

PRACTICAL GEOMETRY-TRIANGLES

Exercise 17.1

1. Construct a $\triangle ABC$, in which:

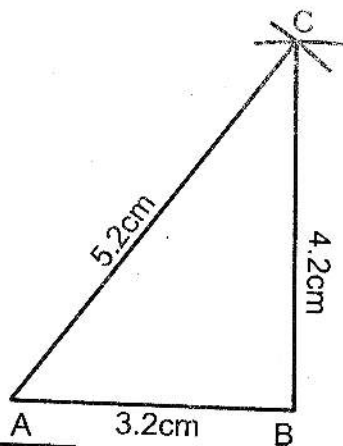
- (i) $m\overline{AB} = 3.2\text{cm}$, $m\overline{BC} = 4.2\text{cm}$,
 $m\overline{CA} = 5.2\text{cm}$

Given

The sides $m\overline{AB} = 3.2\text{cm}$,
 $m\overline{BC} = 4.2\text{cm}$, $m\overline{CA} = 5.2\text{cm}$ of $\triangle ABC$

Required

To construct the $\triangle ABC$



Construction

- (i) Draw a line segment $m\overline{AB} = 3.2\text{cm}$
 - (ii) With centre B and radius 4.2cm , draw an arc.
 - (iii) With centre A and radius 5.2cm , draw another arc which meet previous arc at point C.
 - (iv) Join C to B and A.
- Then ABC is the required $\triangle$.

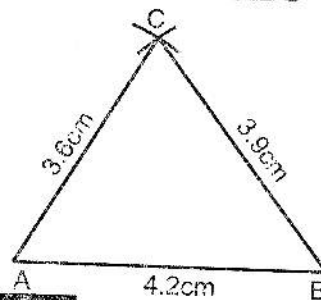
- (ii) $m\overline{AB} = 4.2\text{cm}$, $m\overline{BC} = 3.9\text{cm}$,
 $m\overline{CA} = 3.6\text{cm}$

Given

The sides $m\overline{AB} = 4.2\text{cm}$,
 $m\overline{BC} = 3.9\text{cm}$, $m\overline{CA} = 3.6\text{cm}$ of $\triangle ABC$

Required

To construct the $\triangle ABC$



Construction

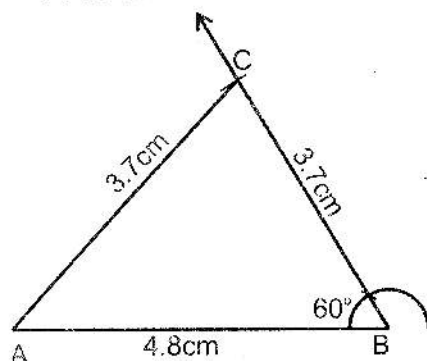
- (i) Draw a line segment $m\overline{AB} = 4.2\text{cm}$
 - (ii) With centre B and radius 3.9cm , draw an arc.
 - (iii) With centre A and radius 3.6cm , draw another arc which meet previous arc at point C.
 - (iv) Join A to C and B to C.
- Then ABC is the required $\triangle$.
- (iii) $m\overline{AB} = 4.8\text{cm}$, $m\overline{BC} = 3.7\text{cm}$,
 $m\angle B = 60^\circ$

Given

The sides $m\overline{AB} = 4.8\text{cm}$,
 $m\overline{BC} = 3.7\text{cm}$ and $m\angle B = 60^\circ$ of $\triangle ABC$

Required

To construct the $\triangle ABC$

**Construction**

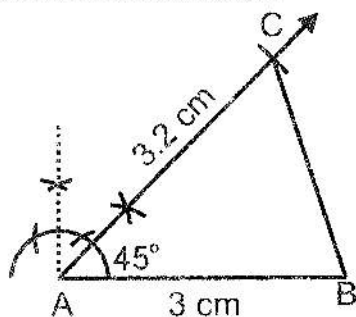
- (i) Draw a line segment $\overline{AB} = 4.8\text{cm}$
 - (ii) At the end point B of $\overline{AB}$ make $m\angle B = 60^\circ$.
 - (iii) Cut off $\overline{BC} = 3.7\text{cm}$ from the terminal side of $\angle 60^\circ$.
 - (iv) Join AC
- Then ABC is the required $\triangle$.
- (iv) $\overline{AB} = 3\text{cm}$, $\overline{AC} = 3.2\text{cm}$,
 $m\angle A = 45^\circ$.

Given

The sides $\overline{AB} = 3\text{cm}$,
 $\overline{AC} = 3.2\text{cm}$ and $m\angle A = 45^\circ$ of $\triangle ABC$

Required

To construct the $\triangle ABC$

**Construction**

- (i) Draw a line segment $\overline{AB} = 3\text{cm}$.

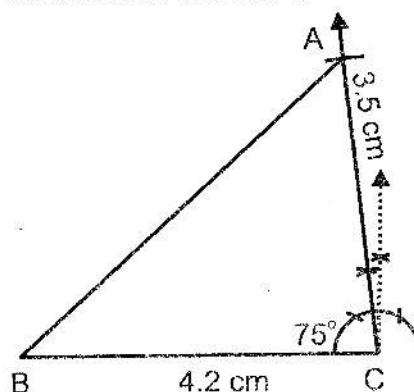
- (ii) At the end point A of $\overline{AB}$ make $m\angle A = 45^\circ$.
 - (ii) Cut off $\overline{AC} = 3.2\text{cm}$ from the terminal side of $\angle 45^\circ$.
 - (iv) Join BC
- Then ABC is the required $\triangle$.
- (v) $\overline{BC} = 4.2\text{cm}$, $\overline{CA} = 3.5\text{cm}$,
 $m\angle C = 75^\circ$

Given

The sides $\overline{BC} = 4.2\text{cm}$,
 $\overline{CA} = 3.5\text{cm}$ and $m\angle C = 75^\circ$ of $\triangle ABC$

Required

To construct the $\triangle ABC$

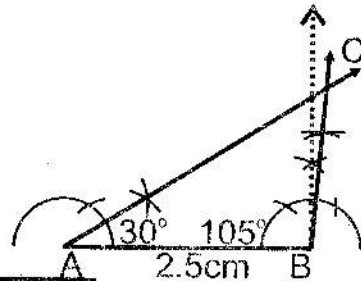
**Construction**

- (i) Draw a line segment $\overline{BC} = 4.2\text{cm}$.
 - (ii) At the end point C of $\overline{BC}$ make $m\angle C = 75^\circ$.
 - (iii) Cut off $\overline{CA} = 3.5\text{cm}$ from the terminal side of $\angle 75^\circ$.
 - (iv) Join AB.
- Then ABC is the required $\triangle$.
- (vi) $\overline{AB} = 2.5\text{cm}$, $m\angle A = 30^\circ$,
 $m\angle B = 105^\circ$.

The side $\overline{mAB} = 2.5\text{cm}$ and angles $m\angle A = 30^\circ$, $m\angle B = 105^\circ$ of $\triangle ABC$

Required

To construct the $\triangle ABC$



Construction

- Draw the line segment $\overline{mAB} = 2.5\text{cm}$.
- At the end point A of $\overline{AB}$ make $\angle A = 30^\circ$.
- At the end point B of $\overline{AB}$ make $m\angle B = 105^\circ$.
- The terminal sides of these two angles meet in C.

Then $\triangle ABC$ is required $\triangle$.

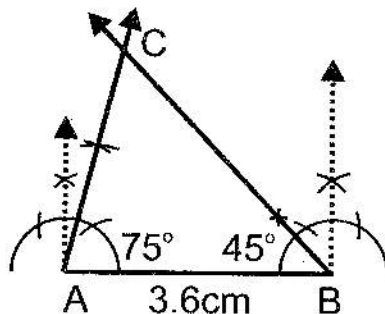
- (vii) $\overline{mAB} = 3.6\text{cm}$, $m\angle A = 75^\circ$,
 $m\angle B = 45^\circ$.

Given

The side $\overline{mAB} = 3.6\text{cm}$ and angles $m\angle A = 75^\circ$, $m\angle B = 45^\circ$ of $\triangle ABC$

Required

To construct the $\triangle ABC$



- Draw the line segment $\overline{mAB} = 3.6\text{cm}$.

- At the end point A of $\overline{AB}$ make $m\angle A = 75^\circ$.

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

- The terminal sides of these two angles meet at C.

Then $\triangle ABC$ is the required $\triangle$.

Q.2. Construct a $\triangle xyz$ in which

- $\overline{mYZ} = 7.6\text{cm}$, $\overline{mXY} = 6.1\text{cm}$,
 $m\angle X = 90^\circ$.

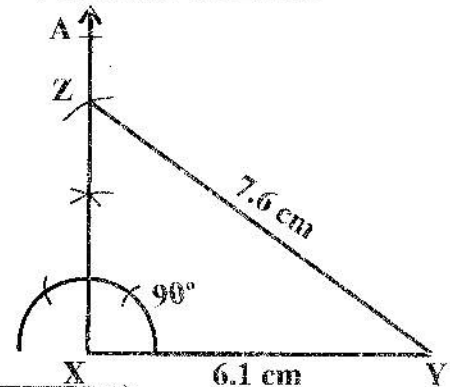
Given

The sides

$\overline{mYZ} = 7.6\text{cm}$, $\overline{mXY} = 6.1\text{cm}$ and
 $m\angle X = 90^\circ$ of $\triangle XYZ$.

Required

To construct the $\triangle XYZ$



Construction

- Draw the line segment $\overline{mXY} = 6.1\text{cm}$
- At the end point X of $\overline{XY}$ make $m\angle X = 90^\circ$.
- With Y as centre and radius 7.6cm, draw an arc which cut terminal side of $\angle 90^\circ$ at point Z.
- Join ZY.

Then XYZ is the required Δ .

- (ii) $m\overline{ZX} = 6.4\text{cm}$, $m\overline{YZ} = 2.4\text{cm}$,
 $m\angle Y = 90^\circ$

Given

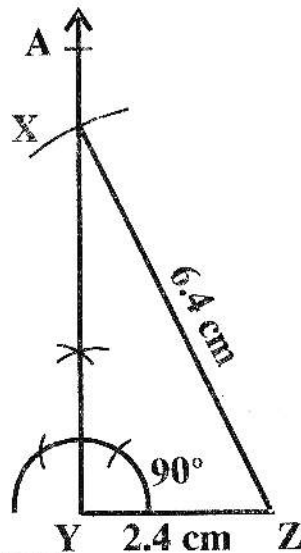
The sides

$$m\overline{ZX} = 6.4\text{cm}, m\overline{YZ} = 2.4\text{cm} \text{ and}$$

$$m\angle Y = 90^\circ \text{ of } \Delta XYZ.$$

Required

To construct the ΔXYZ



Construction

- Draw the line segment $m\overline{YZ} = 2.4\text{cm}$
- At the end point Y of $\overline{YZ}$ make $m\angle Y = 90^\circ$.
- With Z as centre and radius 6.4cm draw an arc which cut terminal side of $\angle 90^\circ$ at point X.
- Join XZ.

Then XYZ is the required Δ .

- (iii) $m\overline{XY} = 5.5\text{cm}$, $m\overline{ZX} = 4.5\text{cm}$,
 $m\angle Z = 90^\circ$

Given

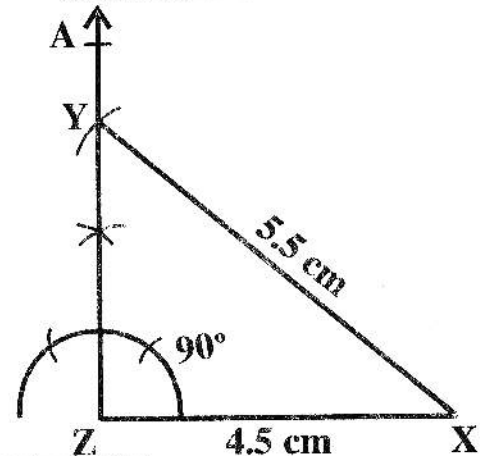
The sides

$$m\overline{XY} = 5.5\text{cm}, m\overline{ZX} = 4.5\text{cm} \text{ and}$$

$$m\angle Z = 90^\circ \text{ of } \Delta XYZ.$$

Required

To construct the ΔXYZ



Construction

- Draw a line segment $m\overline{ZX} = 4.5\text{cm}$
- At the end point Z of $\overline{ZX}$ make $m\angle Z = 90^\circ$.
- With X as centre and radius 5.5cm draw an arc which cut terminal side of $\angle 90^\circ$ at point Y
- Join XY.

Then XYZ is the required Δ .

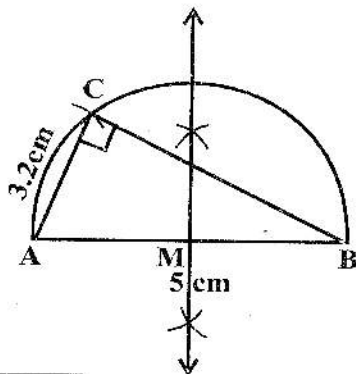
Q.3. Construct a right angled Δ measure of whose hypotenuse is 5cm and one side is 3.2cm.

Given

In right angled Δ hypotenuse is 5cm and one side is 3.2cm

Required

To construct the ΔXYZ



Construction

- (i) Draw a line segment $\overline{AB} = 5\text{cm}$.
- (ii) With $\overline{AB}$ as diameter, draw a semi circle.
- (iii) With A as center draw an arc of radius 3.2cm cutting the semi circle in C.
- (iv) Join C with A and B.

Therefore ABC is required triangle with $\angle C = 90^\circ$

Q.4 Construct a right angled isosceles triangle. Whose hypotenuse is:

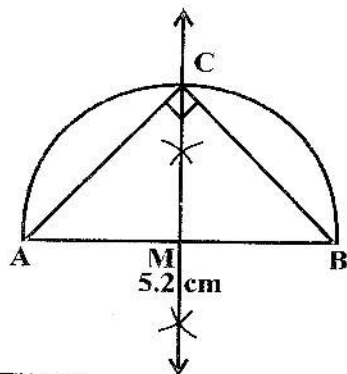
i) Hypotenuse 5.2cm long

Given

In right angled isosceles triangle hypotenuse is 5.2 cm.

Required

To construct right angled isosceles triangle



Construction

- (i) Take $\overline{AB} = 5.2\text{cm}$.

- (ii) Find mid-point M of $\overline{AB}$.
- (iii) With centre as M and radius $\overline{AM} = \overline{MB}$ draw a semi circle which intersects the bisector in C.
- (iv) Join A to C and B to C.

Then $\triangle ABC$ is the required right angled isosceles triangle with $\angle C = 90^\circ$

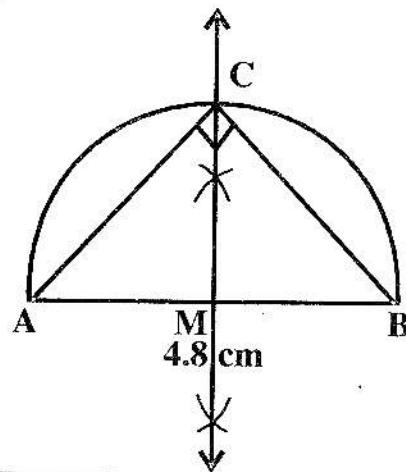
(ii) Hypotenuse 4.8 cm

Given

In right angled isosceles triangle hypotenuse is 4.8 cm.

Required

To construct right angled isosceles triangle.



Construction

- (i) Take $\overline{AB} = 4.8\text{cm}$.
- (ii) Find mid-point M of $\overline{AB}$.
- (iii) With centre as M and radius $\overline{AM} = \overline{MB}$ draw a semi circle which intersects the bisector in C.
- (iv) Join A to C and B to C.

Then $\triangle ABC$ is the required right angled isosceles triangle with $\angle C = 90^\circ$

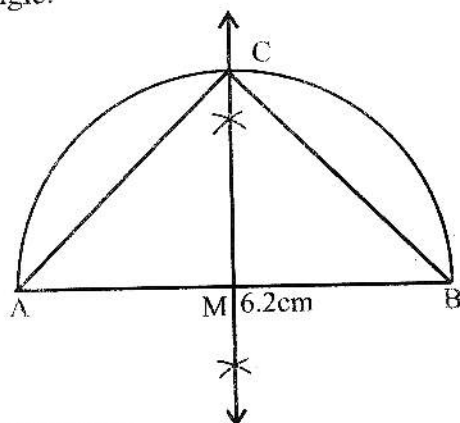
(iii) Hypotenuse 6.2 cm

Given

In right angled isosceles triangle hypotenuse is 6.2 cm.

Required

To construct right angled isosceles triangle.

**Construction**

- (i) Take $mAB = 6.2\text{cm}$.
- (ii) Find mid-point M of AB.
- (iii) With centre as M and radius $mAM = mMB$ draw a semi circle which intersects the bisector in C.
- (iv) Join A to C and B to C.

Then $\triangle ABC$ is the required right angled isosceles triangle with $\angle C = 90^\circ$

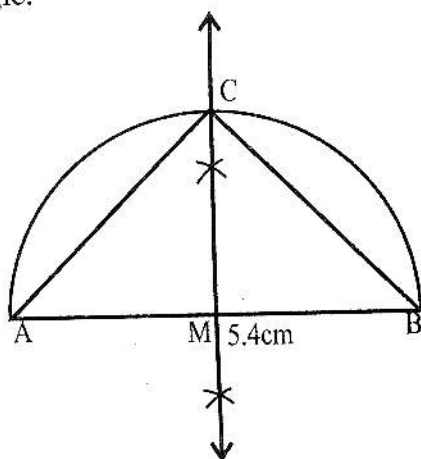
(iv) Hypotenuse 5.4 cm

Given

In right angled isosceles triangle hypotenuse is 5.4 cm.

Required

To construct right angled isosceles triangle.

**Construction**

- (i) Take $mAB = 5.4\text{cm}$.
- (ii) Find mid-point M of AB.
- (iii) With centre as M and radius $mAM = mMB$ draw a semi circle which intersects the bisector in C.
- (iv) Join A to C and B to C.

Then $\triangle ABC$ is the required right angled isosceles triangle with $\angle C = 90^\circ$

Q.5. (Ambiguous case) construct a $\triangle ABC$ in which

- (i) $mAC = 4.2\text{cm}$, $mAB = 5.2\text{cm}$,
 $m\angle B = 45^\circ$.

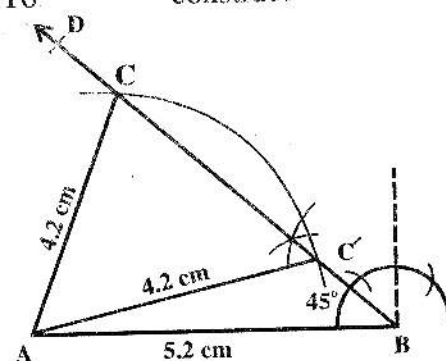
Given

In $\triangle ABC$ $mAC = 4.2\text{cm}$, $mAB = 5.2\text{cm}$,

$m\angle B = 45^\circ$.

Required

To construct $\triangle ABC$

**Construction**

- (i) Draw a line segment $mAB = 5.2\text{cm}$.
- (ii) At the end point B of $\overline{BA}$ make $m\angle B = 45^\circ$.
- (iii) With centre A and radius 4.2cm draw an arc which cuts $\overline{BD}$ in two distinct points C and C' .
- (iv) Join AC and AC' .

$\therefore \triangle ABC$ and $\triangle ABC'$ are required triangles.

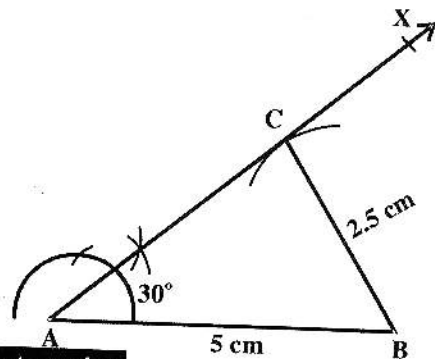
(ii) $\overline{BC} = 2.5\text{cm}$, $\overline{AB} = 5.0\text{cm}$,
 $m\angle A = 30^\circ$.

Given

In $\triangle ABC$ $\overline{BC} = 2.5\text{cm}$,
 $\overline{AB} = 5.0\text{cm}$, $m\angle A = 30^\circ$.

Required

To construct $\triangle ABC$



Construction

- (i) Take $\overline{AB} = 5\text{cm}$.
 - (ii) At the end point A of $\overline{AB}$ make
 $m\angle A = 30^\circ$.
 - (iii) With centre B and radius 2.5cm draw
an arc which touches $\overrightarrow{AX}$ at point C.
 - (iv) Join BC.
- $\therefore \triangle ABC$ is required triangle