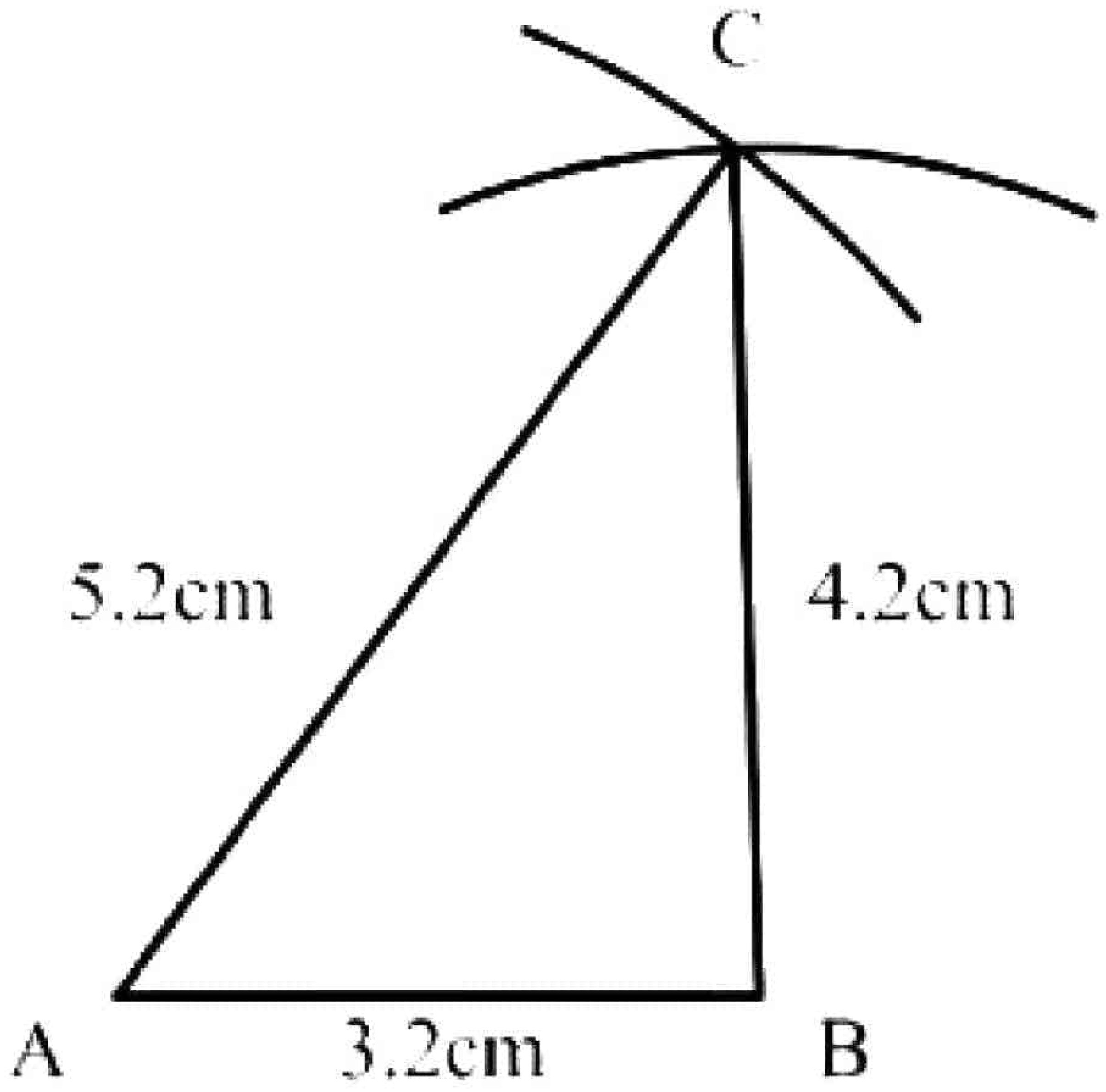
Exercise 17.1

Q.1 Construct a ΔABC in which

(i) $m\overline{AB}=3.2cm\ \ m\overline{BC}=4.2cm\ \ m\overline{CA}=5.2cm$



i. Draw a line segment $m\overline{AB}=3.2cm$

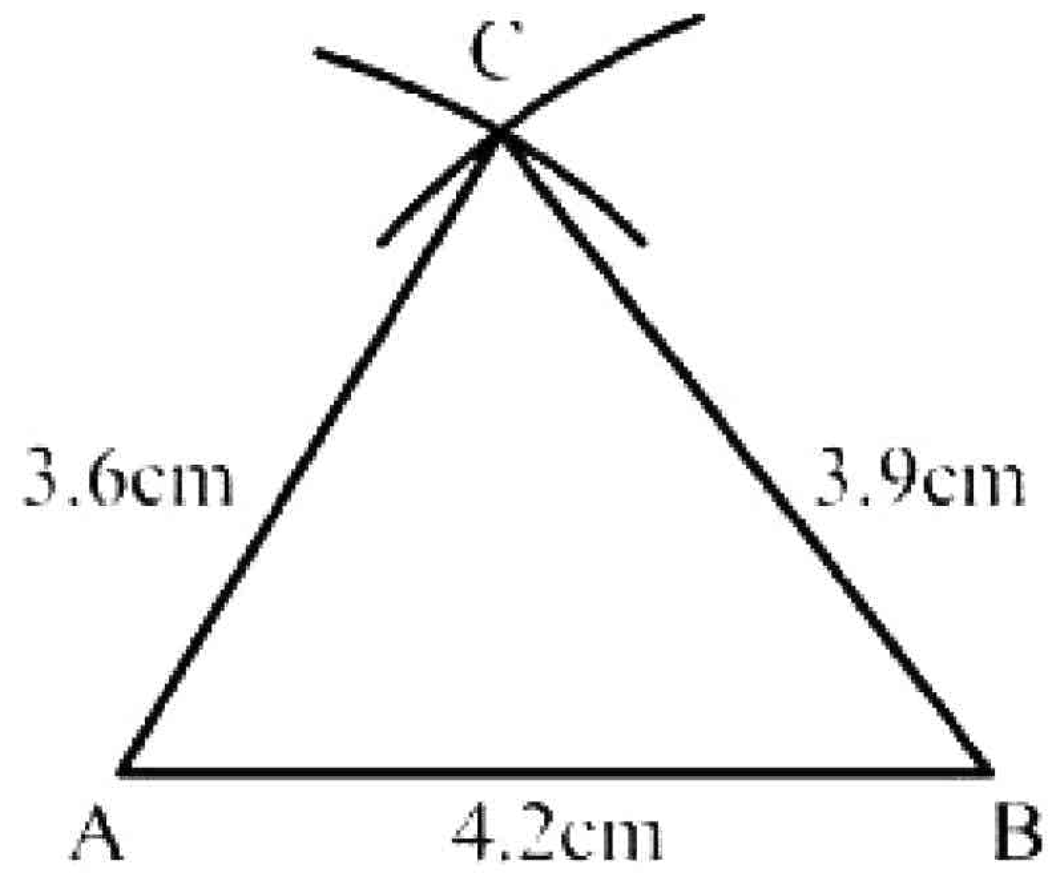
ii. Taking A as centre draw an arc of radius 5.2cm.

iii. Taking B as centre draw an arc of radius 4.2cm to cut at point C.

iv. Join C to A and C to B

Thus ΔABC is the required triangle.

(ii) $m\overline{AB}=4.2cm\ \ m\overline{BC}=3.9cm\ \ m\overline{CA}=3.6cm$



i. Draw a line segment $m\overline{AB}=4.2cm$

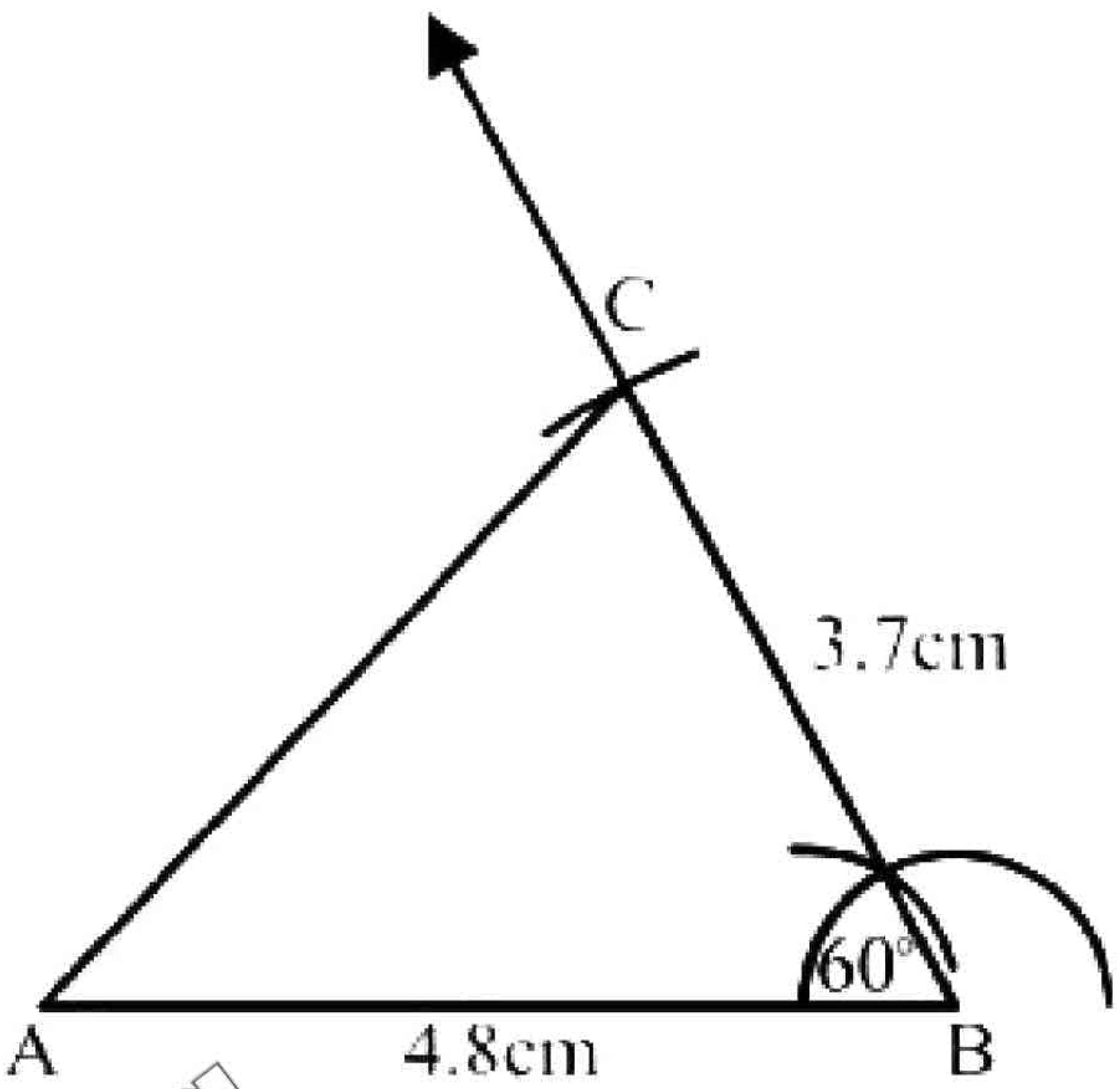
ii. Taking A as centre draw an arc of radius 3.6cm.

iii. Taking B as centre draw an arc of radius 3.9cm to cut at point C.

iv. Join C to A and C to B.

Thus ΔABC is the required triangle.

(iii) $m\overline{AB}=4.8cm\ \ m\overline{BC}=3.7cm\ \ m\angle B=60^\circ$



i. Draw a line segment $m\overline{AB}=4.8cm$.

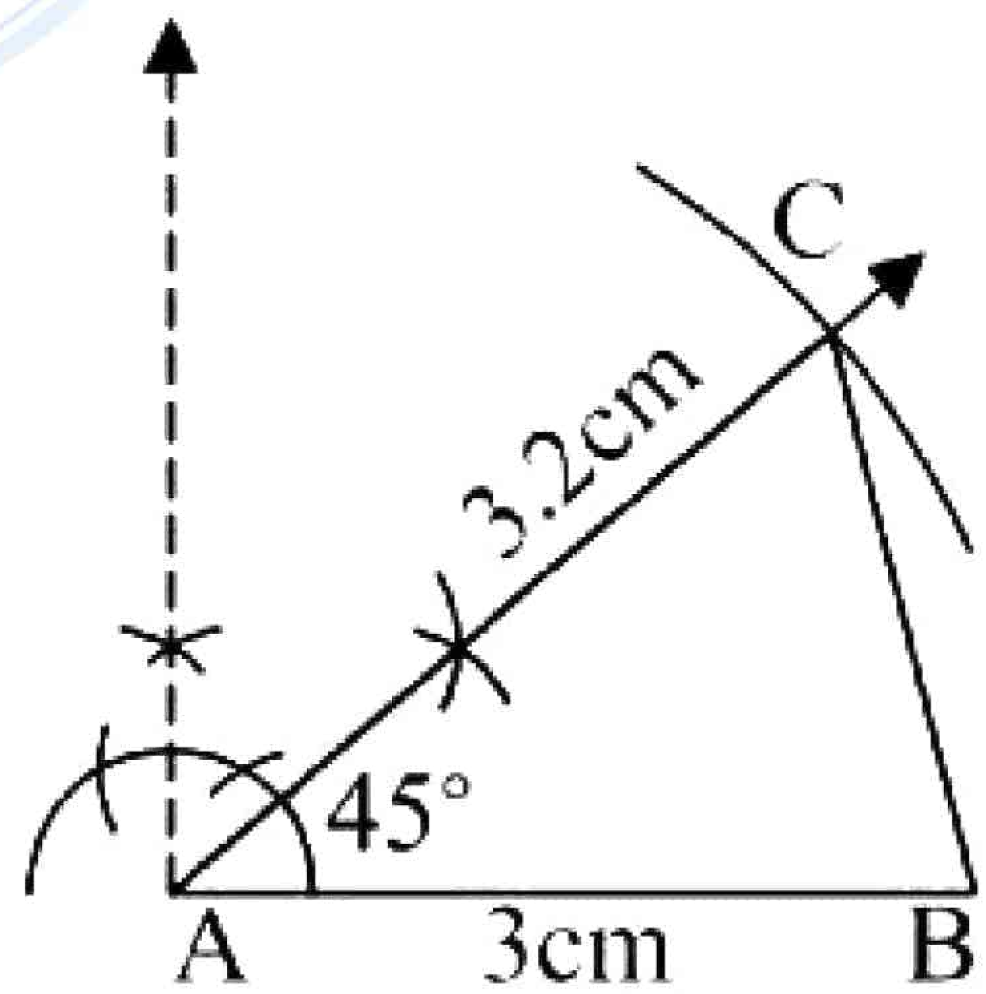
ii. Taking B as centre draw an angle of 60°.

iii. Taking B as centre draw an arc of radius 3.7cm cutting terminal side of 60° at C.

iv. Join C to A.

Thus ΔABC is the required triangle.

(iv) $m\overline{AB}=3cm\ \ m\overline{AC}=3.2cm\ \ \ m\angle A=45^\circ$



i. Draw a line segment $m\overline{AB}=3cm$.

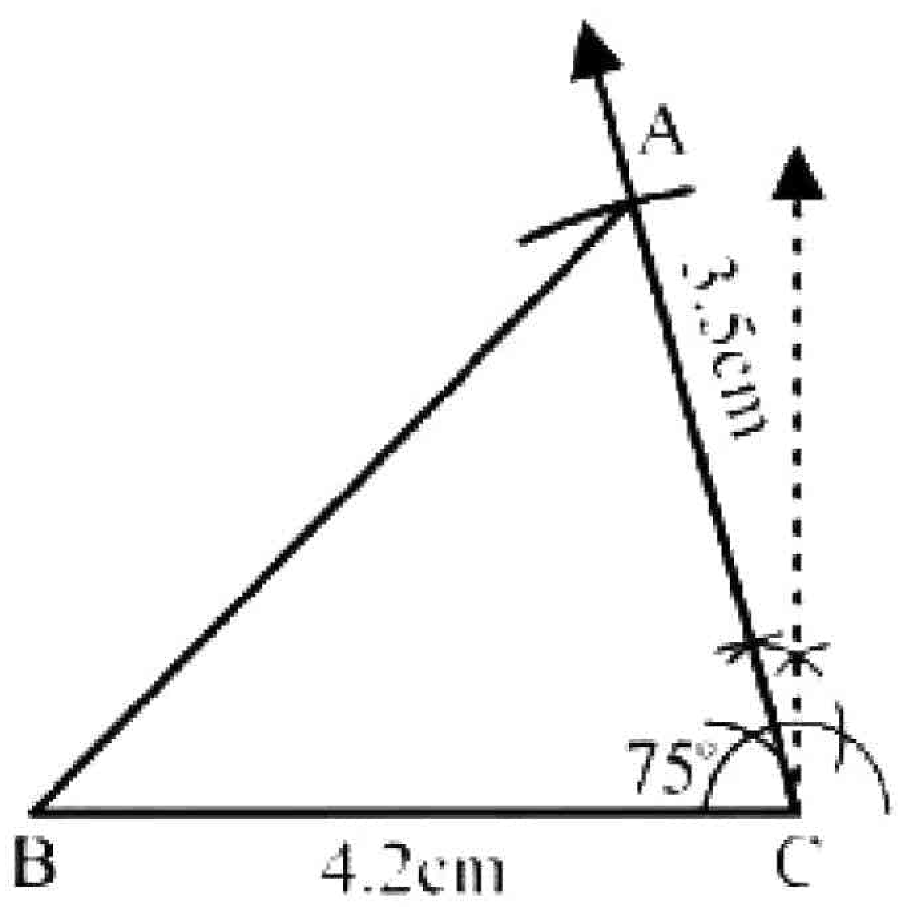
ii. Taking A as centre draw an angle of 45°.

iii. Taking A as centre draw an arc of radius 3.2cm to cut the terminal side of angle at C.

iv. Join C to B.

Thus ΔABC is the required triangle.

(v) $m\overline{BC} = 4.2cm \quad m\overline{CA} = 3.5cm \quad m\angle C = 75^\circ$



i. Draw a line segment $m\overline{BC} = 4.2cm$.

ii. Taking C as centre draw an angle of 75°.

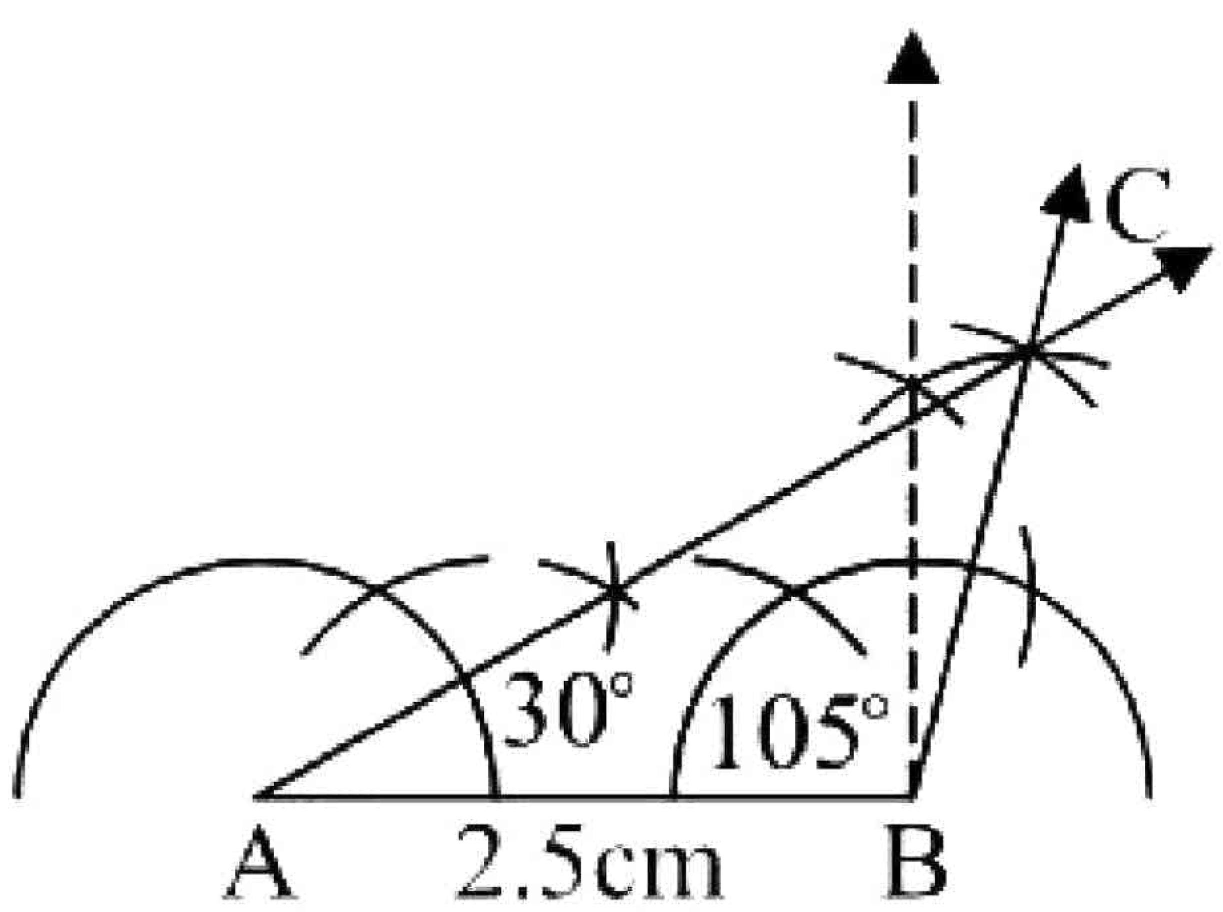
iii. Taking C as centre draw an arc of radius 3.5cm.

iv. Cutting the terminal side of angle at A.

v. Join A to B.

Thus ΔABC is the required triangle.

(vi) $m\overline{AB} = 2.5cm \quad m\angle A = 30^\circ \quad m\angle B = 105^\circ$



i. Draw a line segment $m\overline{AB} = 2.5cm$.

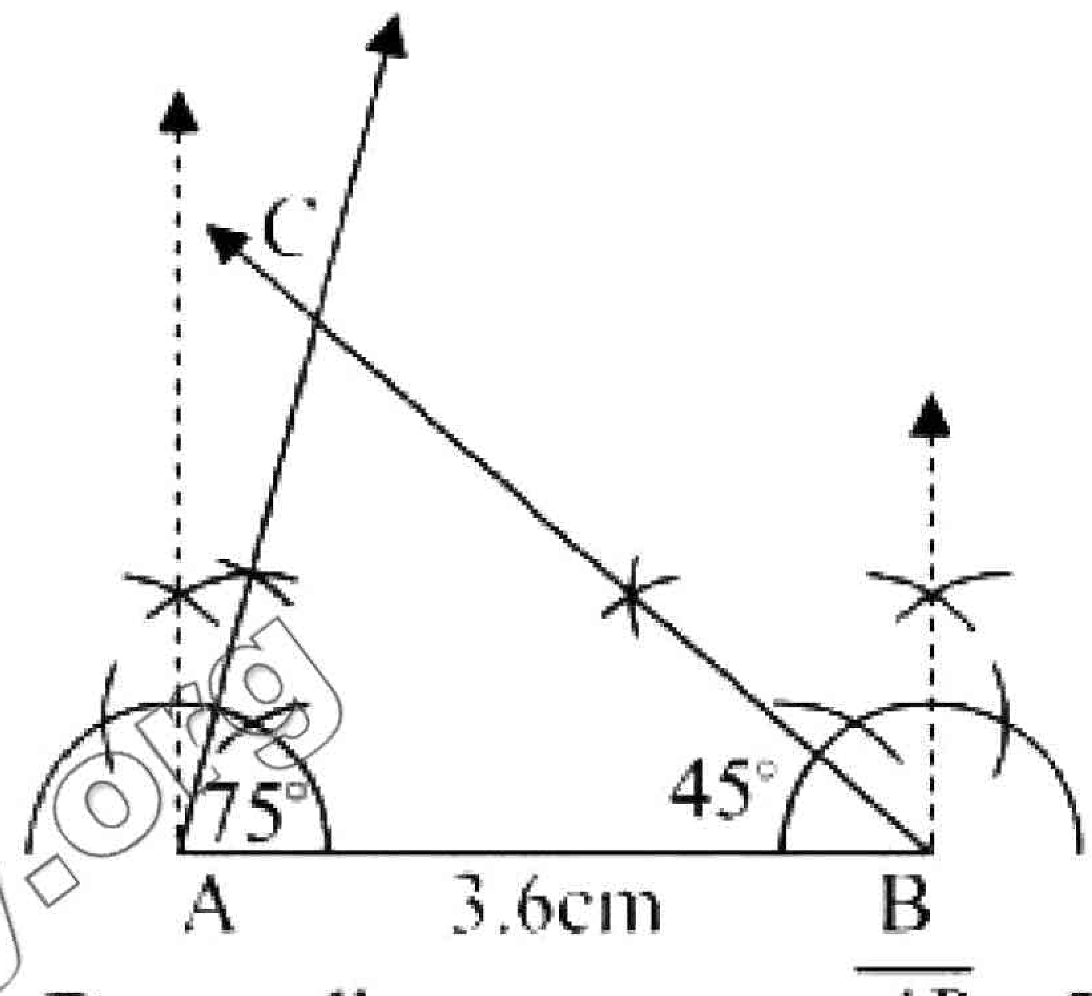
ii. Taking A as centre draw an angle of 30°.

iii. Taking B as centre draw an angle of 105°.

iv. Terminal sides of these two angles meet at C.

Thus ΔABC is the required triangle.

(vii) $m\overline{AB} = 3.6cm \quad m\angle A = 75^\circ \quad m\angle B = 45^\circ$



i. Draw a line segment $m\overline{AB} = 3.6cm$.

ii. Taking A as centre draw an angle of 75°.

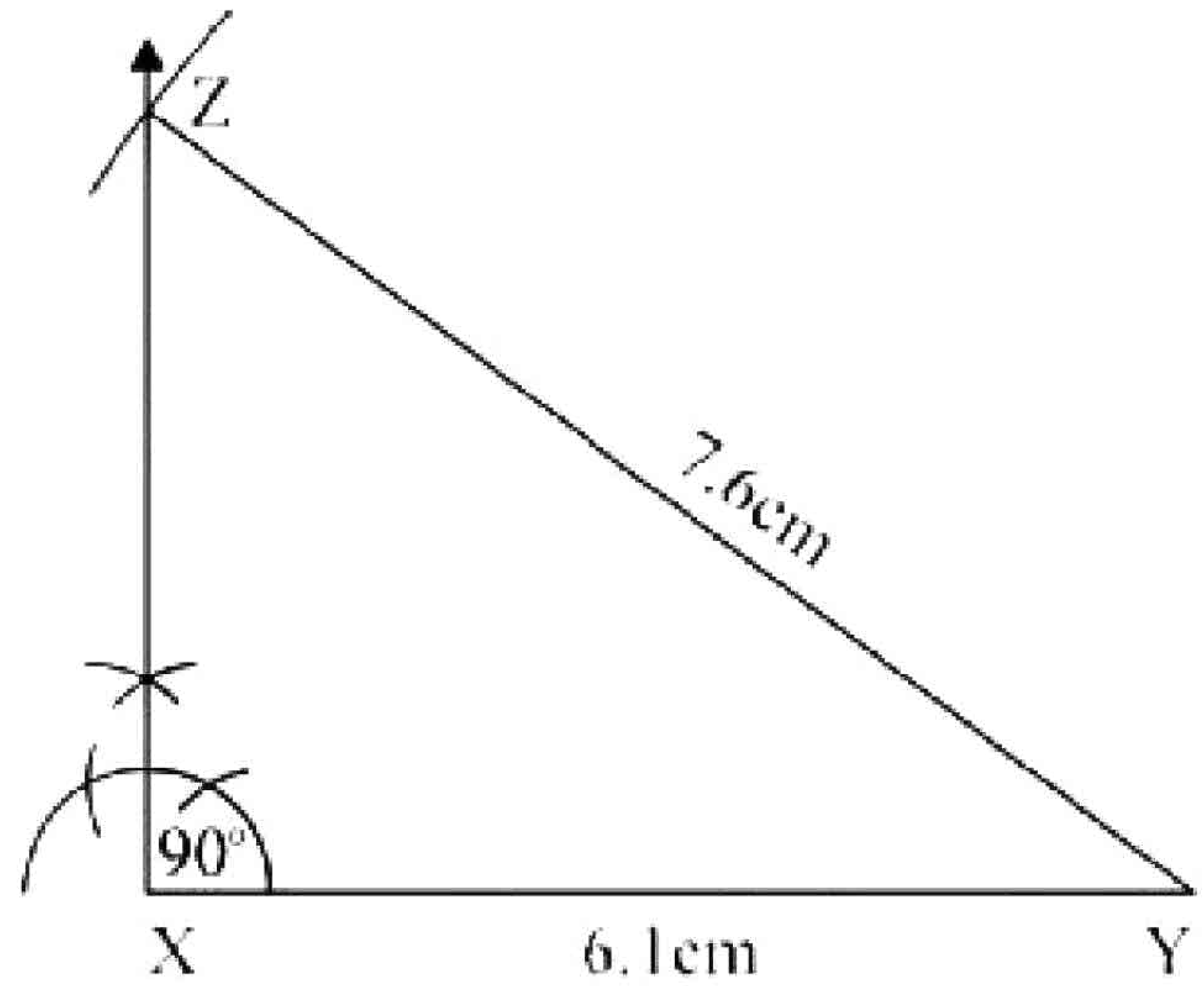
iii. Taking B as centre draw an angle of 45°.

iv. Terminal sides of these two angles meet at point C.

Thus ΔABC is the required triangle.

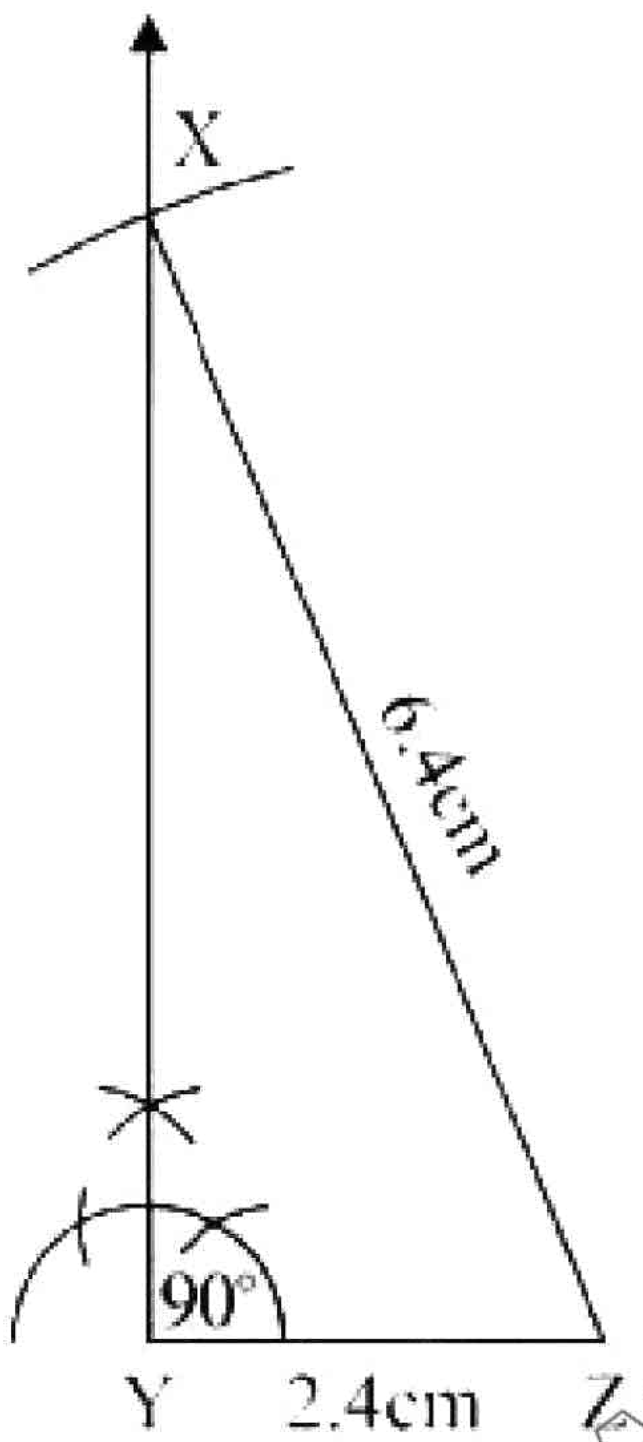
Q.2 Construct a ΔXYZ in which

(i) $m\overline{YZ} = 7.6cm \quad m\overline{XY} = 6.1cm \quad m\angle X = 90^\circ$



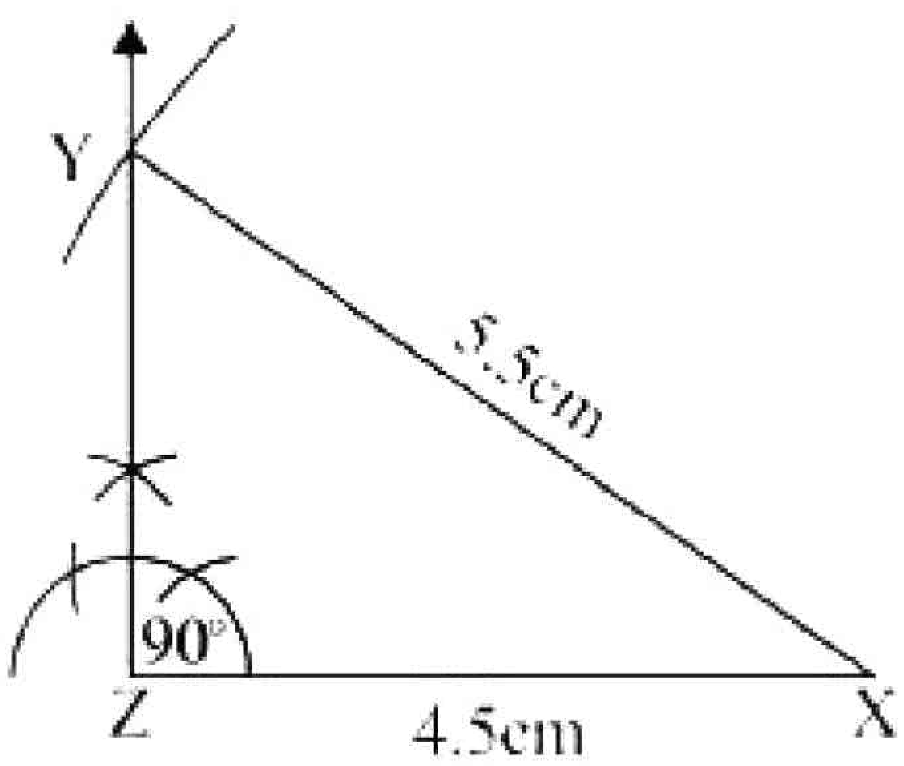
i. Draw a line segment $m\overline{XY} = 6.1cm$.
ii. Taking X as Centre draw an angle of 90°.
iii. Taking Y as Centre draw an arc of radius 7.6cm to cut terminal sides of angle at Z.
iv. Join Y to Z.
Thus ΔXYZ is the required triangle.

(ii) $m\overline{ZX} = 6.4cm$ $m\overline{YZ} = 2.4cm$ $m\angle Y = 90°$



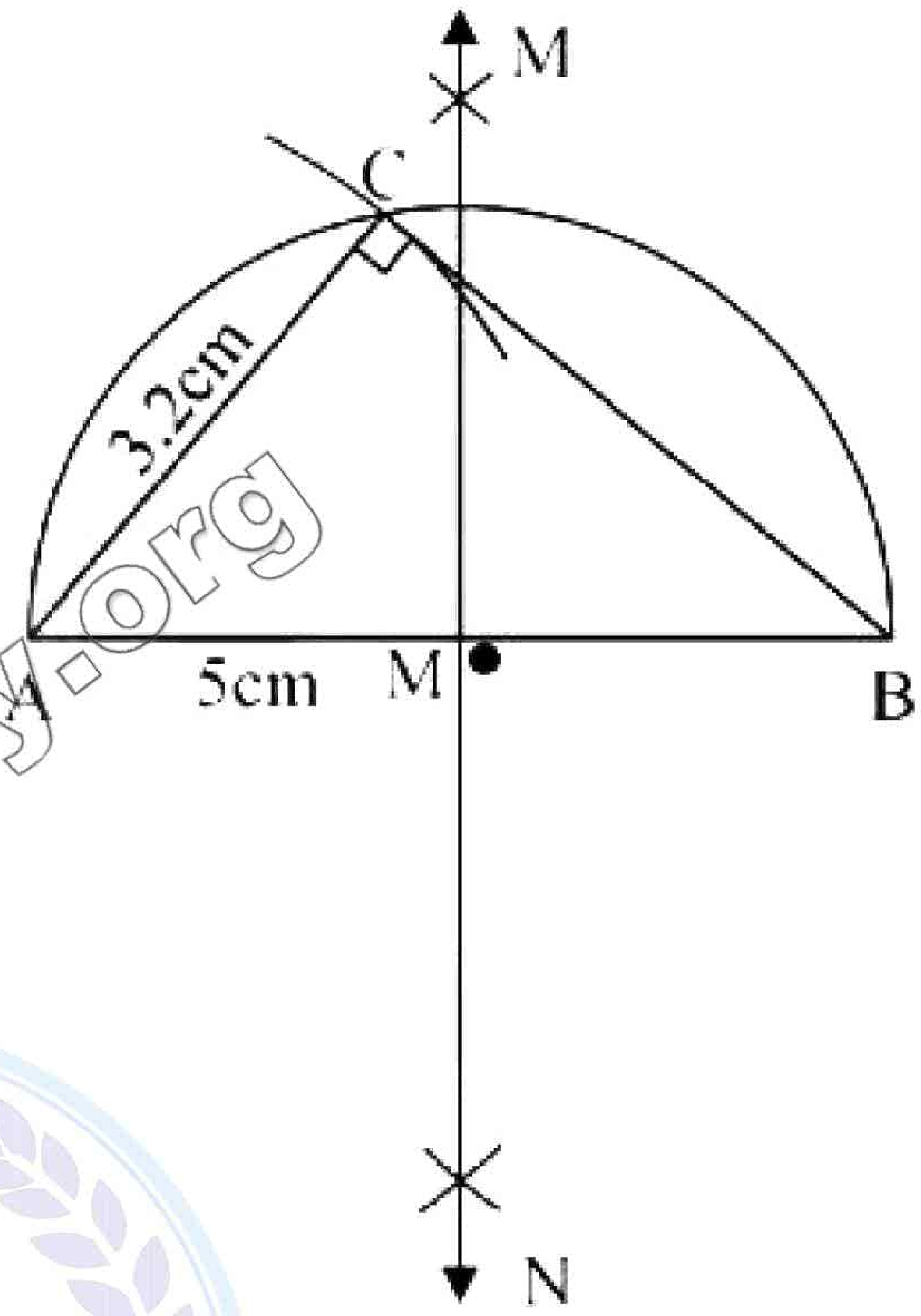
i. Draw a line segment $m\overline{YZ} = 2.4cm$.
ii. Taking Y as centre draw an angle of 90°.
iii. Taking Z as centre draw an arc of radius 6.4cm. Which cuts the terminal side of angle at X.
iv. Join X and Z.
Thus ΔXYZ is the required triangle.

(iii) $m\overline{XY} = 5.5cm$ $m\overline{ZX} = 4.5cm$ $m\angle Z = 90°$



i. Draw a line segment 4.5cm.
ii. Taking Z as centre draw an angle of 90°.
iii. Taking X as centre draw an arc of radius 5.5cm. Which cut the terminal side angle at Y.
iv. Join Y to X.
Thus ΔXYZ is the required triangle.

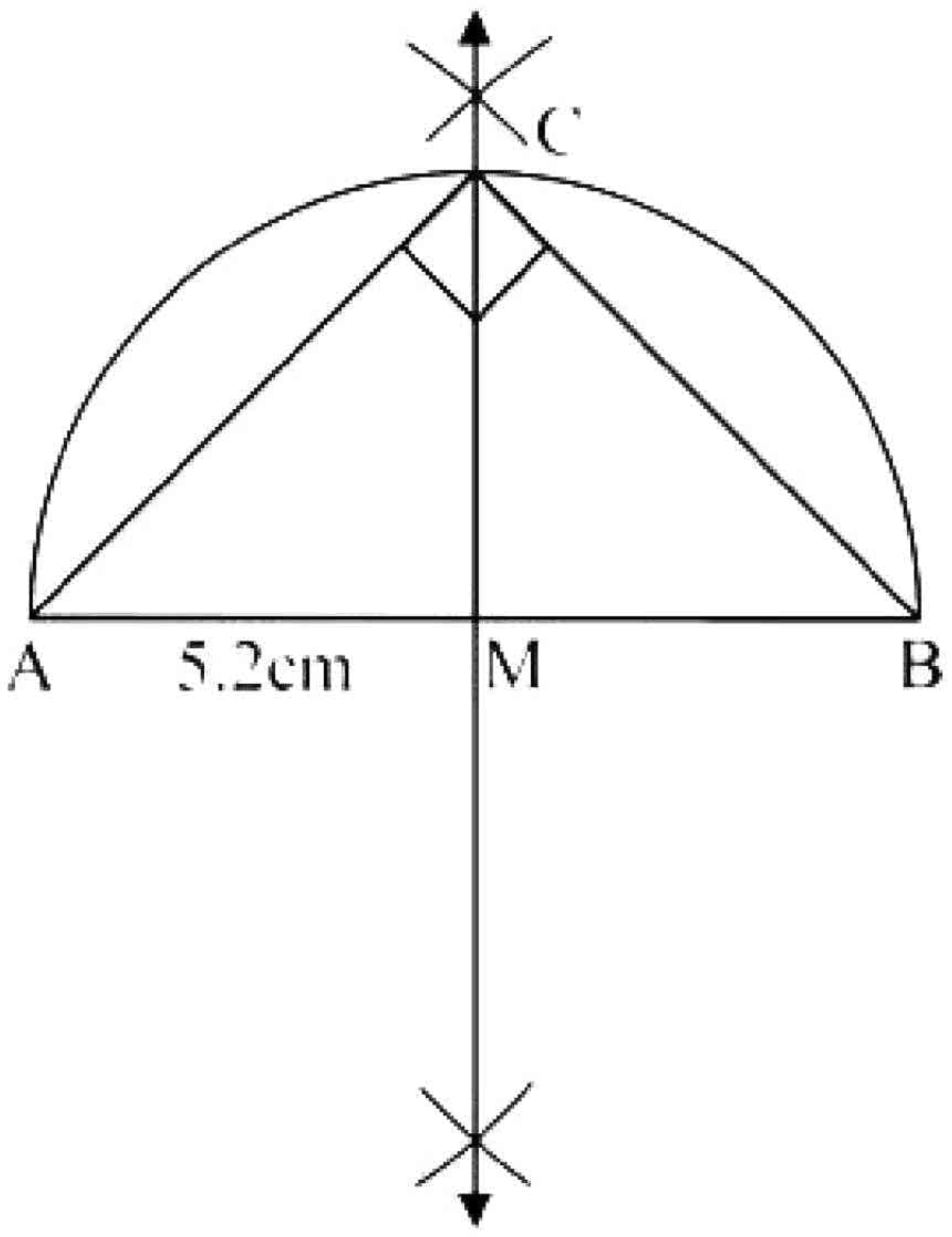
Q.3 Construct a right angled Δ measure of whose hypotenuse is 5cm and one side is 3.2 cm



Construction:
i. Draw a line segment $m\overline{AB}$=5cm.
ii. Bisect $\overline{AB}$ at M.
iii. Taking M as centre take a radius $\overline{AM}$ or $\overline{BM}$ and draw a semicircle.
iv. Taking A as centre draw an arc of radius 3.2cm cutting semicircle at C.
v. Join C to A and C to B.
Thus ΔABC is the required right angled triangle.

Q.4 Construct right angled isosceles triangle whose hypotenuse is

(i) 5.2cm long



Construction:

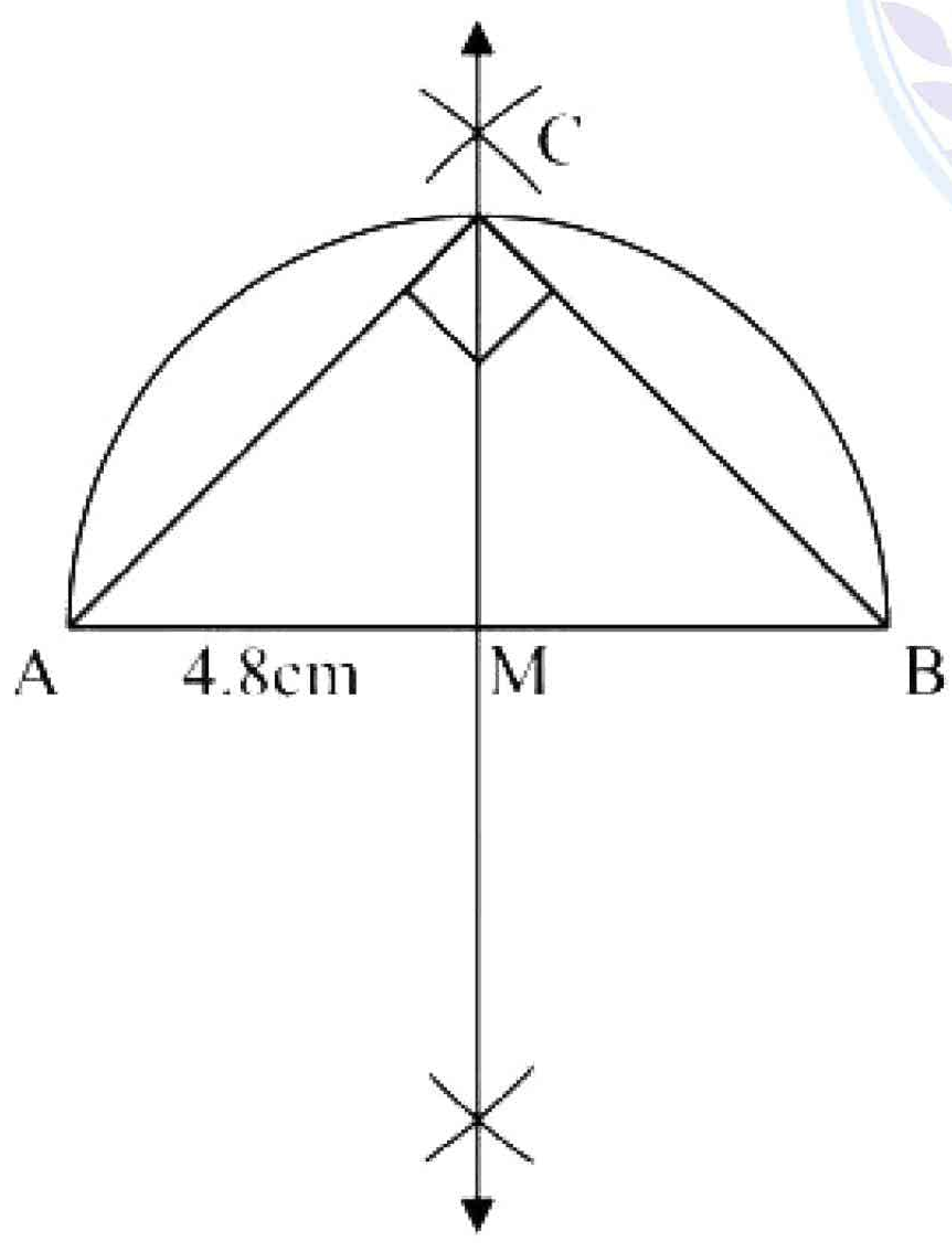
i. Draw a line segment $m\overline{AB} = 5.2cm$.

ii. Bisect $\overline{AB}$ at point M.

iii. With M as centre draw a semi circle of radius $\overline{AM}$ or $\overline{BM}$ which intersects the right bisector at C.

iv. Join A to C and B to C.
ΔABC is the required right angled isosceles triangle with $m\angle C = 90^\circ$.

(ii) 4.8cm long



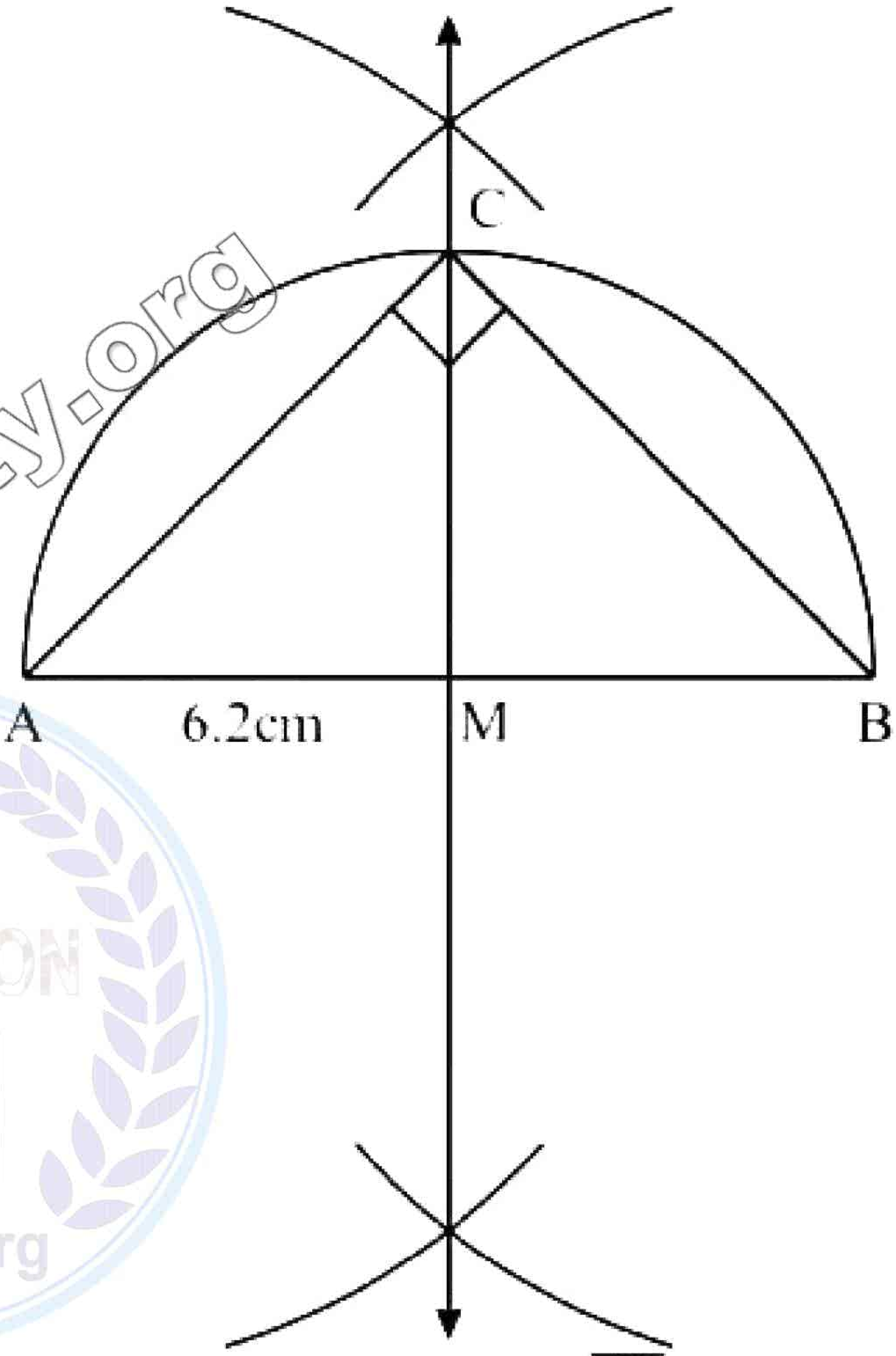
i. Take a line segment $m\overline{AB} = 4.8cm$.

ii. Bisect $\overline{AB}$ at point M.

iii. Taking M as centre draw a semi circle of radius $\overline{AM}$ or $\overline{MB}$ which intersects the right bisector at C.

iv. Join A to C and B to C.
Thus ABC is the right angled isosceles triangle with $\angle C = 90^\circ$.

(iii) 6.2 cm



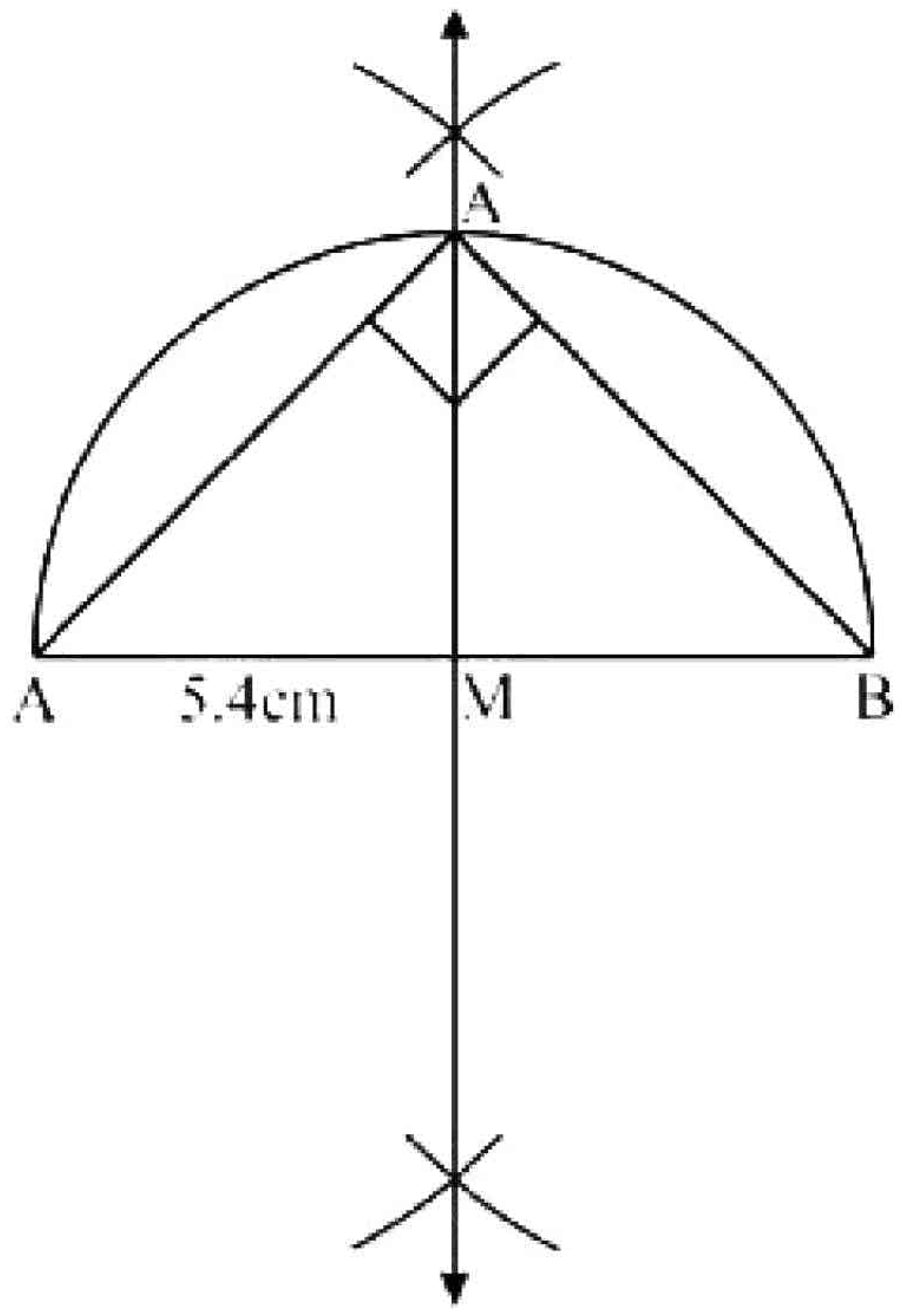
i. Take a line segment $m\overline{AB} = 6.2cm$.

ii. Bisect $\overline{AB}$ at point M.

iii. Taking M as a centre draw a semi circle of radius $\overline{AM}$ or $\overline{BM}$ which intersects the right bisector at C.

iv. Join A to C and B to C.
Thus ΔABC is the right angled isosceles triangle with $\angle C = 90^\circ$.

(iv) 5.4 cm



Construction:

i. Take a line segment $m\overline{AB} = 5.4cm$.

ii. Bisect $\overline{AB}$ at point M.

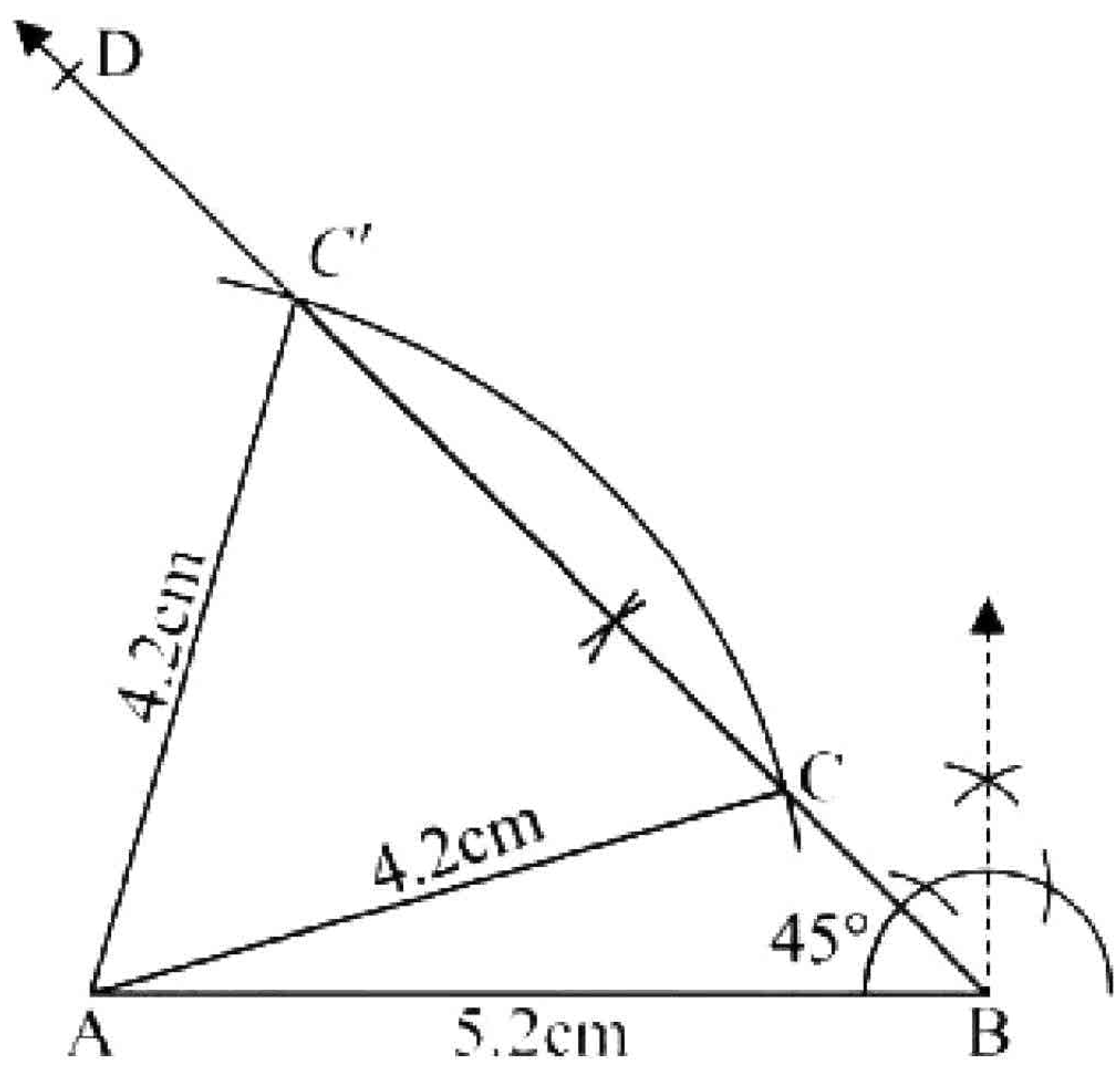
iii. Taking M as a centre draw a semi circle of radius $\overline{AM}$ or $\overline{BM}$ which intersects the right bisector at C.

iv. Join A to C and B to C.

Thus ΔABC is the right angled isosceles triangle with $\angle C = 90^o$.

Q.5 (Ambiguous case) Construct a Δ ABC in which

(i) $m\overline{AC} = 4.2cm$ $m\overline{AB} = 5.2cm$ $m\angle B = 45^o$



Construction:

i. Draw a line segment $m\overline{AB} = 5.2cm$.

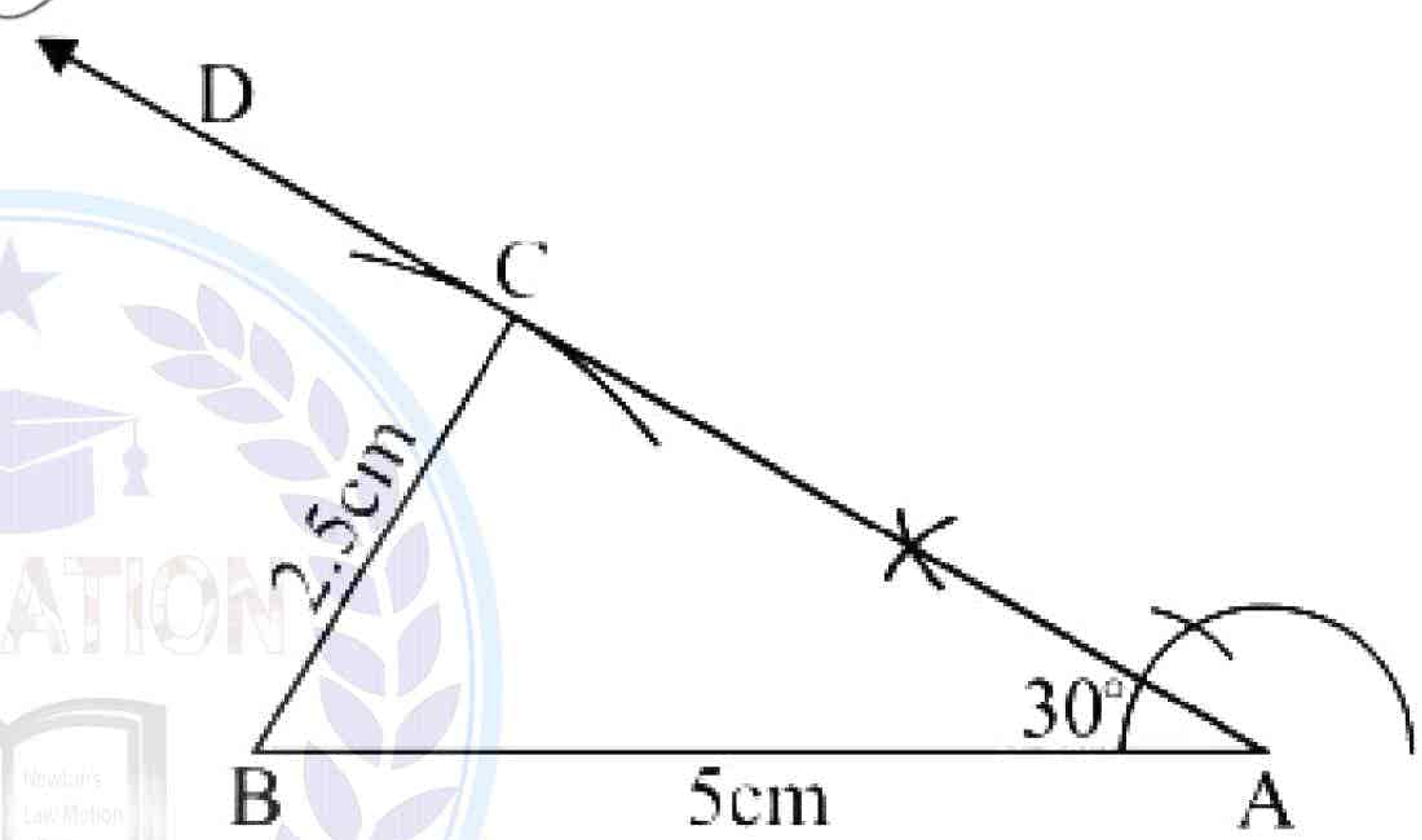
ii. At the end point B of $\overline{BA}$ make $\angle B = 45^o$.

iii. With centre at A and radius 4.2cm draw an arc which cuts $\overrightarrow{BD}$ in two distinct points C and C`.

iv. Draw $\overline{AC}$ and $\overline{AC'}$.

∴ ΔABC and ΔABC` are required triangles.

(ii) $m\overline{BC} = 2.5cm$ $m\overline{AB} = 5cm$ $m\angle A = 30^o$



Construction:

i. Take a line segment $m\overline{AB} = 5cm$.

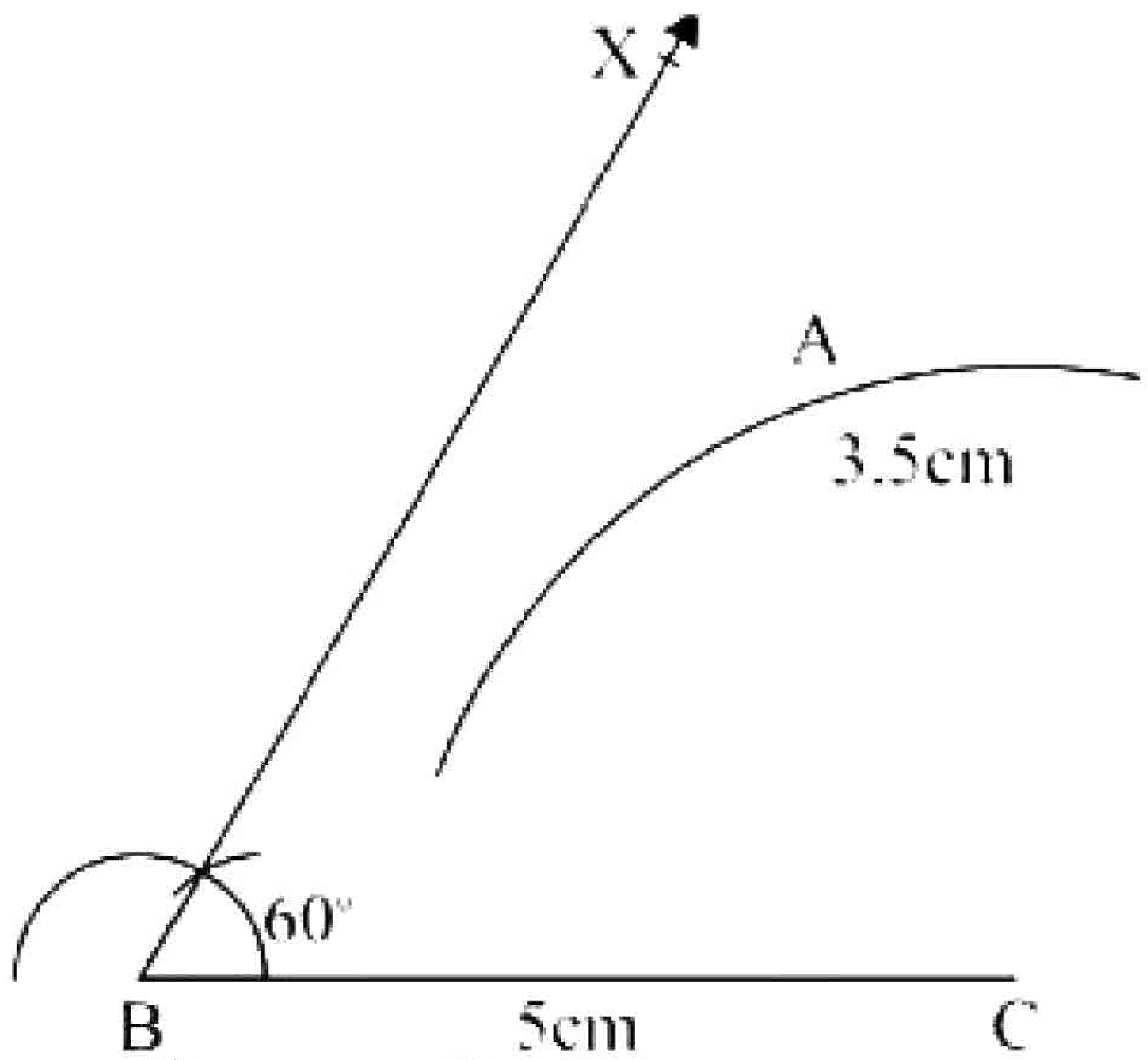
ii. At the end point A of $\overline{AB}$ make $m\angle A = 30^o$.

iii. Taking B as centre draw an arc of radius 2.5cm which touch as $\overrightarrow{AD}$ at point C.

iv. Join B to C.

∴ ΔABC is required triangle.

(iii) $m\overline{BC} = 5cm$ $m\overline{AC} = 3.5cm$ $m\angle B = 60^o$



Construction:

i. Take a line segment $m\overline{BC} = 5cm$.

ii. At the end point B of $\overline{BC}$ make an angle of $\angle B = 60^\circ$.

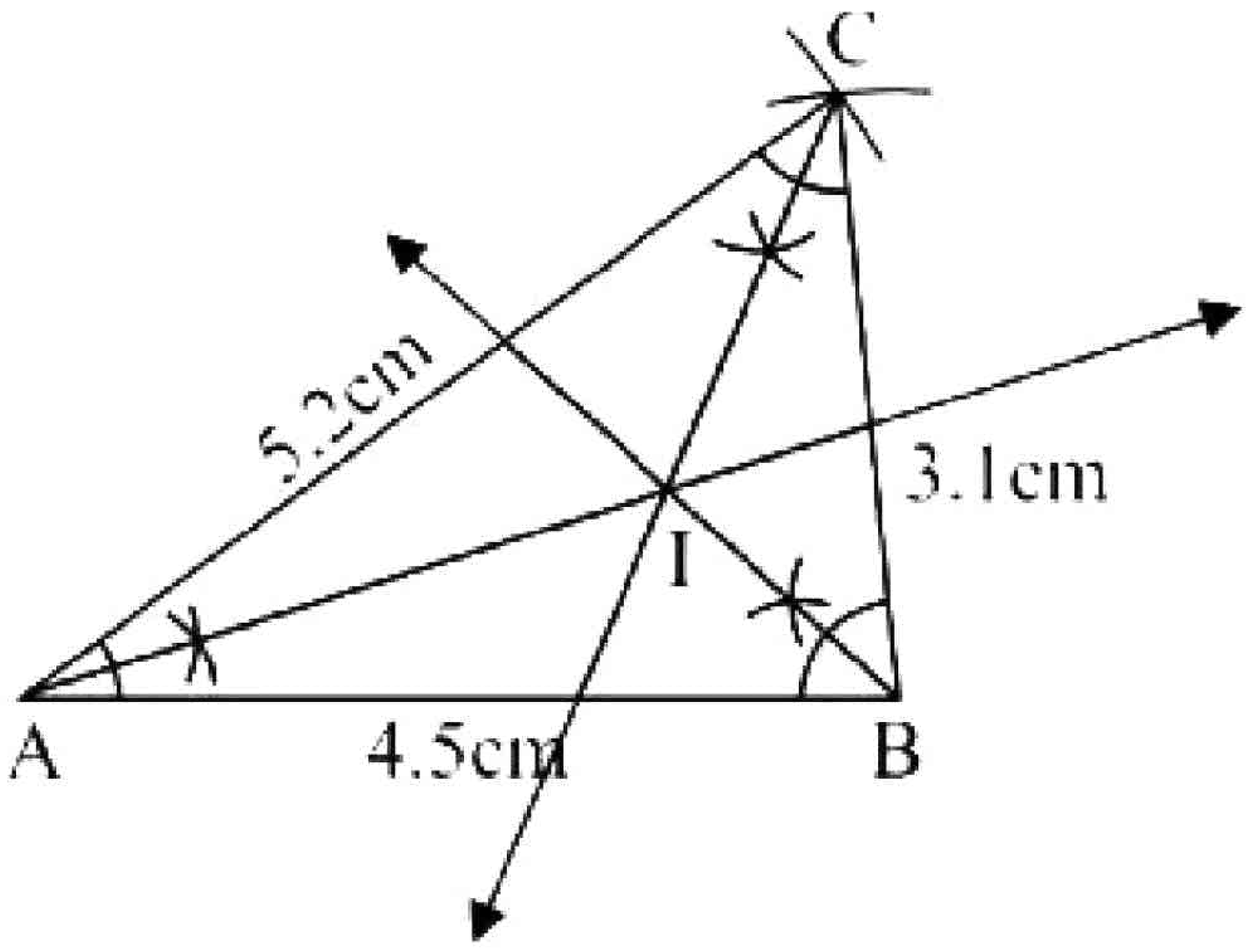
iii. Taking C as centre draw an arc of radius 3.5cm which does not touches or intersects $\overrightarrow{BX}$ at any point.

$\therefore$ ΔABC is not possible.

Exercise 17.2

Q.1 Construct the following Δ's ABC. Draw the Bisector of their angle and verify their Concurrency.

(i) $m\overline{AB} = 4.5cm \quad m\overline{BC} = 3.1cm \quad m\overline{CA} = 5.2cm$



i. Draw a line segment $m\overline{AB} = 4.5cm$.

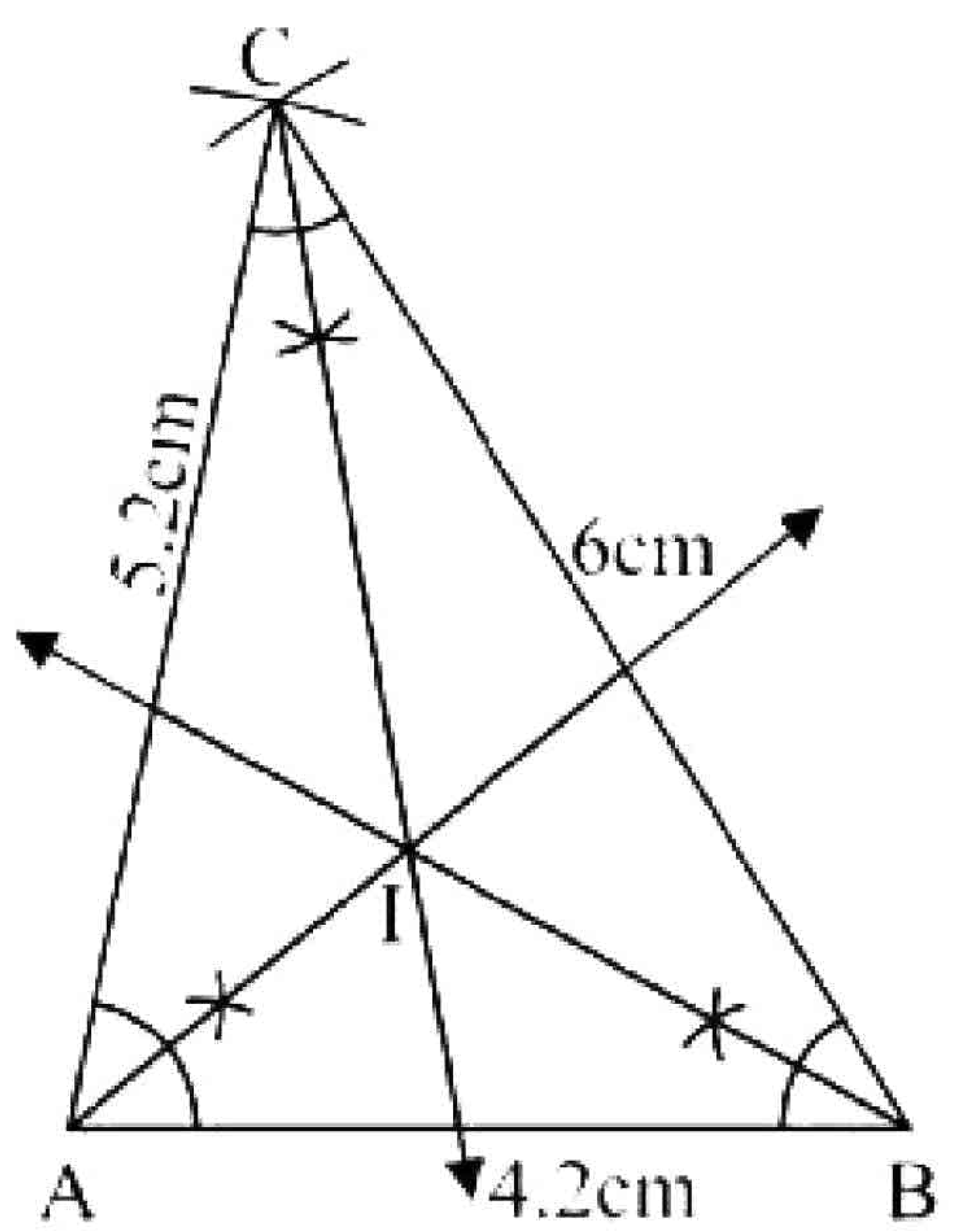
ii. Taking B as centre draw an arc of $m\overline{BC} = 3.1cm$.

iii. Taking A as centre draw a arc $m\overline{AC} = 5.2cm$ to cut C.

iv. Join C to B and C to A.

v. Draw the angle bisectors of $\angle A, \angle B$ and $\angle C$ meeting each other at the point I.
All the angle bisectors pass through point I. hence angle bisectors of ΔABC are concurrent.

(ii) $m\overline{AB} = 4.2cm \quad m\overline{BC} = 6cm \quad m\overline{CA} = 5.2cm$



i. Draw a line segment $\overline{AB} = 4.2cm$.

ii. Taking A as centre draw an arc of radius $5.2cm$.

iii. Taking B as centre draw another arc of radius $6cm$ to intersect the first arc at C.

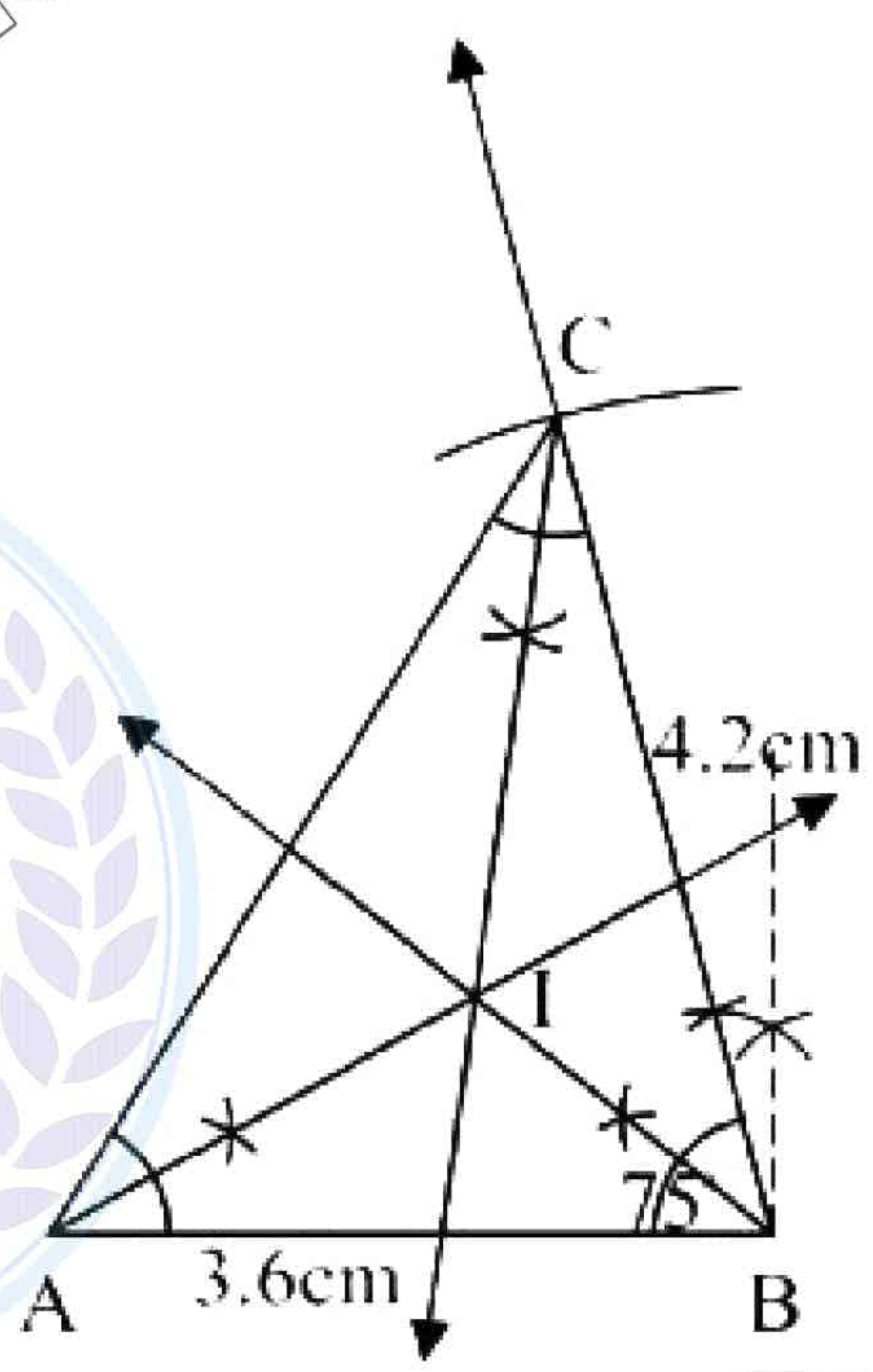
iv. Draw $\overline{AC}$ and $\overline{BC}$. Thus ΔABC is the required triangle.

v. Draw the bisectors of $\angle A$ and $\angle B$ meeting each other at point I.

vi. Now draw the bisector of third $\angle C$.

vii. We observe that the third angle bisector also passes through the point I.
Hence the angle bisectors of the ΔABC are concurrent at I.

(iii) $m\overline{AB} = 3.6cm \quad m\overline{BC} = 4.2cm \quad m\angle B = 75^\circ$



i. Draw a line segment $m\overline{AB} = 3.6$cm .

ii. Taking B as center draw an angle of 75° .

iii. Taking B as centre draw an arc of radius $4.2cm$ to intersect the terminal sides of angle at C.

iv. Draw $\overline{AC}$ to complete ΔABC.

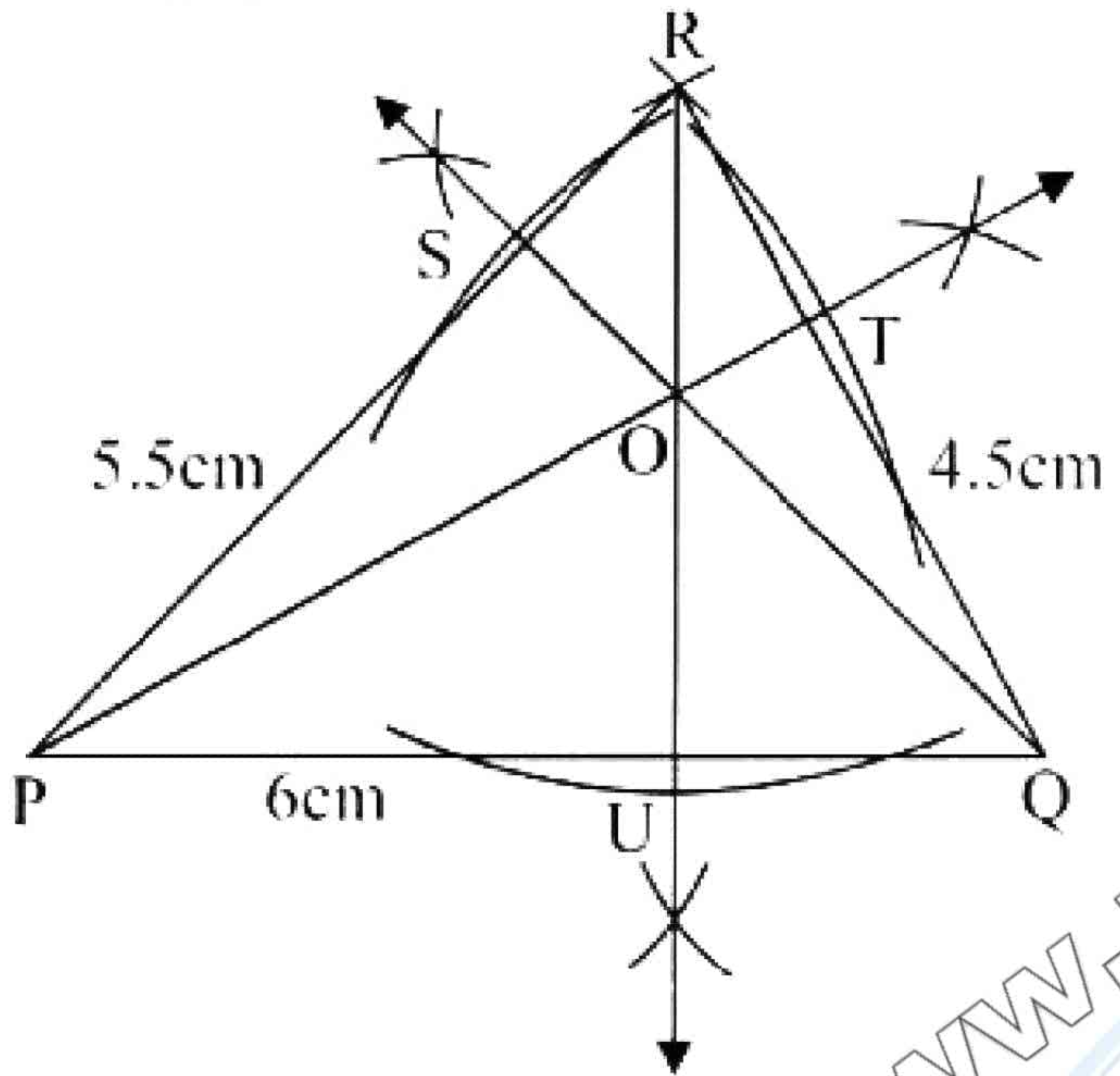
v. Draw the bisector of $\angle A$ and $\angle B$ meeting each other at point I.

vi. Now draw the bisector of the third angle $\angle C$.

vii. We observe that third angle bisector also passes through the point I.
Hence the angle bisectors of the ΔABC are concurrent at I which lies within the triangle.

Q.2 Construct the following triangles PQR. Draw their altitudes and show that they are concurrent.

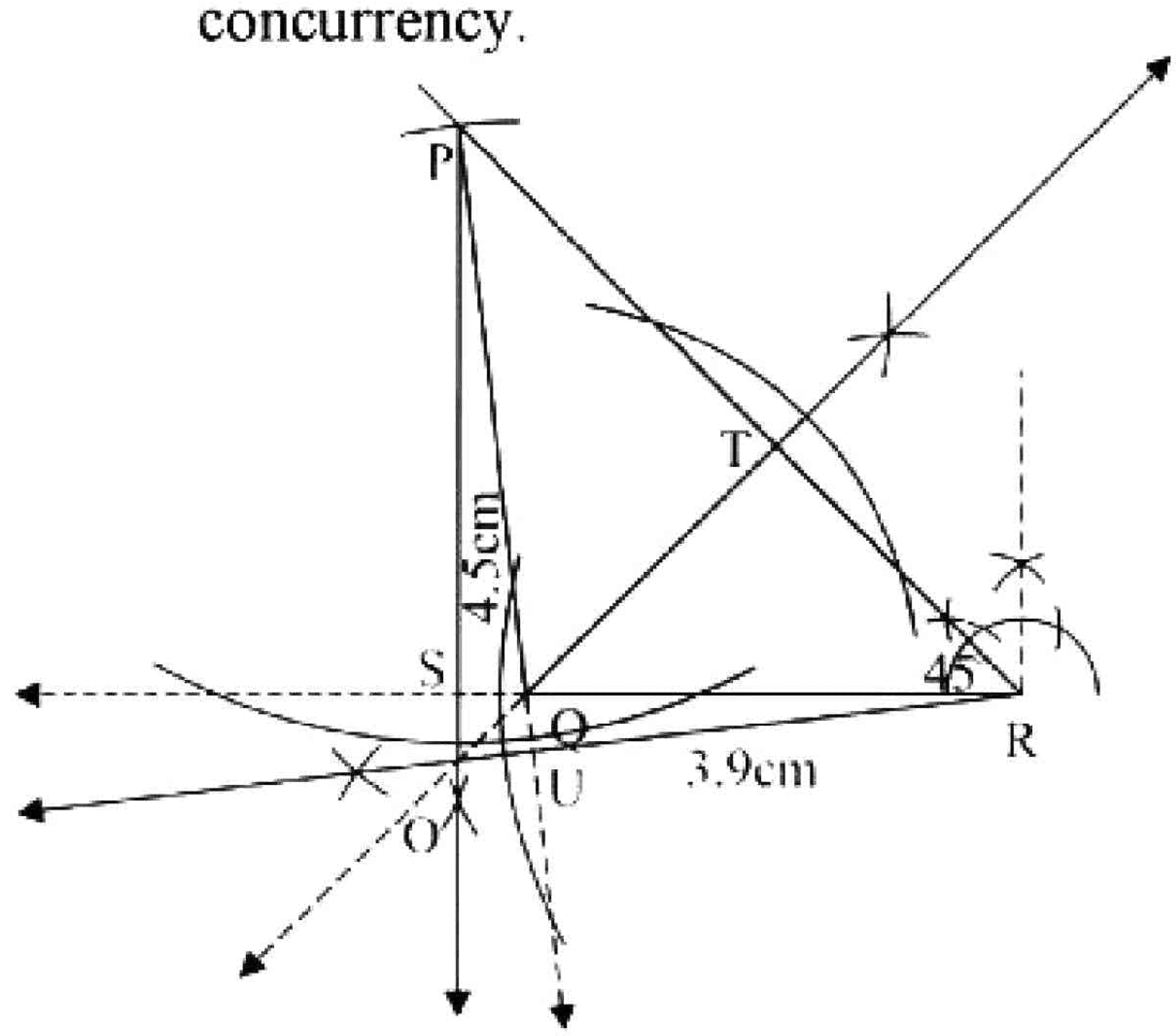
(i) $m\overline{PQ} = 6cm, m\overline{QR} = 4.5cm$ and $m\overline{PR} = 5.5cm$



i. Draw a line segment $m\overline{PQ} = 6cm$.
ii. Taking P as centre draw an arc of radius $5.5cm$.
iii. Taking Q as centre draw another arc of radius $4.5cm$ to intersect the first arc at R.
iv. Join P to R and Q to R to complete ΔPQR.
v. From vertex P drop $\overline{PT} \perp \overline{QR}$.
vi. Form vertex Q drop $\overline{QS} \perp \overline{PR}$.
vii. Now from third vertex R drop $\overline{RU} \perp \overline{PQ}$.
viii. We observe that third altitude also passes through the point of intersection O of the first two.
Hence three altitudes of ΔPQR are concurrent at O.

(ii) $m\overline{PQ} = 4.5cm\ m\overline{QR} = 3.9cm\ m\angle R = 45^\circ$

Required:
i. To construct ΔPQR.
ii. To draw altitudes and verify their concurrency.



Construction:
i. Draw a line segment $m\overline{QR} = 3.9cm$.
ii. Taking R as centre draw an angle of 45°.
iii. Taking Q as centre draw an arc of radius $4.5cm$ which intersects the terminal side of angle at P.
iv. Join P to Q to complete the ΔPQR.
v. From vertex P drop $\overline{PS} \perp \overline{RQ}$ produced.
vi. From vertex Q drop $\overline{QT} \perp \overline{PR}$.
vii. Form vertex R drop $\overline{RU} \perp \overline{PQ}$ produced.
Hence the three altitudes of ΔPQR are concurrent at point O.

(iii) $m\overline{RP}=3.6cm$ $m\angle Q=30^\circ$ $m\angle P=105^\circ$

Sum of three angles in a triangle is 180° so,

$\angle P+\angle Q+\angle R=180^\circ$

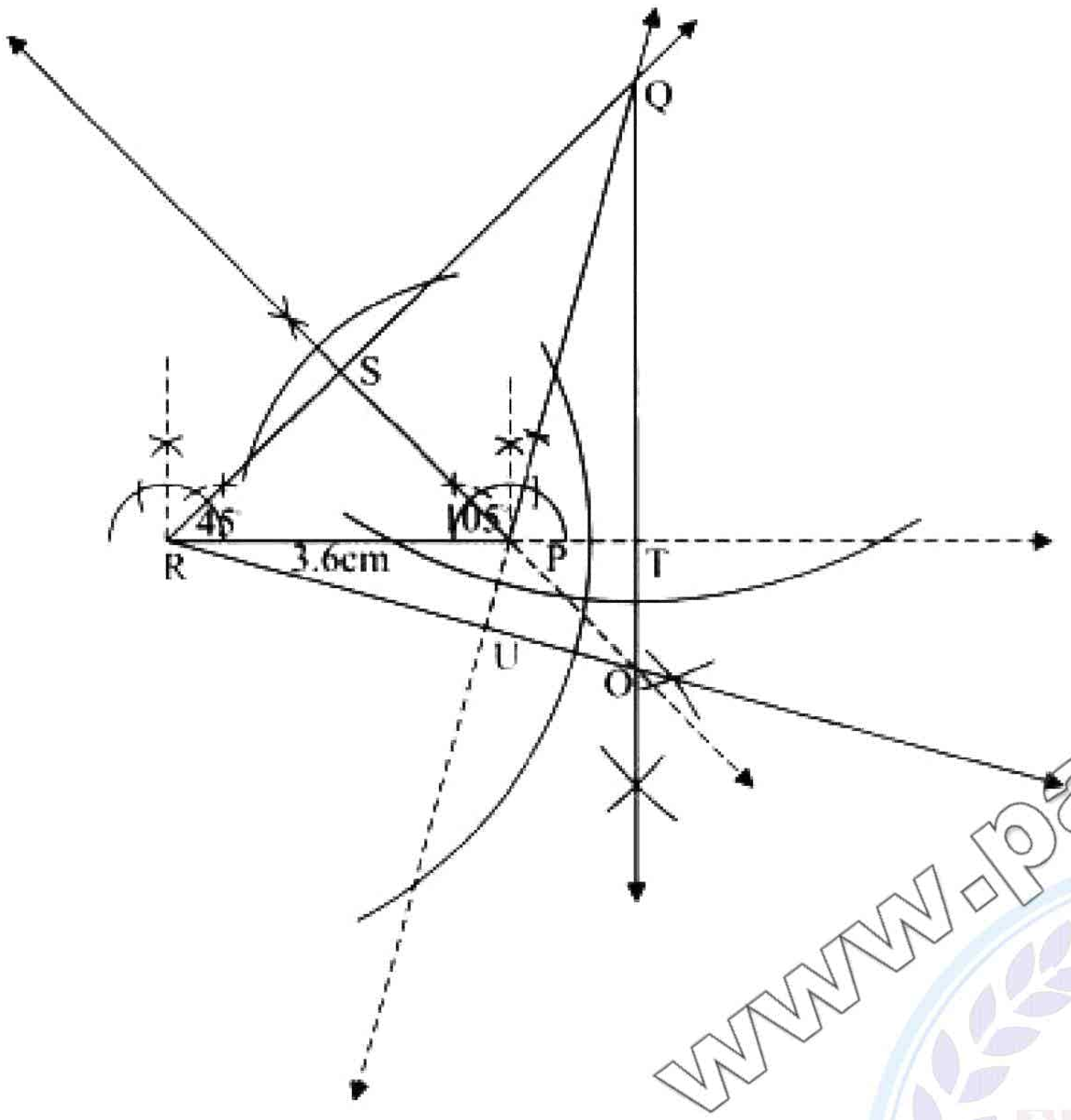
$105+30+\angle R=180^\circ$

$135+\angle R=180^\circ$

$\angle R=180^\circ-135^\circ$

$\angle R=45^\circ$

So



Construction:

i. Draw a line segment $m\overline{RP}=3.6cm$.

ii. Taking R as centre, construct an angle of 45°.

iii. Taking P as centre draw an angle of 105°.

iv. Terminal arms of both angles meet in point Q forming ΔPQR.

v. From vertex P drop $\overline{PS}\perp\overline{RQ}$.

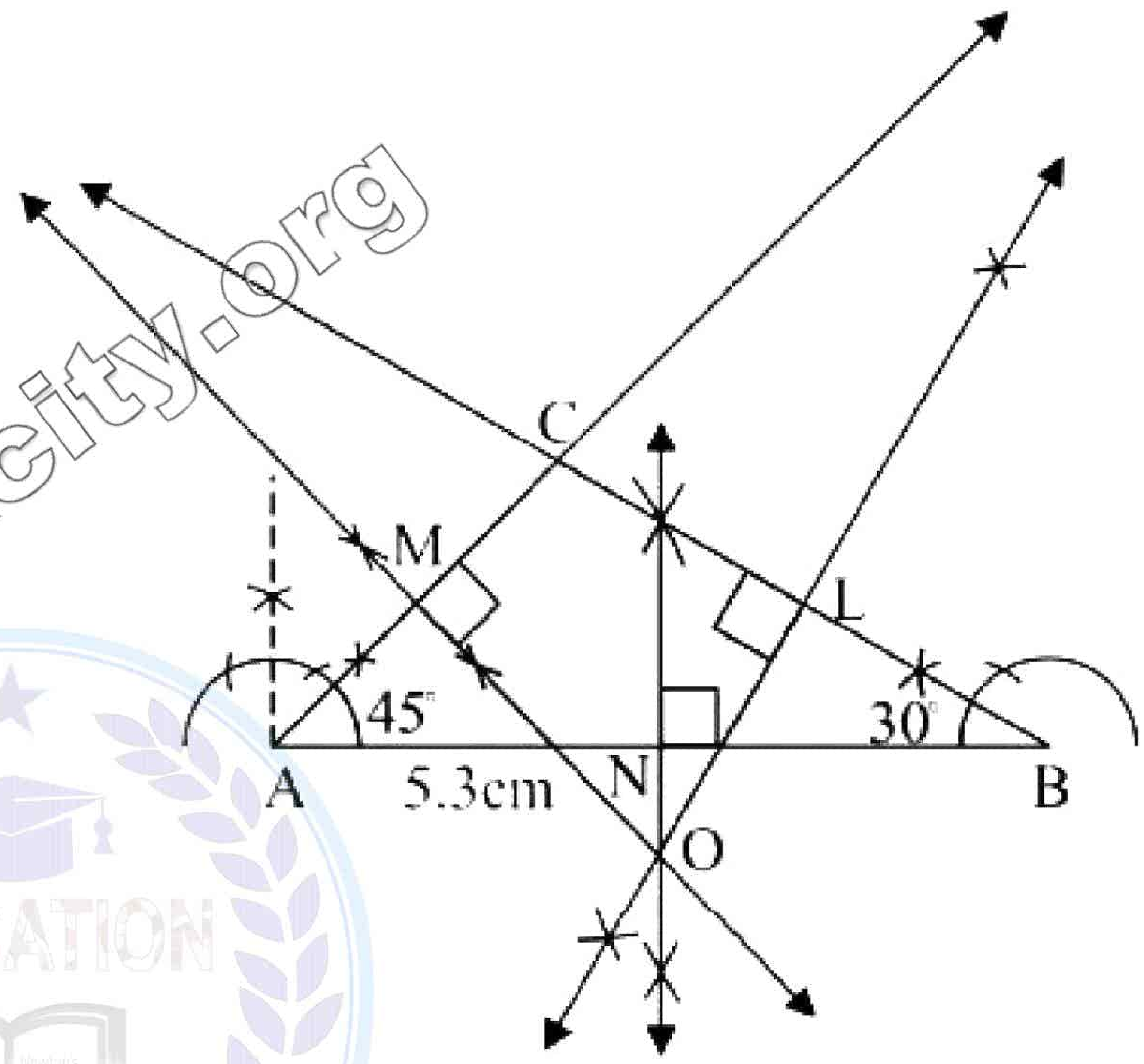
vi. From vertex Q drop $\overline{QT}\perp\overline{RP}$ produced.

vii. Form vertex R drop $\overline{RU}\perp\overline{QP}$ produced.

Hence the three altitudes of ΔPQR are concurrent at point O.

Q.3 Contract the following triangles ABC draw the perpendicular bisector of three sides and verify their concurrency. Do they meet inside the triangle?

(i) $\overline{AB}=5.3cm$ $m\angle A=45^\circ$ $m\angle B=30^\circ$



Construction:

i. Draw a line segment $m\overline{AB}=5.3cm$.

ii. At the end point A of $\overline{AB}$ make $m\angle A=45^\circ$.

iii. At the end point B of $\overline{AB}$ make $m\angle B=30^\circ$.

iv. Terminal sides of two angles meet at C. The ABC is requiredΔ.

v. Draw perpendicular bisectors of $\overline{AB},\overline{BC}$ and $\overline{CA}$ meeting each other in the point O.

Hence the three perpendicular bisectors of sides of ΔABC are concurrent at O outside the triangle.

(ii) $m\overline{BC} = 2.9cm$ $m\angle A = 30°$ $m\angle B = 60°$

The sum of three angles in a triangle is 180° then

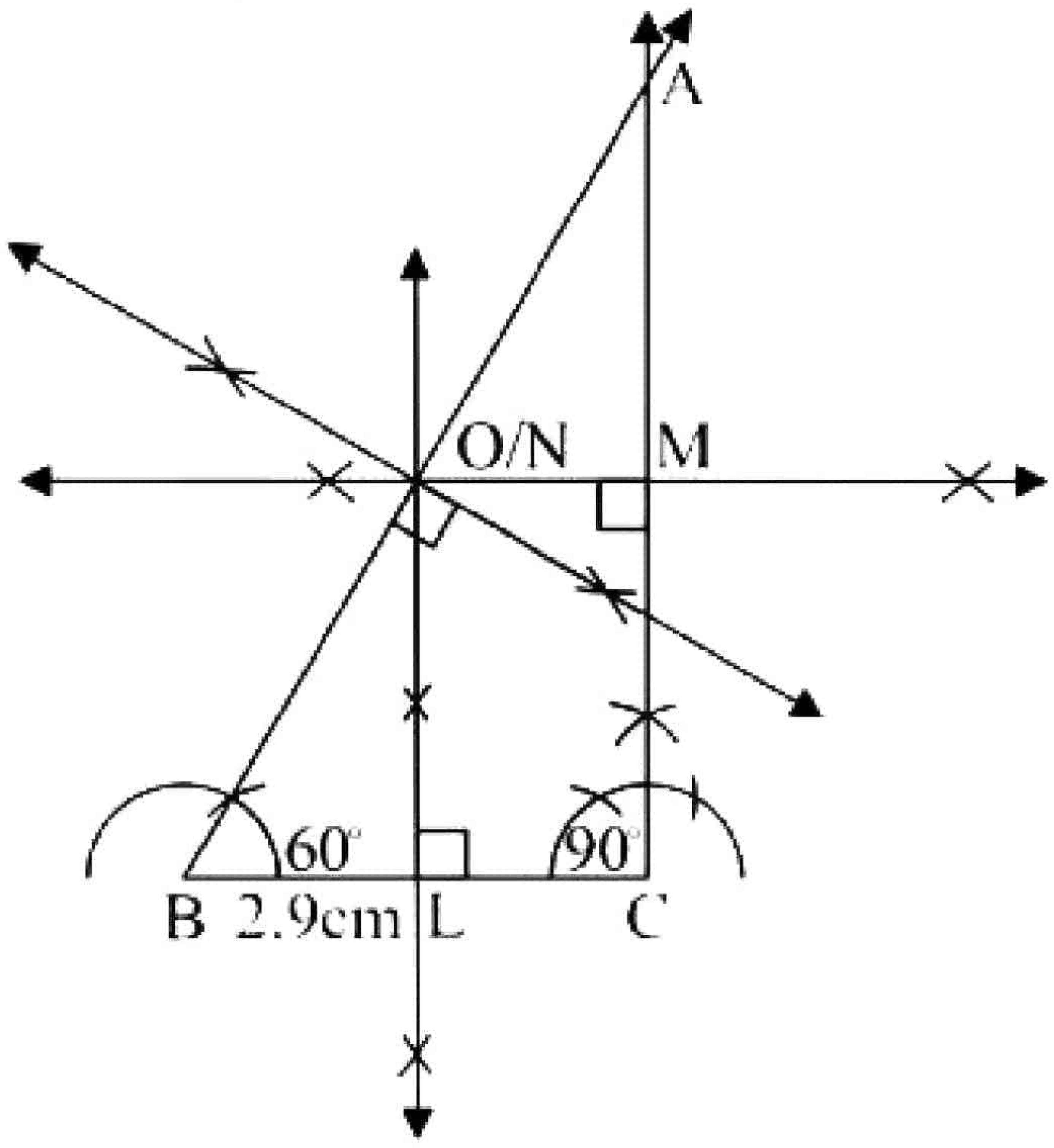
$\angle A + \angle B + \angle C = 180°$

$30 + 60 + \angle C = 180°$

$90 + \angle C = 180°$

$\angle C = 180° - 90°$

$\angle C = 90°$



Construction:

i. Draw a line segment $m\overline{BC} = 2.9cm$.

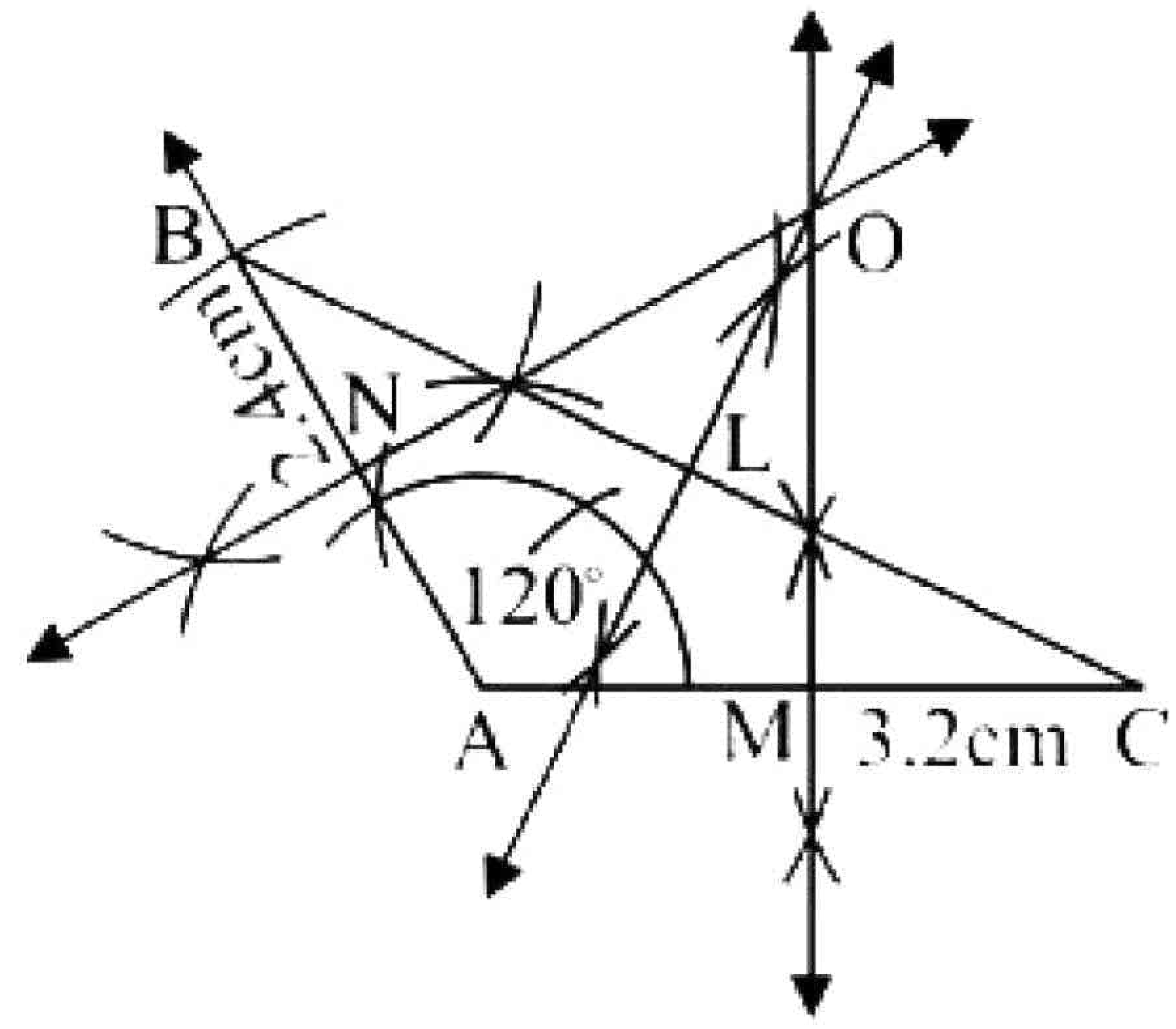
ii. At the end point B of $\overline{BC}$ make $m\angle B = 60°$.

iii. At the end point C of $\overline{BC}$ make $m\angle C = 90°$.

iv. Terminal sides of two angles meet at A. The ABC is requiredΔ.

v. Draw perpendicular bisectors of $\overline{AB}, \overline{BC}$ and $\overline{CA}$ meeting each other at the point O.
Hence the three perpendicular bisectors of sides of ΔABC are concurrent at O, at the mid point of hypotenuse.

(iii) $m\overline{AB} = 2.4cm$ $m\overline{AC} = 3.2cm$ $m\angle A = 120°$



Construction:

i. Take $\overline{AC} = 3.2cm$.

ii. At A draw an angle of 120°.

iii. Taking centre A draw an arc of radius 2.4cm which cuts the terminal side of angle A at point B.

iv. Join C to B, ΔABC is the triangle.

v. Draw perpendicular bisectors of $\overline{AB}, \overline{BC}$ and $\overline{CA}$ meeting each other at the point O outside the triangle.
Hence all the three perpendicular bisectors are concurrent.

Q.4 Construct the following Δs XYZ. Draw their three medians and show that they are concurrent.

(i) $m\overline{YZ} = 4.1cm$ $m\angle Y = 60°$ $m\angle X = 75°$

Sum of three angles in a triangle is 180° then

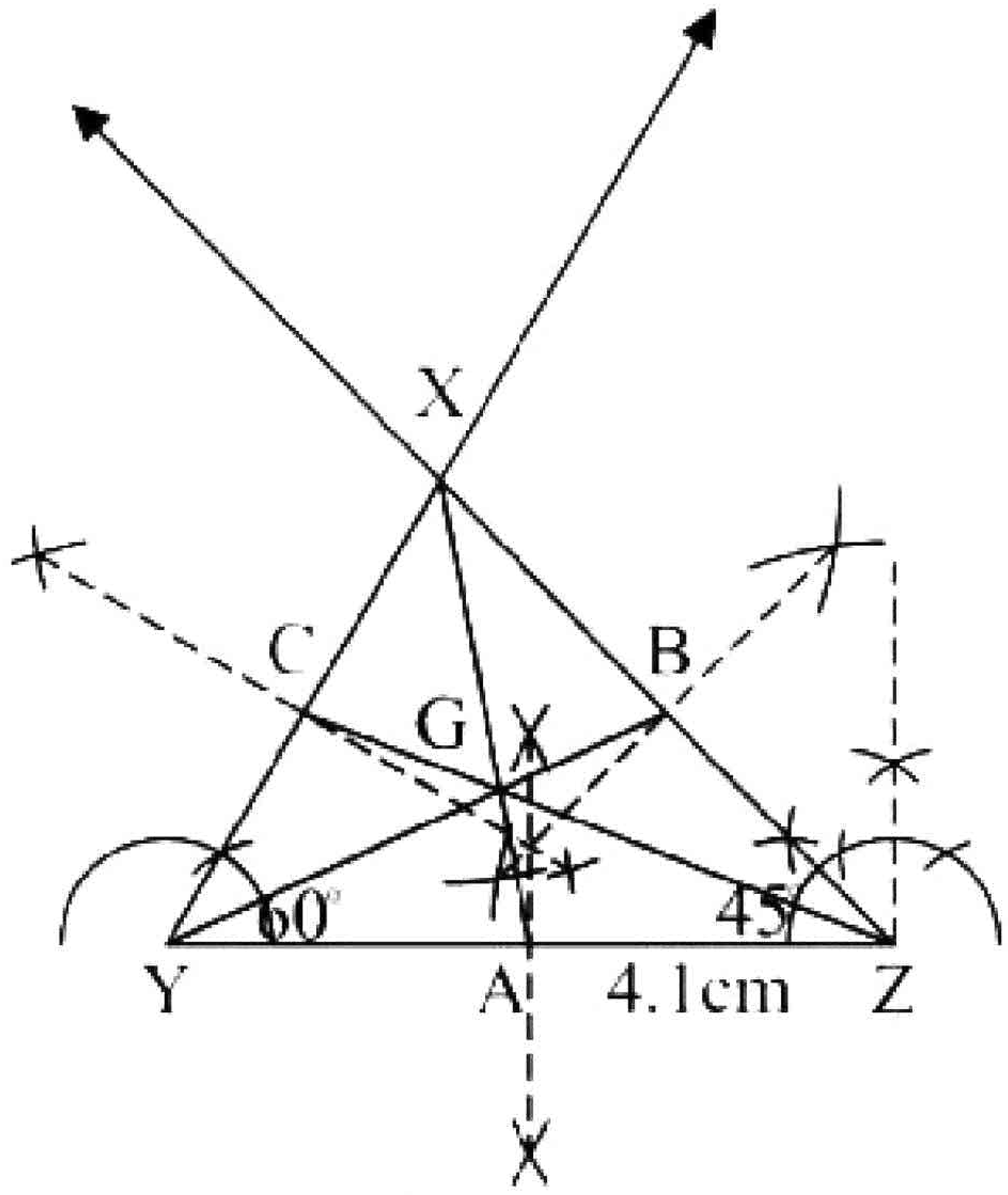
$m\angle X + m\angle Y + m\angle Z = 180°$

$75 + 60 + m\angle Z = 180°$

$135 + m\angle Z = 180°$

$m\angle Z = 180° - 135°$

$m\angle Z = 45°$



Construction:

i. Take $m\overline{YZ} = 4.1cm$.

ii. Taking Z as centre draw an angle of 45°.

iii. Taking Y as centre draw an angle of 60°.

iv. The terminal sides of these angles meet at X.
Then XYZ is requiredΔ.

v. Draw perpendicular bisectors of the sides $\overline{XZ}, \overline{XY}$ and $\overline{YZ}$ of ΔXYZ and make their midpoints B,C and A respectively.

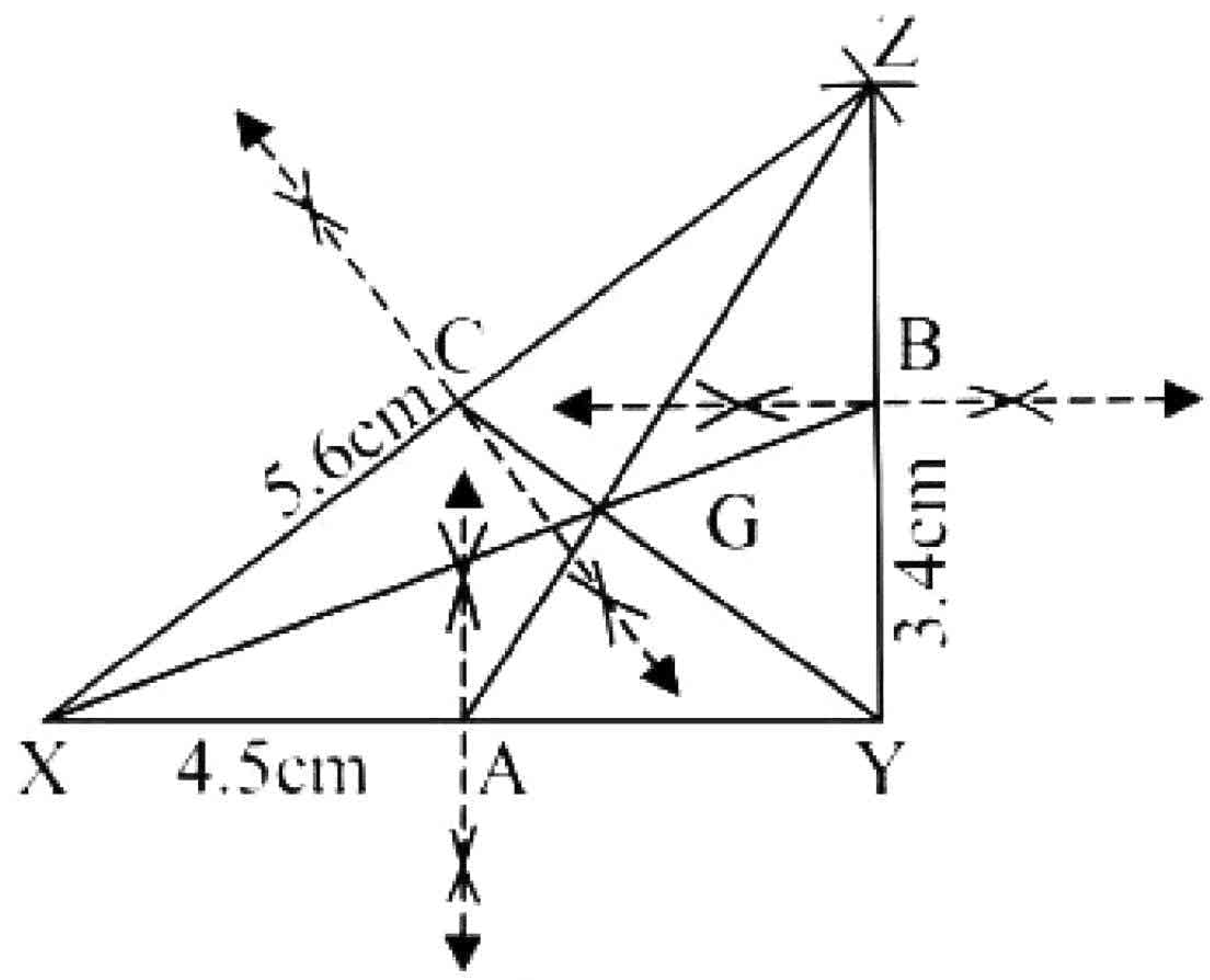
vi. Join Y to B, midpoint of XZ to get $\overline{YB}$ as median.

vii. Join Z to C midpoint of XY to get $\overline{ZC}$ as median.

viii. Join X to A midpoint of YZ to get $\overline{XA}$ as median.

All median intersect at point G. Hence the median are concurrent at G.

(ii) $m\overline{XY} = 4.5cm$ $m\overline{YZ} = 3.4cm$ $m\overline{ZX} = 5.6cm$



Construction:

i. Take $m\overline{XY} = 4.5cm$.

ii. Taking Y as centre draw an arc of radius 3.4cm.

iii. Taking X as center draw another arc of radius 6.5cm to cut at point Z.

iv. Join X to Z and Y to Z.

v. Draw perpendicular bisectors of the sides $\overline{XY}, \overline{YZ}$ and $\overline{XZ}$ of ΔXYZ and make their mid point A, B and C.

vi. Join Y to mid point C to get median $\overline{YC}$.

vii. Join Y to mid point B to get median $\overline{XB}$.

viii. Join Z to mid point A to get median $\overline{ZA}$.

All medians intersect at point G. Hence medians are concurrent at G.

(iii) $m\overline{ZX} = 4.3cm$ $m\angle X = 75°$ and $m\angle Y = 45°$

Sum of three angles in a triangle is 180° then

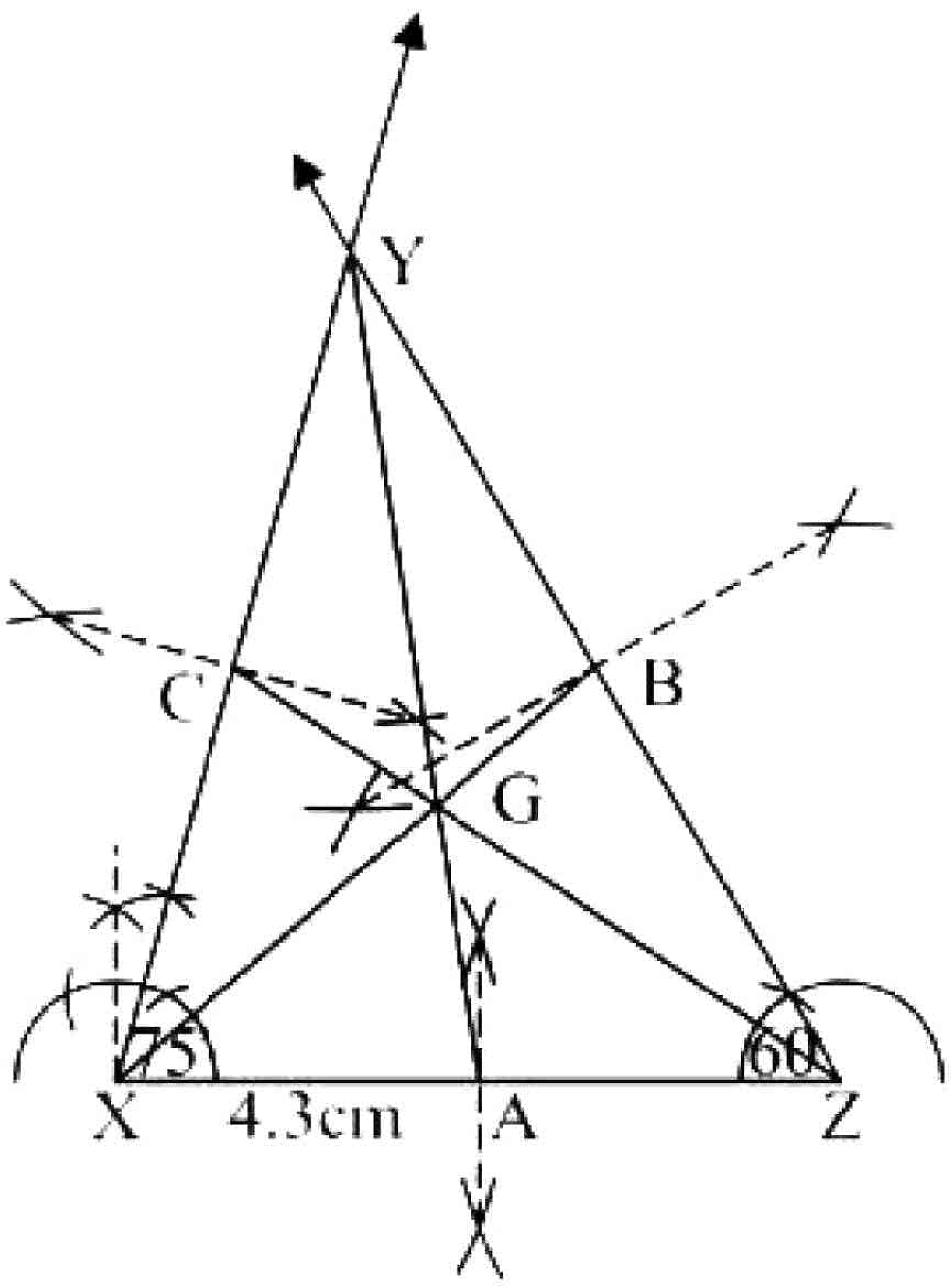
$$m\angle X + m\angle Y + m\angle Z = 180°$$

$$75 + 45 + m\angle Z = 180°$$

$$120° + m\angle Z = 180°$$

$$m\angle Z = 180° - 120°$$

$$m\angle Z = 60°$$



Construction:

i. Take $m\overline{ZX} = 4.3cm$.

ii. Taking Z as centre draw an angle of 60°.

iii. Taking X as centre draw an angle of 75°.

iv. The terminal sides of these angles meet at Y.
Then XYZ is required∆.

v. Draw perpendicular bisectors of the sides $\overline{XZ}, \overline{YZ}$ and $\overline{XY}$ of ∆XYZ and make their midpoints A,B and C respectively.

vi. Join X to midpoint B to get $\overline{XB}$ as median.

vii. Join Z to midpoint C to get $\overline{ZC}$ as median.

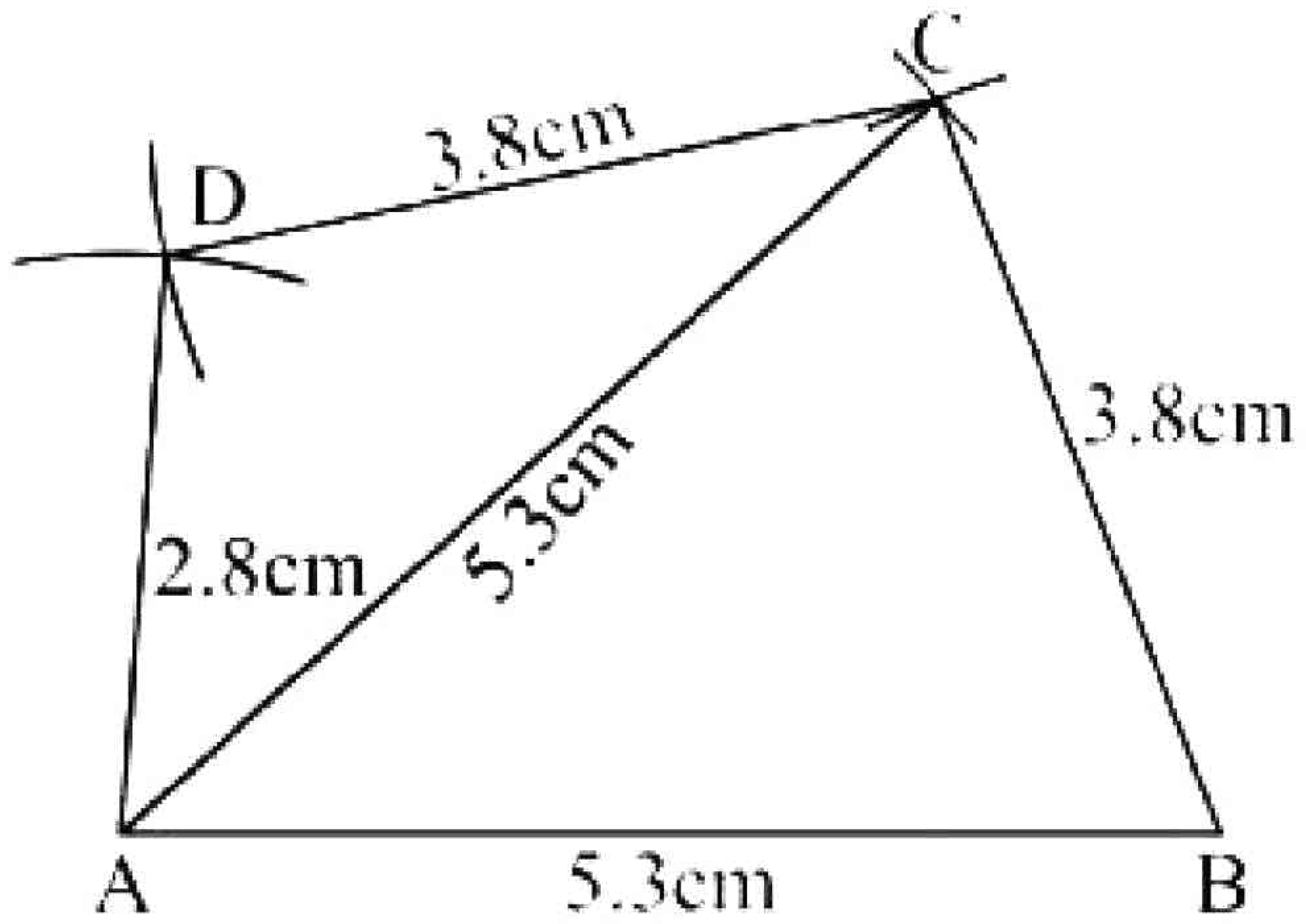
viii. Join Y to midpoint A to get $\overline{YA}$ as median.
All median intersect at point G.
Hence the median are concurrent at G.

Exercise 17.3

Q.1

(i) Construction a quadrilateral ABCD, having

$m\overline{AB} = \overline{AC} = 5.3cm$ $m\overline{BC} = m\overline{CD} = 3.8cm$ and $m\overline{AD} = 2.8cm$.



Construction:

i. Draw a line segment $\overline{AB} = 5.3cm$.

ii. Taking B as centre draw an arc of radius $\overline{BC} = 3.8cm$.

iii. Taking A as centre draw an arc of radius $\overline{AC} = 5.3cm$ to cut at C.

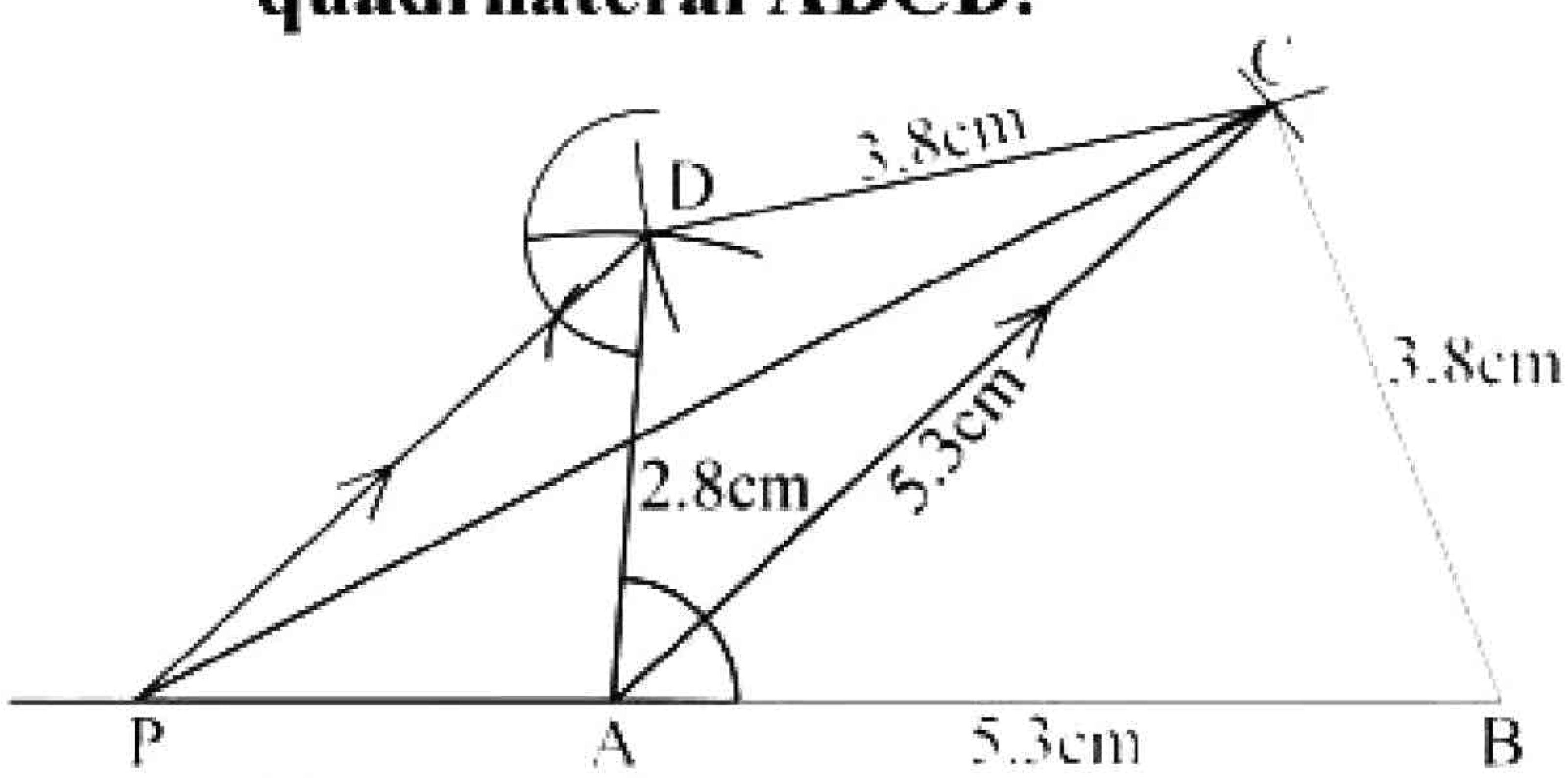
iv. Taking C as centre draw an arc of radius $\overline{CD} = 3.8cm$.

v. Taking A as centre draw an arc of radius $\overline{AB} = 2.8cm$ to cut at D.

vi. Join B to C, C to D, A to C and A to D.

ABCD is the required quadrilateral.

(ii) On the side $\overline{BC}$ construct a Δequal in area to the quadrilateral ABCD.



Construction:

i. Join A to C.

ii. Through D draw $\overline{DP} \parallel \overline{CA}$ meeting $\overline{BA}$ produced at P.

iii. Join $\overline{PC}$.

iv. Then PBC is required triangle.

$\Delta s\ APC, ADC$ stand on the same base AC and same parallels AC and PD.

Hence

$\Delta APC = \Delta ADC$

$\Delta APC + \Delta ABC = \Delta ADC + \Delta ABC$

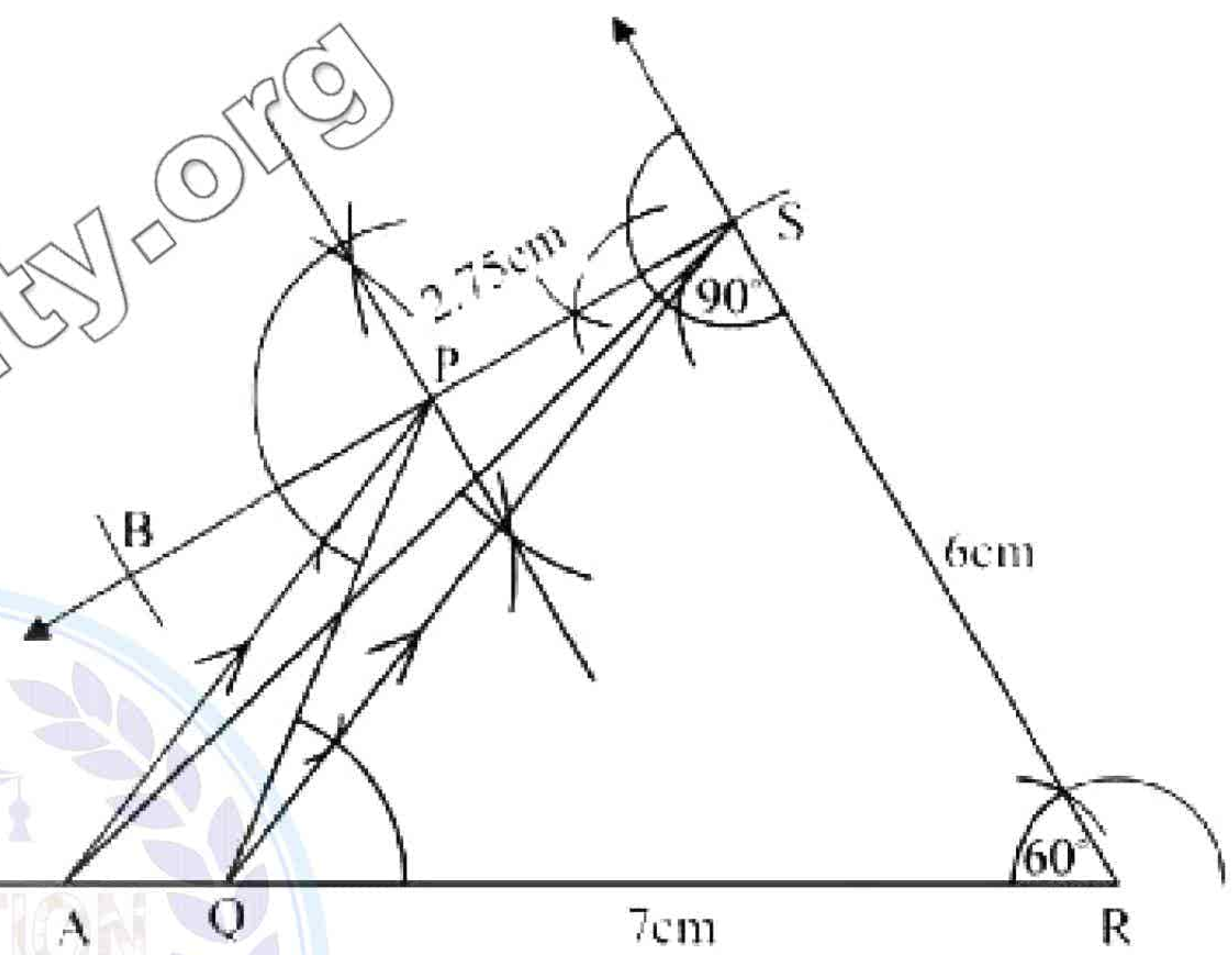
or ΔPBC =quadrilateral ABCD

Q.2 Construct a Δ equal to the quadrilateral PQRS, having

$m\overline{QR} = 7cm$ $m\overline{RS} = 6cm$

$m\overline{SP} = 2.75cm$ $m\angle QRS = 60°$

and $m\angle RSP = 90°$.



Construction:

i. Draw a line segment $\overline{QR} = 7cm$.

ii. At point R draw an angle of 60°.

iii. Taking R as center draw an arc of radius of 6cm to cut at S.

iv. At point S draw an angle 90°.

v. Taking S as centre draw an arc of radius of 5.5cm, cutting the terminal side of 90° at point B.

vi. Find the mid point of $m\overline{SB}$ at point P.

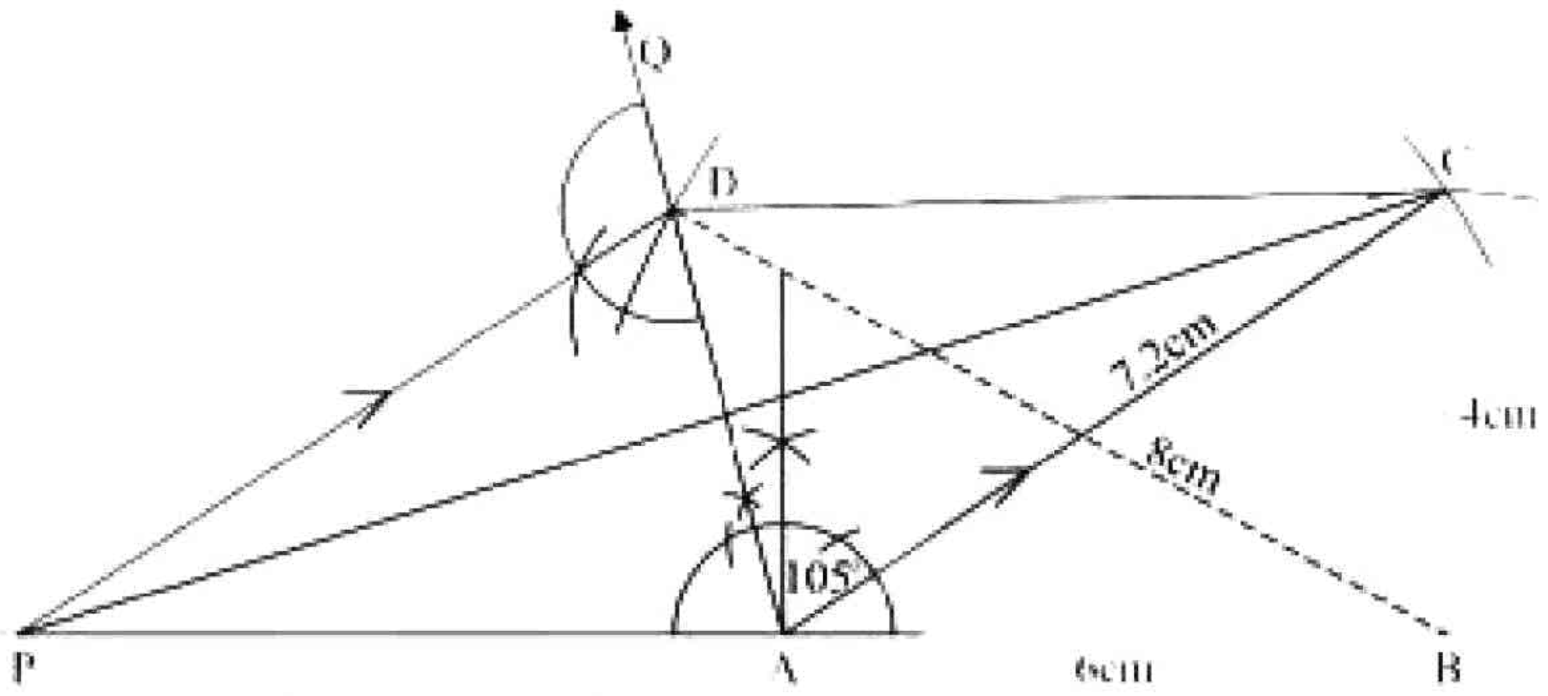
vii. Join P to Q.

viii. Draw $\overline{PA}$ parallel to $\overline{SQ}$

ix. Join A to S.

x. ΔARS is required triangle equal in area to quadrilateral PQRS.

Q.3 Construct a Δequal in area to quadrilateral ABCD having
$m\overline{AB} = 6cm \quad m\overline{BC} = 4cm,$
$\overline{AC} = 7.2cm \quad m\angle BAD = 105^\circ$
and $m\overline{BD} = 8cm$ **.**



Construction:

i. Draw a line segment $\overline{AB} = 6cm$.

ii. Taking A as centre draw an arc of radius 7.2cm.

iii. Taking B as centre draw an arc of radius $4cm$ to cut at C. Join C to A and C to B.

iv. Taking A as centre make an angle $\angle QAB = 105^\circ$.

v. Taking B as centre make an arc of radius 8cm to cut at D point.

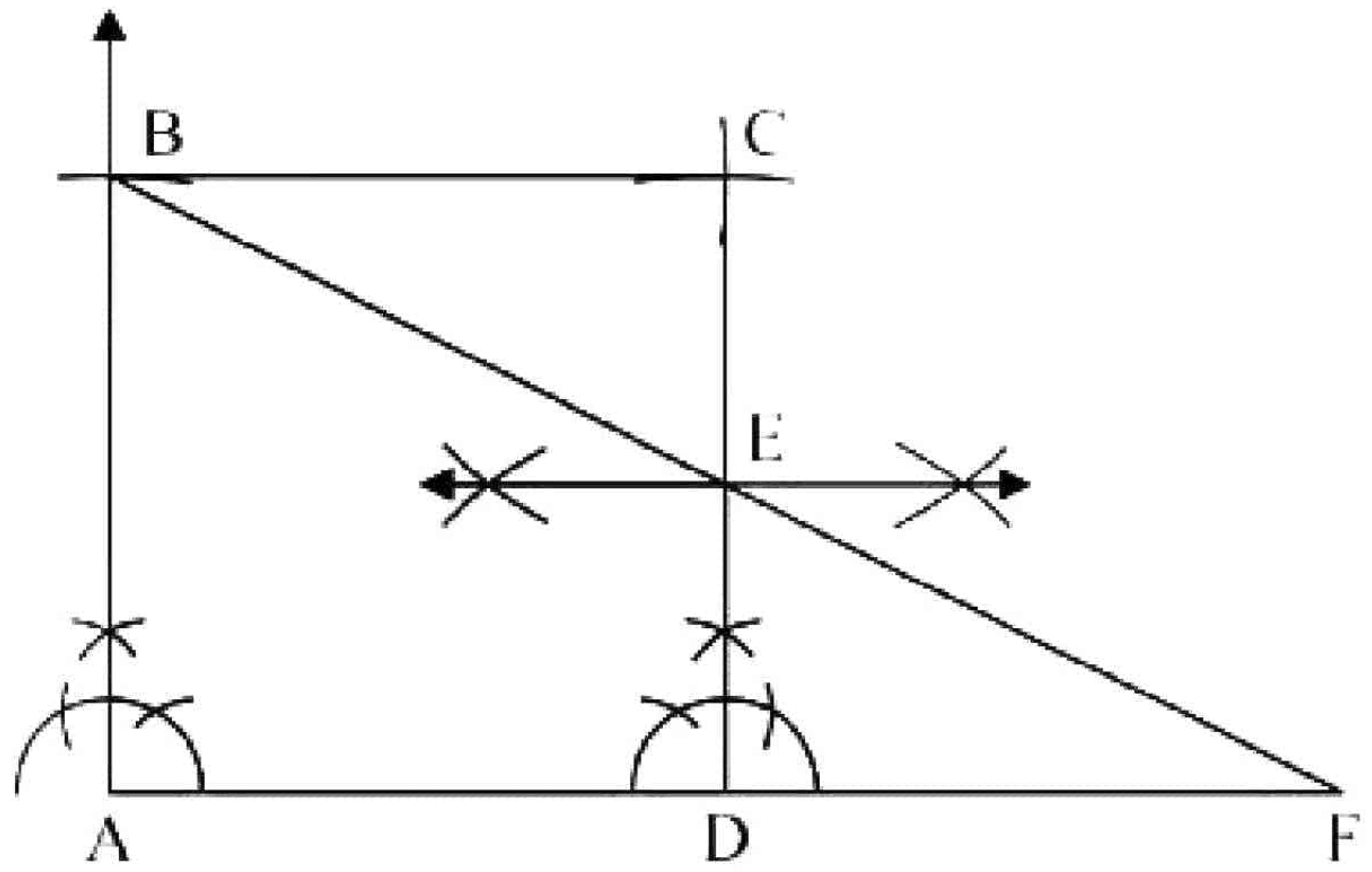
vi. Join D to C to complete the ABCD quadrilateral.

vii. Draw $\overline{DP} \parallel \overline{CA}$ o meet $\overrightarrow{BA}$ produced at P.

viii. Join C to P.

Thus ΔPBC is the required triangle.

Q.4 Construct a right angled triangle equal in area to given square.



Construction:

Let measurement of each side of square is 3.8cm.

i. Construct a square ABCD with each side 3.8cm long.

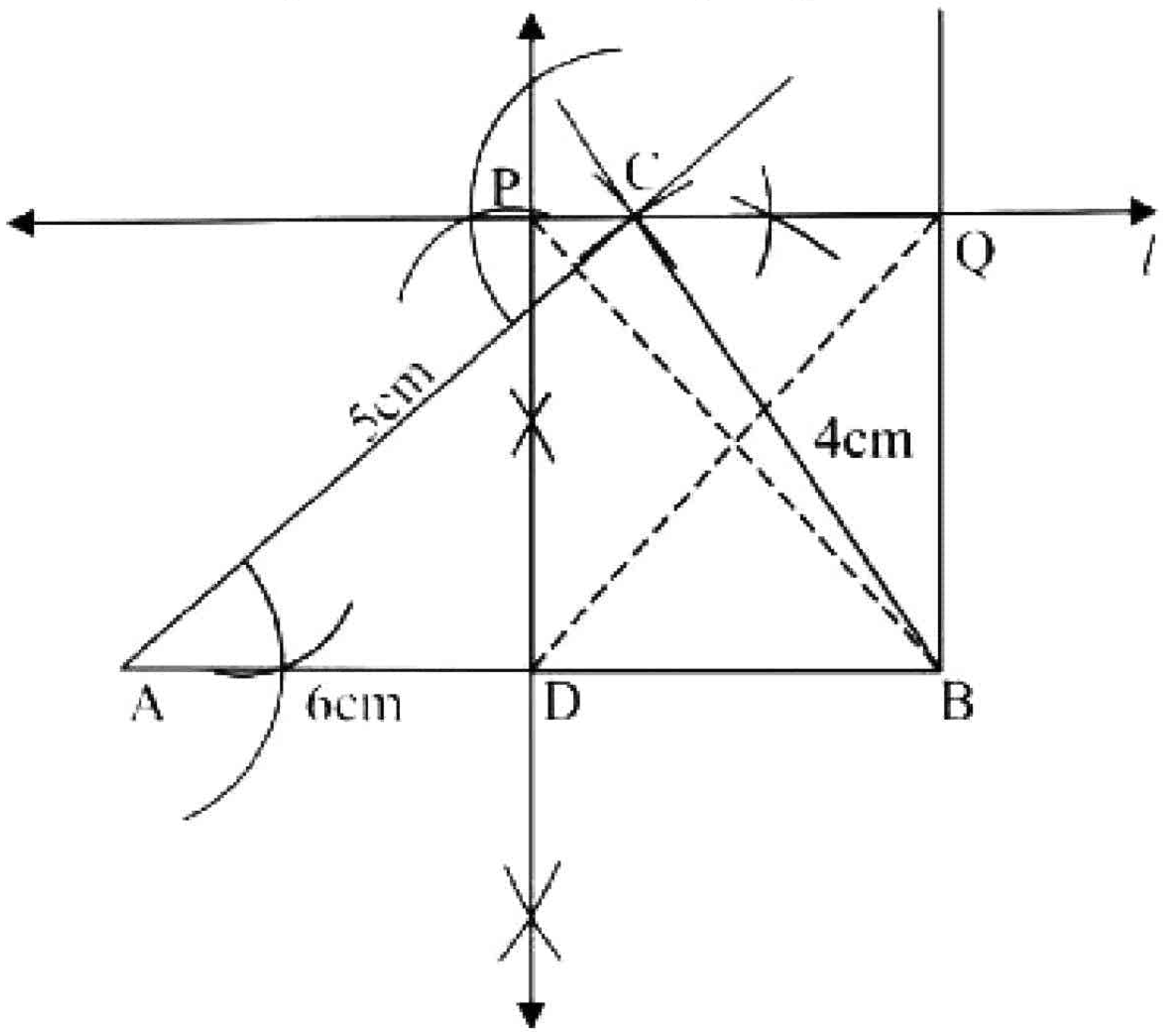
ii. Bisect $\overline{CD}$ at E .

iii. Join B to E and produced it to meet $\overline{AD}$ produced in F.

ΔABF is required triangle equal in area to square ABCD.

Exercise 17.4

Q.1 Construct a Δ with sides 4cm, 5cm and 6cm and construct a rectangle having its area equal to that of the Δ measure its diagonals. Are they equal



Construction:

i. Draw a line segment $\overline{AB} = 6cm$.

ii. Taking A as centre draw an arc of radius 5cm.

iii. Taking B as centre draw an arc of radius 4cm to cut at C. Join A to C and B to C.

iv. ABC is the requiredΔ.

v. Draw a line l through C parallel to $\overline{AB}$.

vi. Draw the ⊥ bisector of $\overline{AB}$ in D and cutting the line at P.

vii. On the line l, cut $\overline{PQ}$ equal to $\overline{DB}$.

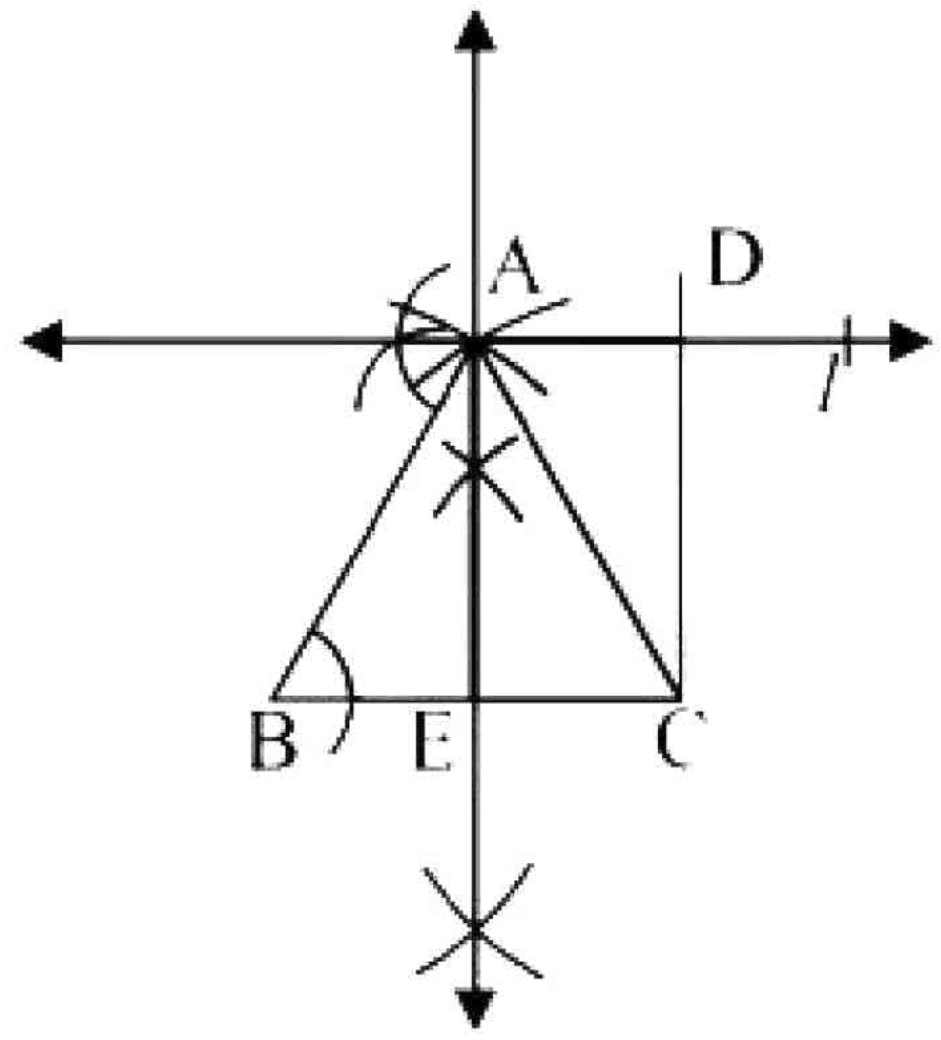
viii. Join B to Q.

ix. PQBD is the required rectangle.

x. The length of each diagonal measured to be 4.5cm.

xi. The length of each diagonal is same.

Q.2 Transform an isosceles Δ into a rectangle.



Construction:

i. Draw a line segment $\overline{BC}$.

ii. With B as centre draw in arc of suitable radius.

iii. With C as centre draw another are of same radius which cuts the first arc at point A.

iv. Join A to B and A to C.

v. ΔABC is the isosceles Δ with $m\overline{AB} = m\overline{AC}$.

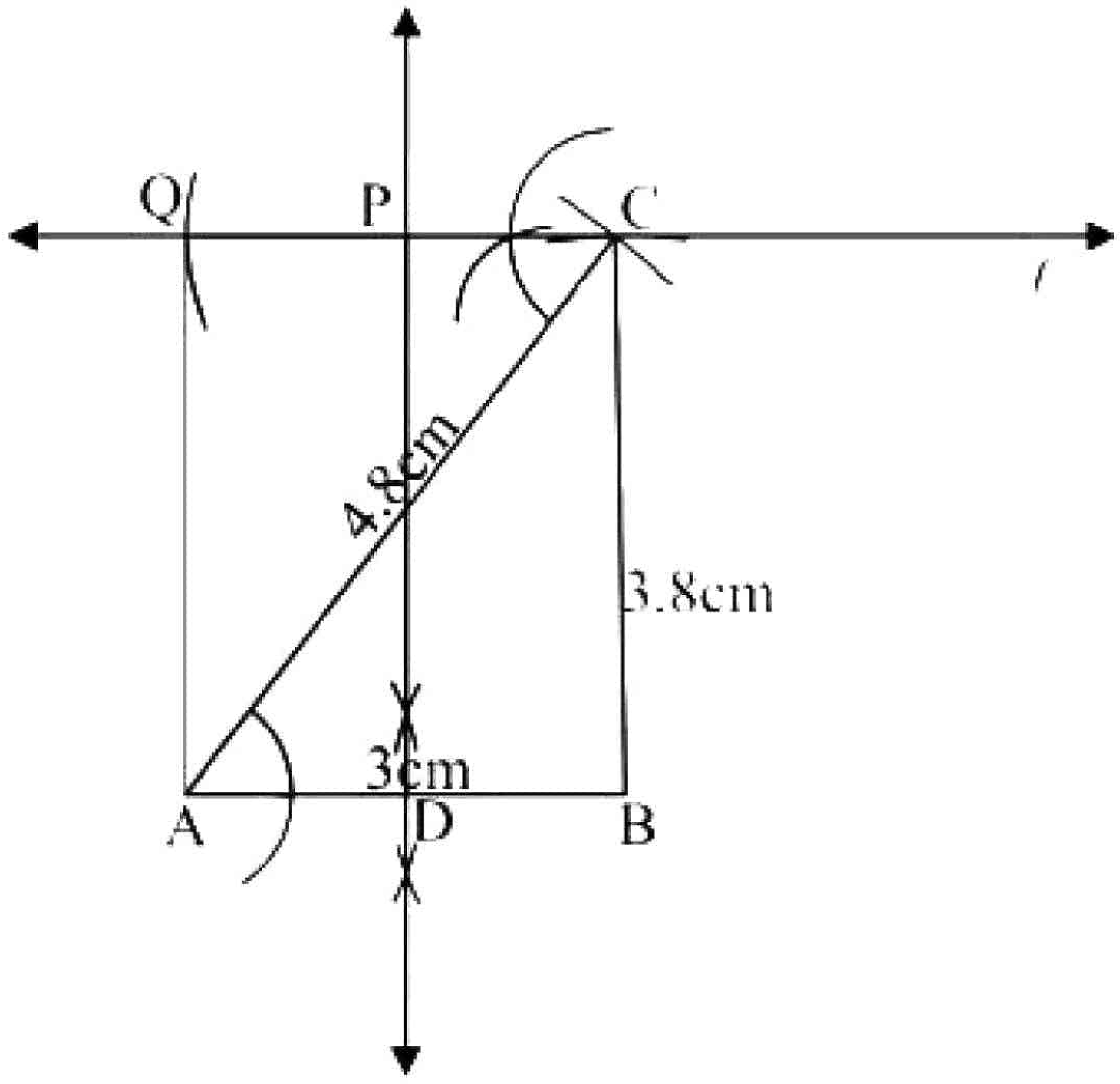
vi. Draw the perpendicular bisector of $\overline{BC}$ passing through point A.

vii. Through A draw a line $l \parallel \overrightarrow{BC}$.

viii. On l cut $\overline{AD}$ equal to $\overline{EC}$ and the Join C with D.

ix. CDAE is the required rectangle equal in area to ΔABC.

Q.3 Construct a ABC such that $m\overline{AB} = 3cm$, $m\overline{BC} = 3.8cm$ and $m\overline{AC} = 4.8cm$. Construct a rectangle equal in area to the ΔABC, and measure its sides.



Construction:

i. Draw a line segment $\overline{AB} = 3cm$.

ii. Taking B as centre draw an arc of radius $\overline{BC} = 3.8cm$.

iii. Taking A as centre draw an arc of radius $\overline{AC} = 4.8cm$ to cut at C.

iv. Join C to A and C to B.

v. ABC is the requiredΔ.

vi. Through C draw a line l parallel $\overline{AB}$.

vii. Draw the $\perp$ bisector of $\overline{AB}$ cutting the line l in P.

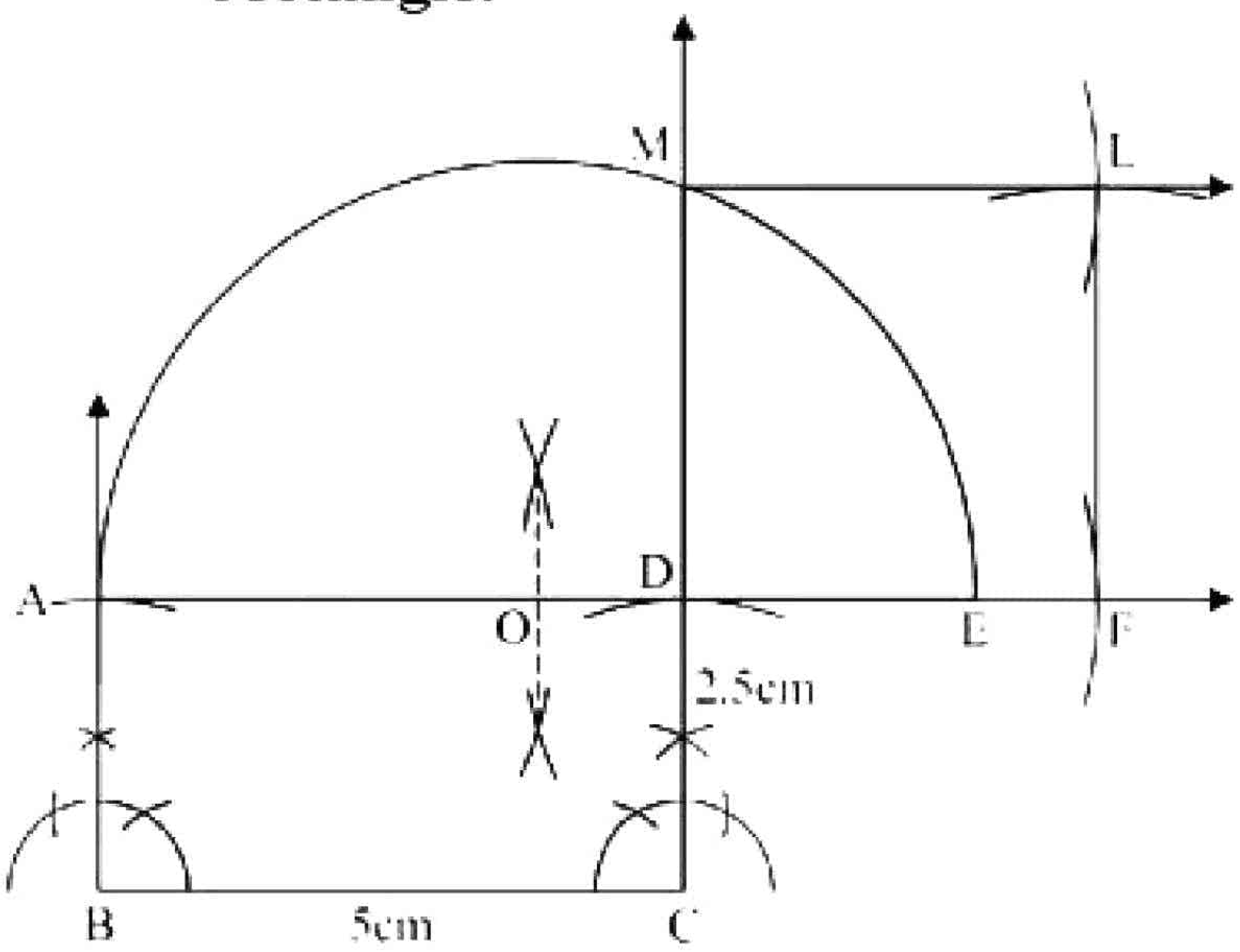
viii. On ℓ cut $\overline{PQ} \cong \overline{DA}$.

ix. PQAD is the required rectangle measure of sides of rectangle PQAD

$m\overline{PD}$= 3.8cm $m\overline{AD}$ = 1.5cm

Exercise 17.5

Q.1 Construct a rectangle whose adjacent sides are 2.5cm and 5cm respectively. Construct a square having area equal to the given rectangle.



Construction:

i. Make the rectangle ABCD with given lengths of sides.

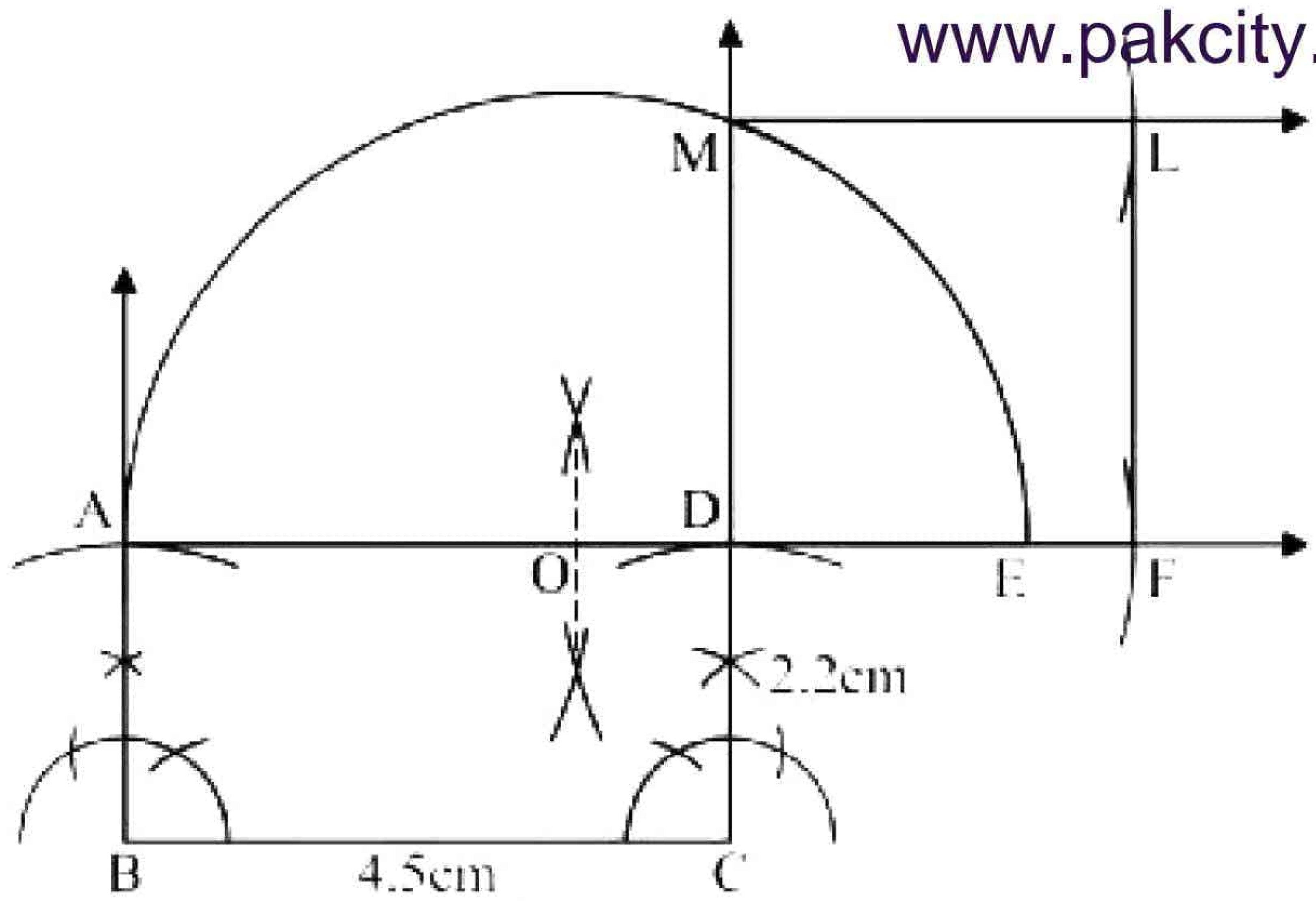
ii. Produce AD to point E such that $m\overline{DE} = m\overline{DC}$.

iii. Bisect $\overline{AE}$ at O.

iv. With O as centre and $\overline{OA}$ radius draw a semicircle cutting $\overline{CD}$ produced in M.

v. With $\overline{DM}$ as side complete the square $DFLM$.

Q.2 Construct a square equal in area to a rectangle whose adjacent sides are 4.5cm and 2.2cm respectively. Measure the sides of the square and find its area and compare with the area of the rectangle.



Construction:

i. Make the rectangle ABCD with given sides.

ii. Produce AD and cut $m\overline{DE} = m\overline{DC}$.

iii. Bisect $\overline{AE}$ at O.

iv. With O as centre and $\overline{OA}$ radius draw a semicircle cutting $\overline{CD}$ produced in M.

v. With $\overline{DM}$ as side complete the square $DF\angle M$.

vi. Side of the square (average) = 3.15cm

Area $= 3.15 \times 3.15 = 9.9cm^2$

Area of rectangle $= 2.2 \times 4.5 = 9.9cm^2$

Area of rectangle = Area of square

Q.3 In Q2 above verify by measurement that the perimeter of the square is less then that of the rectangle.

Perimeter of rectangle = 2 [length + briclth]

= 2 [4.5 + 2.2]

= 2 [6.7]

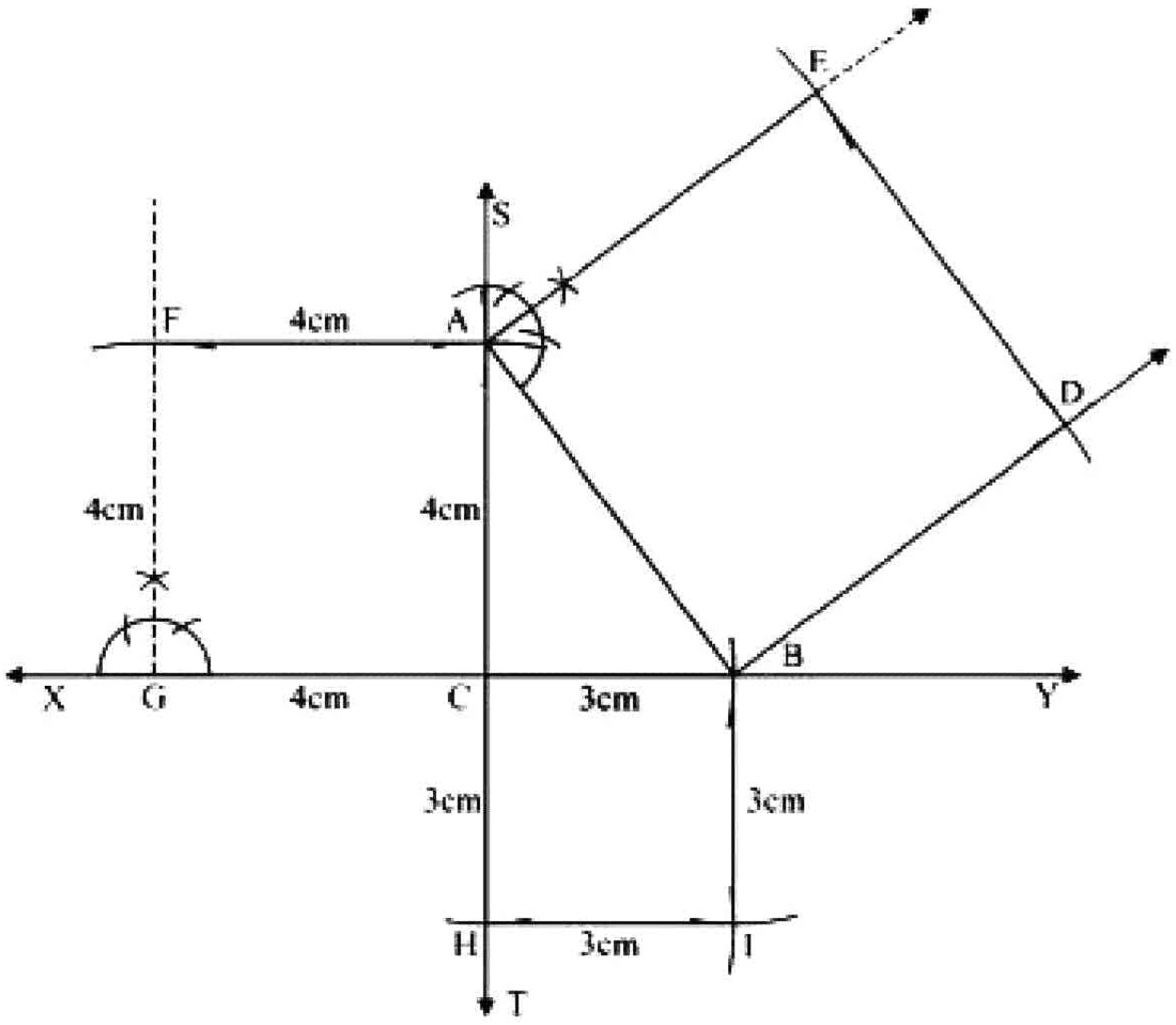
= 13.4 cm

Perimeter of square $= 4 \times l$

$= 4 \times 3.2$

= 12.8 cm

Q.4 Construct a square equal in area to the sum of two squares having sides 3cm and 4cm respectively.



Construction:

i. Draw a line segment $\overleftrightarrow{XY}$.

ii. Draw a line perpendicular $\overleftrightarrow{ST}$ at point C.

iii. Cut of $\overline{CB} = 3cm$ and $\overline{CG} = 4cm$.

iv. $\overline{CG}$ is the side of square complete the square ACGF.

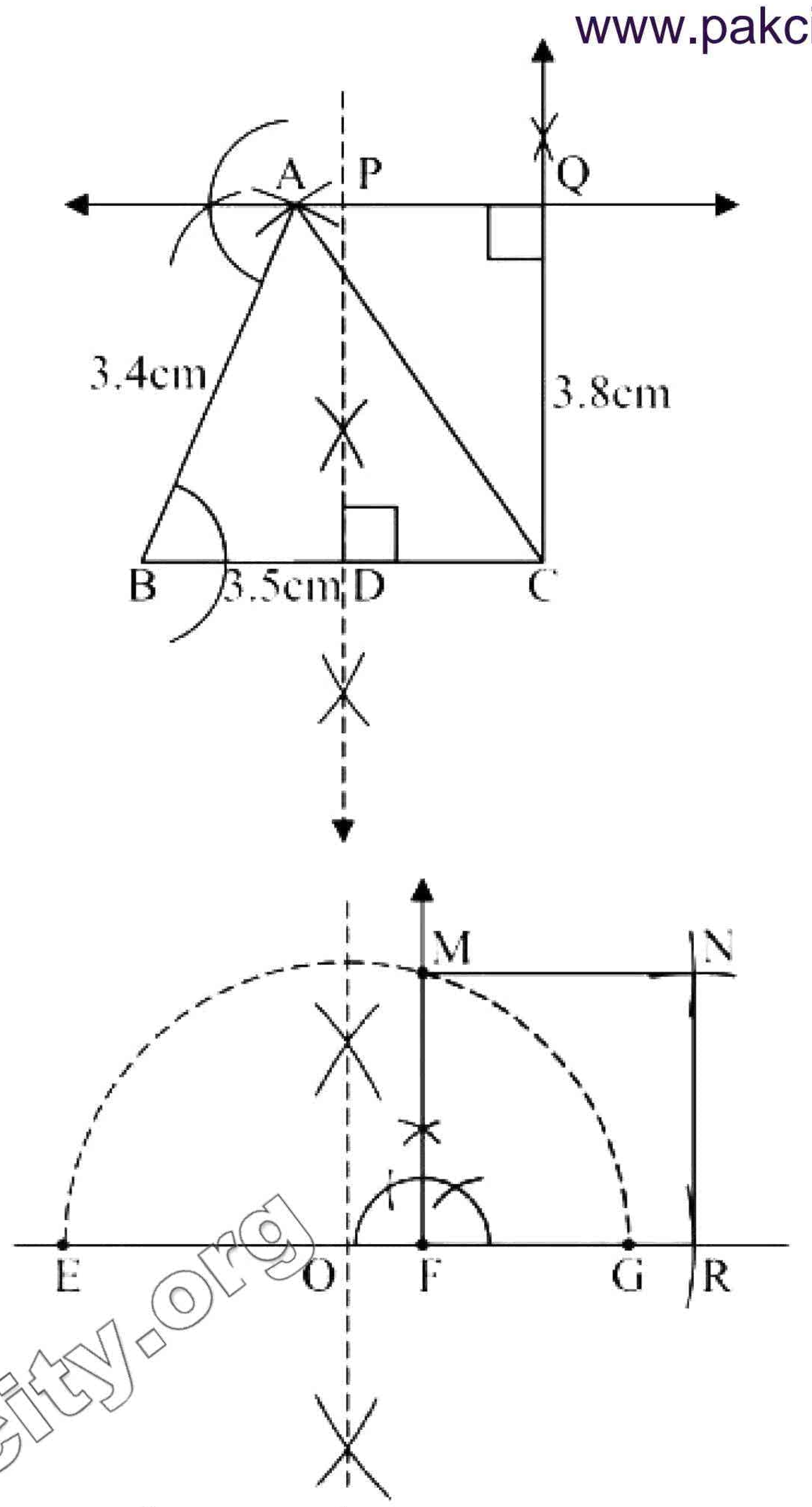
v. $\overline{CB}$ is the side of square complete the square CBIH.

vi. Join B to A.

vii. $\overline{AB}$ is the side of square so, complete the square ABDE.

viii. ABDE is the required square. Using Pythagoras theorem to prove.

Q.5 Construct a Δ having base 3.5cm and other two sides equal to 3.4cm and 3.8cm respectively. Transform it into a square of equal area



Construction:

i. Draw $\overleftrightarrow{PAQ} \parallel \overline{BC}$

ii. Draw perpendicular bisector of $\overline{BC}$, bisector it at D and meeting $\overleftrightarrow{PAQ}$ at P.

iii. Draw $\overline{CQ} \perp \overline{PQ}$ meeting it in Q.

iv. Take a line EFG and cut radius $\overline{EF} = \overline{DP}$ and $\overline{FG} = \overline{DC}$.

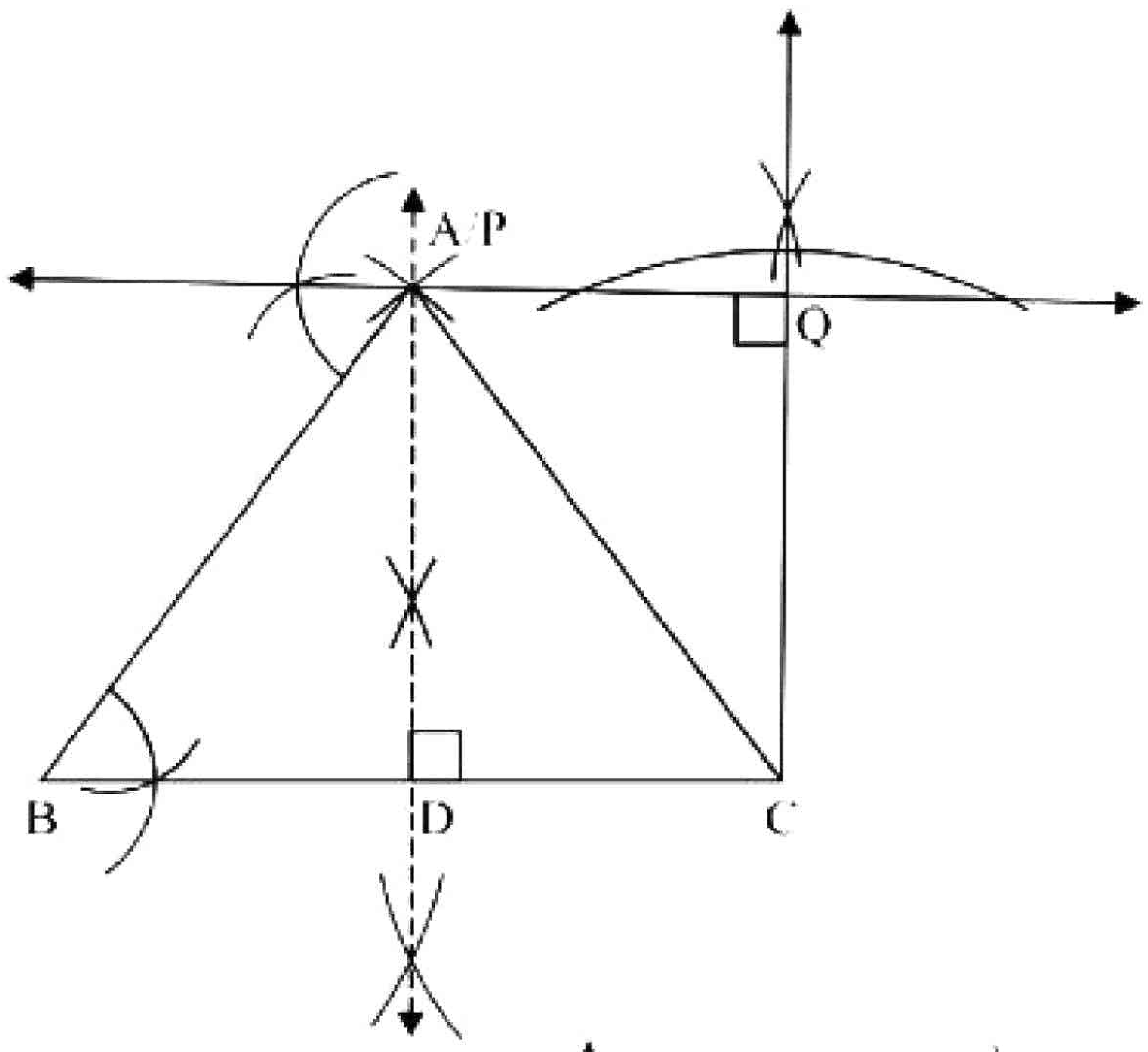
v. Bisect $\overline{EG}$ at O.

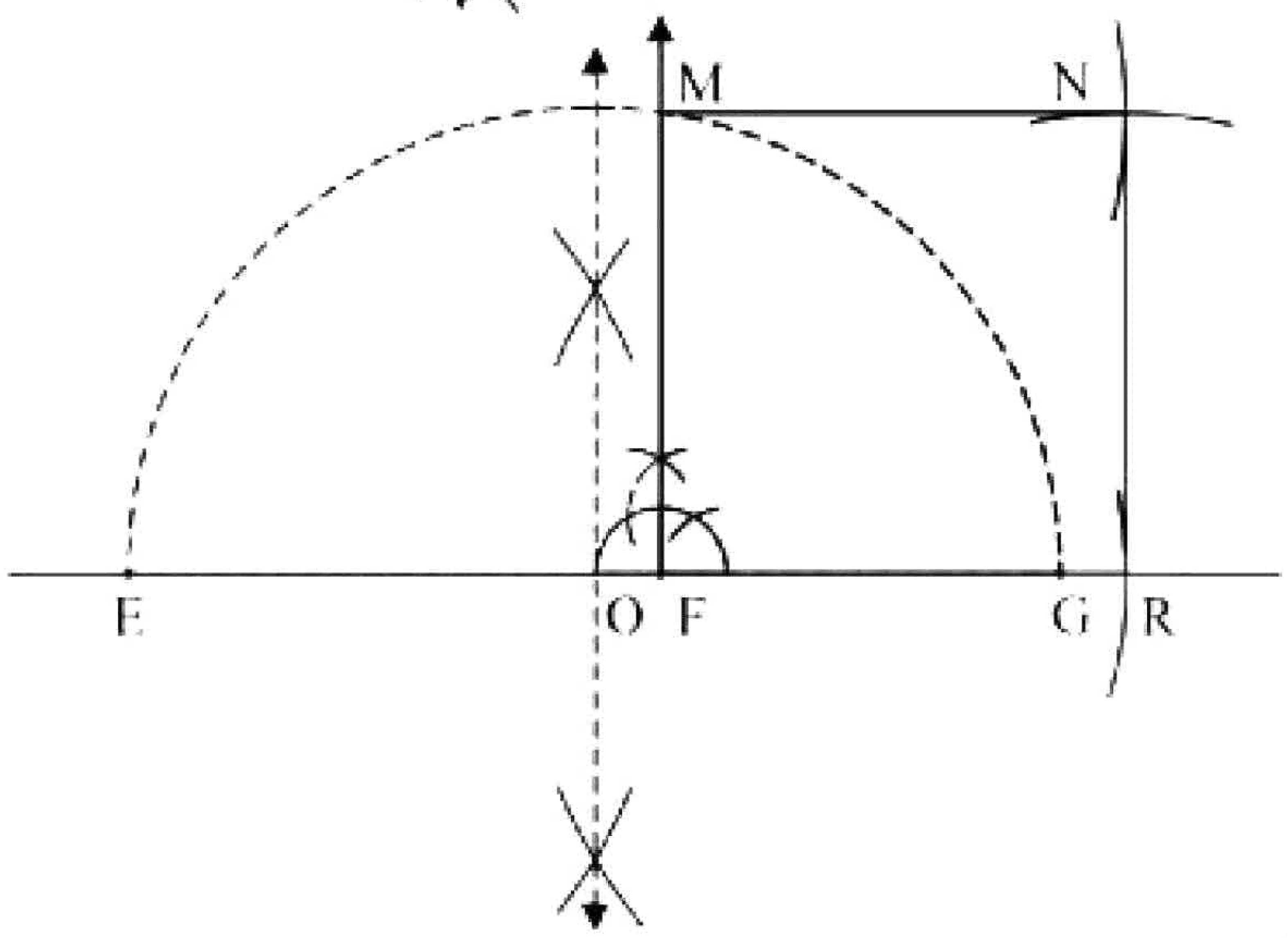
vi. With O as centre and radius $= \overline{OE}$ draw a semi-circle.

vii. At F draw $\overline{FM} \perp \overline{EG}$ meeting the semi-circle at M.

viii. With $\overline{MF}$ as a side, complete the required square FMNR.

Q.6 Construct a Δ having base 5 and other sides equal to 5cm and 6cm construct a square equal in area to given Δ.





Construction:

i. Draw $\overleftrightarrow{PAQ} \parallel \overline{BC}$

ii. Draw perpendicular bisector of $\overline{BC}$, bisector it at D and meeting $\overleftrightarrow{PAQ}$ at P.

iii. Draw $\overline{CQ} \perp \overline{PQ}$ meeting it in Q.

iv. Take a line EFG and cut radius $\overline{EF} = \overline{DP}$ and $\overline{FG} = \overline{DC}$.

v. Bisect $\overline{EG}$ at O.

vi. With O as centre and radius $= \overline{OE}$ draw a semi-circle.

vii. At F draw $\overline{FM} \perp \overline{EG}$ meeting the semi-circle at M.

viii. With $\overline{MF}$ as a side, complete the required square FMNR.

Revised Exercise 17

Q.1 Fill in the blanks to make the statements true:

(i) The side of right angled triangle opposite to 90° is called _________.

(ii) The line segment joining a vertex of a triangle which is to the mid point of its opposite side is called a _________.

(iii) A line drawn from a vertex of a triangle which is _________ to its opposite side is called an attitude of the triangle.

(iv) The bisectors of the three angles of a triangle are_________.

(v) The points of concurrency of right bisector of the three sides of the triangle are _________ from its vertices.

(vi) Two or more triangle are said to be similar if they are equiangular and measures of their corresponding sides are_________.

(vii) The altitudes of a rights triangle are concurrent at the ______of the right angle.

Answer Key

(Fill in the Blank)

i	Hypotenuse	v	Equidistant
ii	Median	vi	Proportional
iii	Perpendicular	vii	Vertex
iv	Concurrent		

Q.2 Multiple Choice Questions. (Choose the correct answer).

(i) The triangle having two sides congruent is called
(a) Scalene **(b)** Right angled
(c) Equilateral **(d)** Isosceles

(ii) A quadrilateral having each angle equal to 90° is called
(a) Parallelogram **(b)** Rectangle
(c) Trapezium **(d)** Rhombus

(iii) The right bisector of the three sides of a triangle are
(a) Congruent **(b)** Collinear
(c) Concurrent **(d)** Parallel

(iv) The _________ altitudes of an isosceles triangle are congruent.
(a) Two **(b)** Three
(c) Four **(d)** None of these

(v) A point equidistant from the end points of a line – segments is on its_________.
(a) Bisector **(b)** Right - bisector
(c) Perpendicular **(d)** Median

(vi) _________ congruent triangles can be made by joining the mid-point of the sides of a triangle.
(a) Three **(b)** Four
(c) Five **(d)** Two

(vii) The diagonals of parallelogram _________ each other.
(a) Bisect **(b)** Trisect
(c) Bisect at right angle **(d)** None of these

(viii) **The medians of a triangle cut each other in the ration__________.**

(a) 4:1 **(b)** 3:1

(c) 2:1 **(d)** 1:1

(ix) **One angle on the base of an isosceles triangle is 30°. What is the measure o its vertical angle__________.**

(a) 30° **(b)** 60°

(c) 90° **(d)** 120°

(x) **If the three attitudes of a triangle are congruent then, the triangle will be__________.**

(a) Isosceles **(b)** Equilateral

(c) Right angled **(d)** Acute angled

(xi) **If two medians of a triangle are congruent then the triangle will be__________.**

(a) Isosceles **(b)** Equilateral

(c) Right angled **(d)** Acute angled

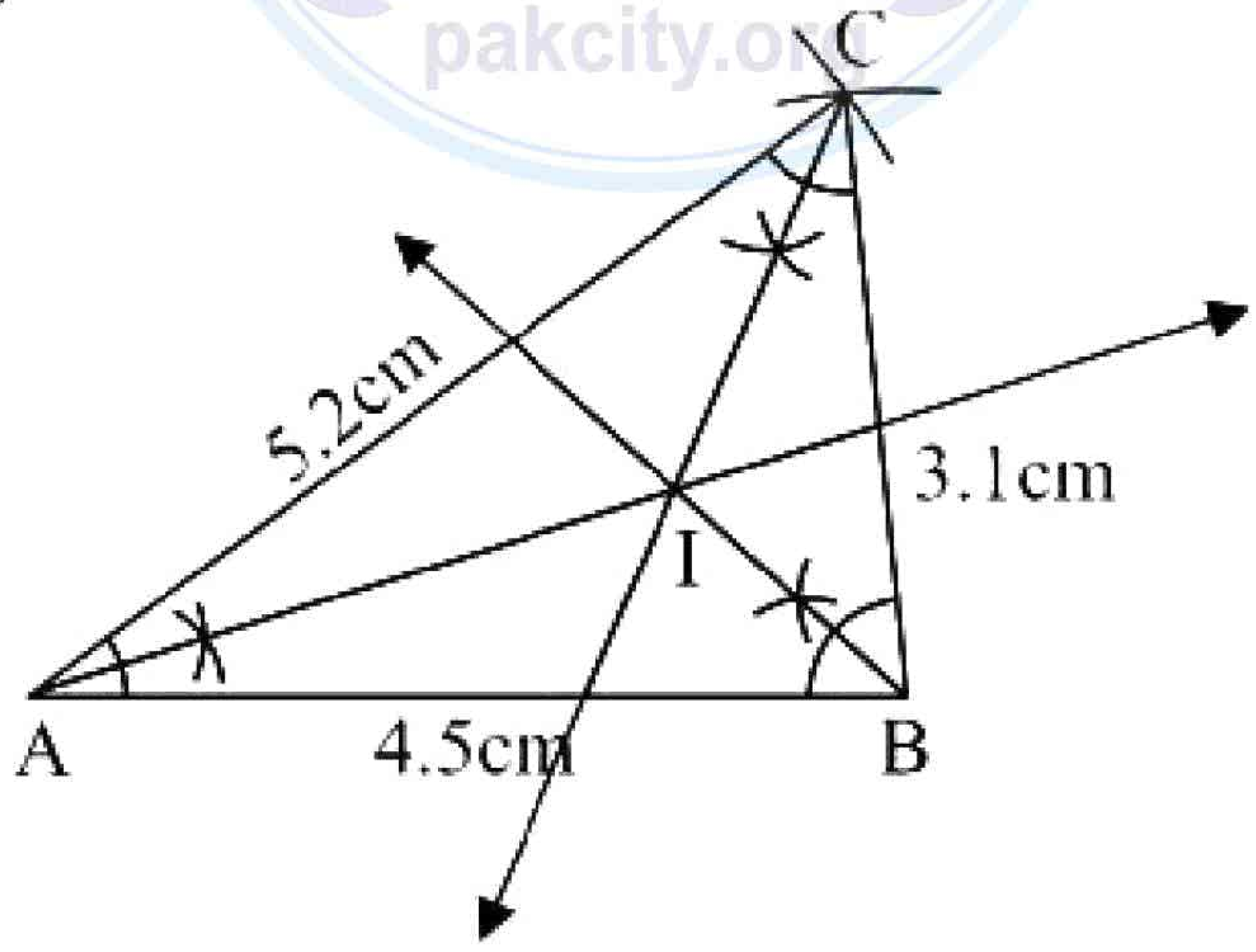
Answer Key
(MCQ'S)

i	d	vii	a
ii	b	viii	c
iii	c	ix	d
iv	a	x	
v		xi	a
vi	b		

Q.3 **Define the following.**

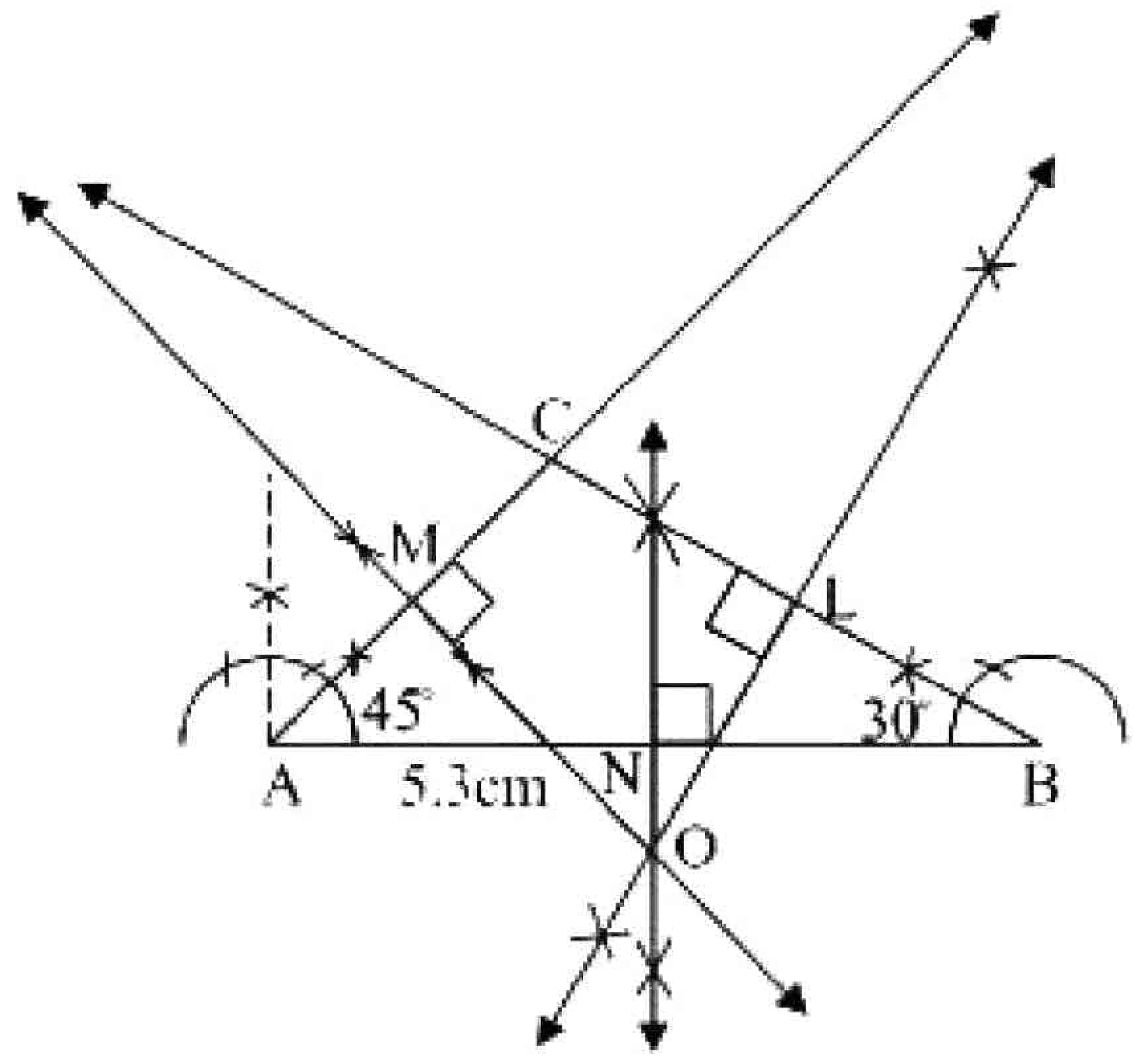
(i) **Incentre**

The point where the internal bisectors of the angles of a triangle meet is called incentre of a triangle. It is denoted by I.



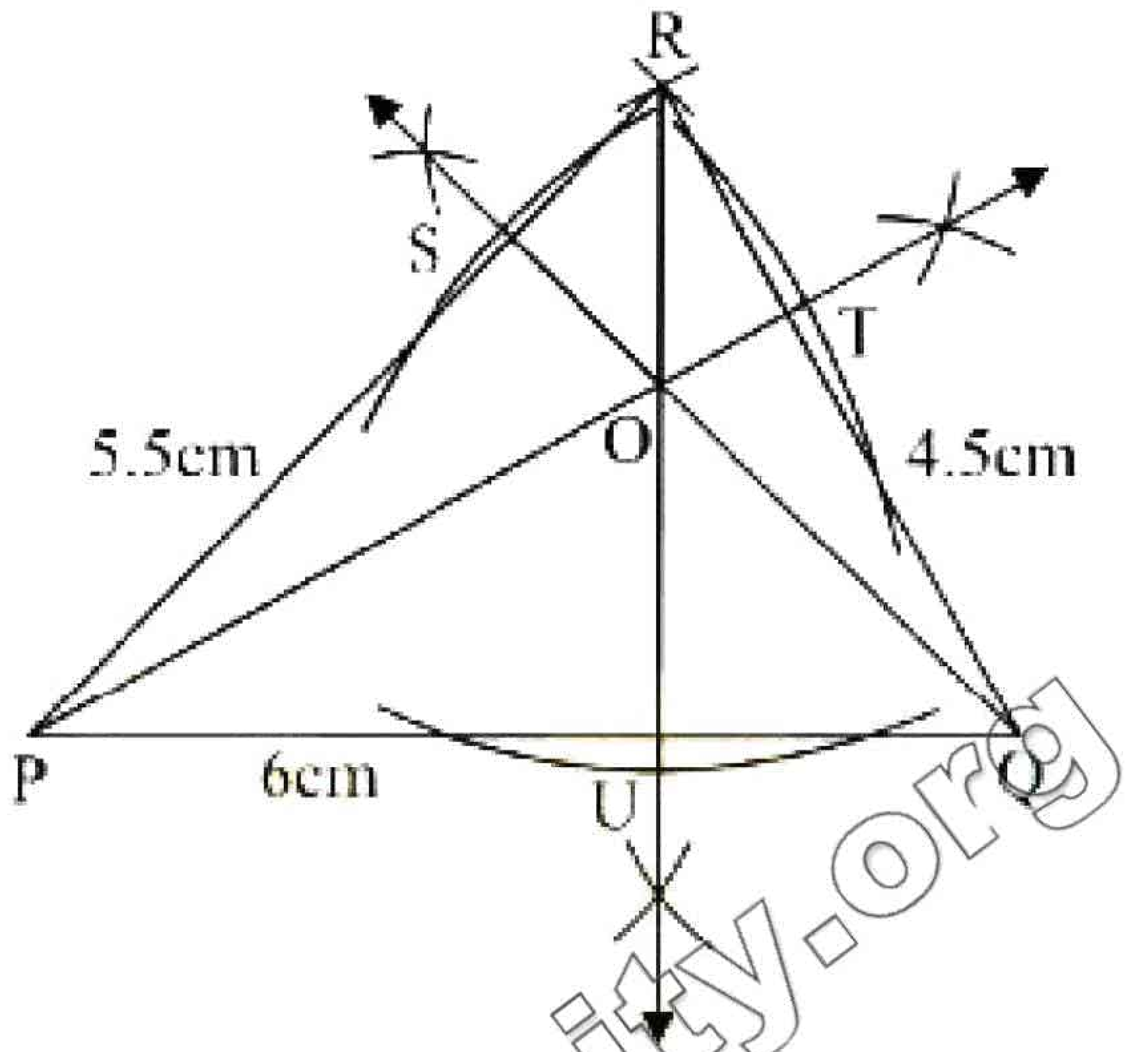
(ii) **Circumcentre**

The point of concurrency of the three perpendicular bisectors of the sides of a triangle is called circumcentre of a triangle. It is denoted by O.



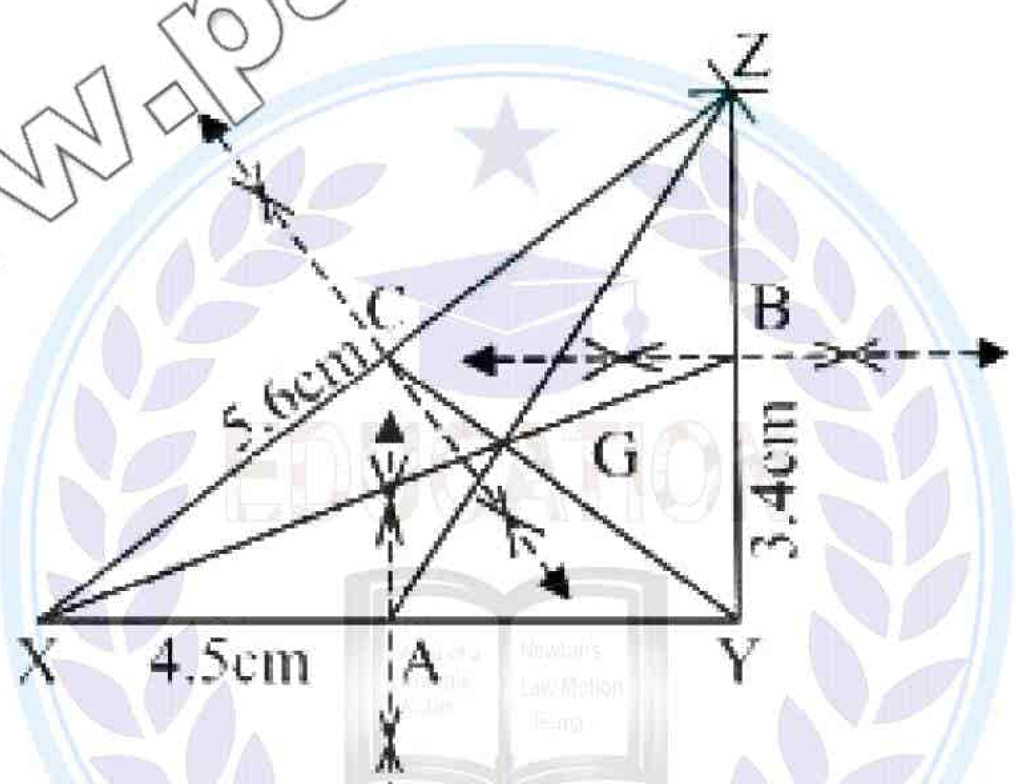
(iii) Orthocenter

The point of concurrency of three altitudes of a triangle is called orthocenter of a triangle. It is denoted by O.



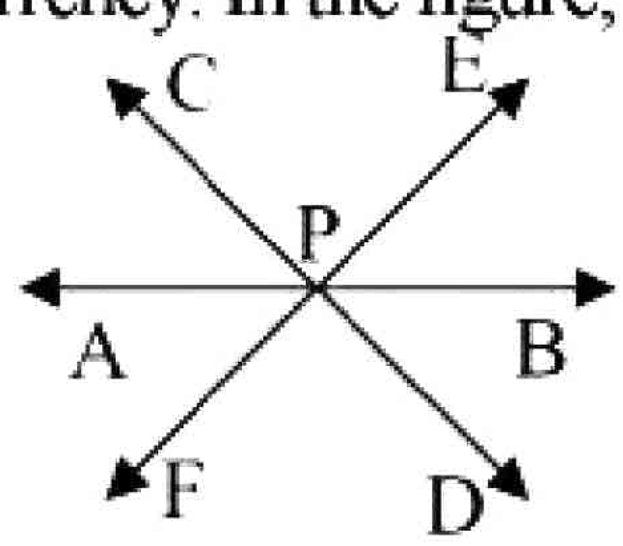
(iv) Centroid

The point of concurrency of three medians of a triangle is called centroid of a triangle. It is denoted by G.



(v) Point of concurrency

Three are more than three lines are said to be concurrent if these lines pass through the same point and that point is called the point of concurrency. In the figure, *P* is the point of concurrency.



Unit 17: Practical Geometry – Triangles

Overview

Right bisector of a line segment

A line i is called a right bisector of a line segment if i is perpendicular to the line segment and passes through its mid-point.

Angle bisector

Median of a triangle

A line segment joining a vertex of a triangle to the mid-point of the opposite side is called a median of the triangle.

Altitude of a triangle

A line segment from a vertex of a triangle, perpendicular to the line containing the opposite side, is called an altitude of the triangle.