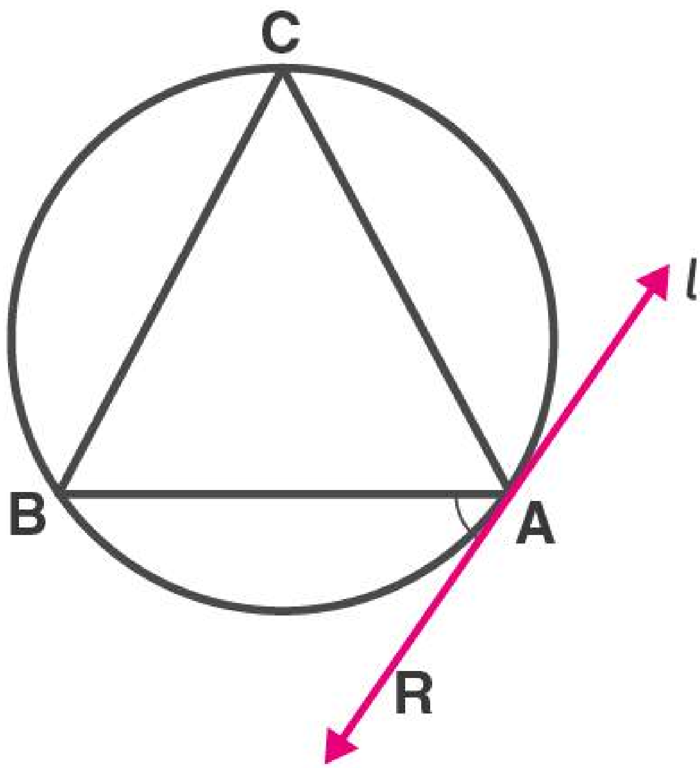
Solution:
Construction steps.
1. Draw a circle of radius 3.5 cm with centre O.
2. Mark a point P in the exterior of the circle so that OP = 5.7 cm
3.Join OP. Draw perpendicular bisector of segment OP and mark the midpoint M.
4. Draw a circle with radius OM and centre M.
5.Name the point of intersection of the two circles as A and B.
6.Draw line PA and line PB.
Line PA and PB are the required tangents to the circle from point P.



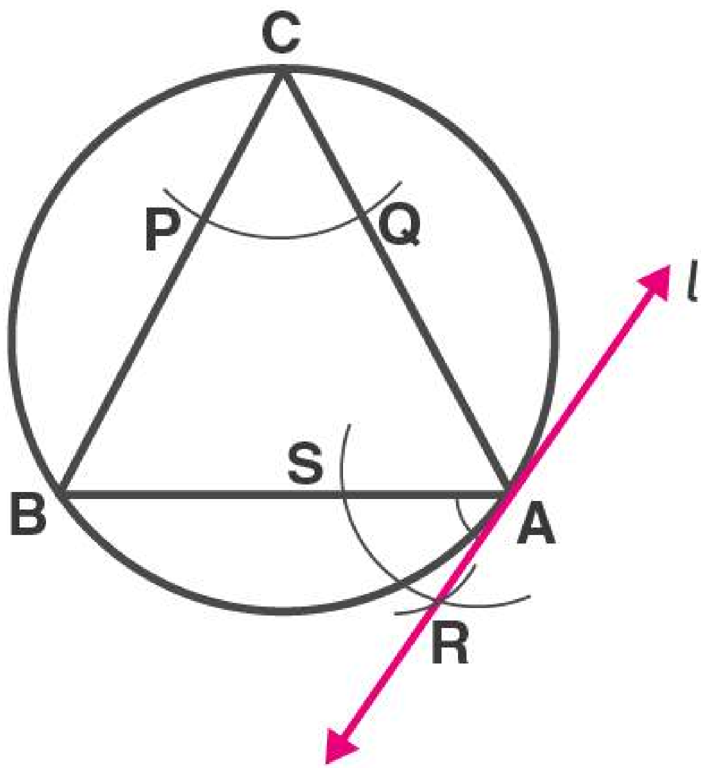
3. Draw any circle. Take any point A on it and construct tangent at A without using the centre of the circle.

Solution:

Analysis: As shown in the above figure, let line l be the tangent to the circle at point A. Line AB is a chord and ∠ BCA is an inscribed angle. Now by tangent- secant angle theorem, ∠BCA ≅ ∠BAR.
By converse of tangent- secant theorem, if we draw the line *l* such that, ∠ BAR ≅ ∠BCA, then it will be the required tangent.
Rough figure is shown below.



Construction steps:
(1) Draw a circle of any radius . Take any point A on it.
(2) Draw chord AB and an inscribed ∠ BCA .
(3) With the centre C and any convenient radius draw an arc intersecting the sides of ∠BCA in points P and Q.
(4) Using the same radius and centre A, draw an arc intersecting the chord AB at point S.
(5) Taking the radius equal to d(PQ) and centre S, draw an arc intersecting the arc drawn in the previous step. Let R be the point of intersection of these arcs. Draw line AR. Line AR is the required tangent to the circle.



4. Draw a circle of diameter 6.4 cm. Take a point R at a distance equal to its diameter from the centre. Draw tangents from point R.

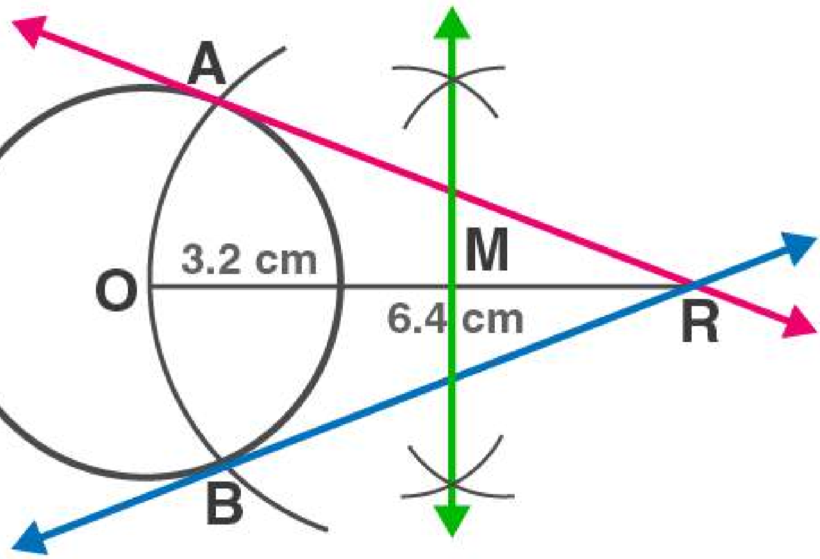
Solution:

Construction steps:

1.Draw a circle of radius = 6.4/ 2 = 3.2 cm with centre O.

2. Mark a point R in the exterior of the circle so that OR = 6.4 cm.
3. Draw segment OR. Draw a perpendicular bisector of OR. Mark its midpoint M.
4. Draw a circle with radius OM and centre M.
5. Mark the point of intersection of the two circles as A and B.
6. Draw lines RA and RB.

RA and RB are the required tangents from point R.


A
3.2 cm
O
M
6.4 cm
R
B