17. Constructions

Exercise 17.1

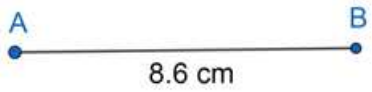
1. Question

Draw a line segment of length 8.6 cm. Bisect it and measure the length of each part.

Answer

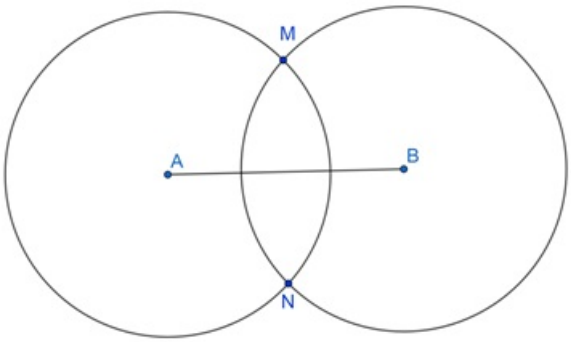
Steps of construction:

(i) Draw a line segment AB=8.6 cm.

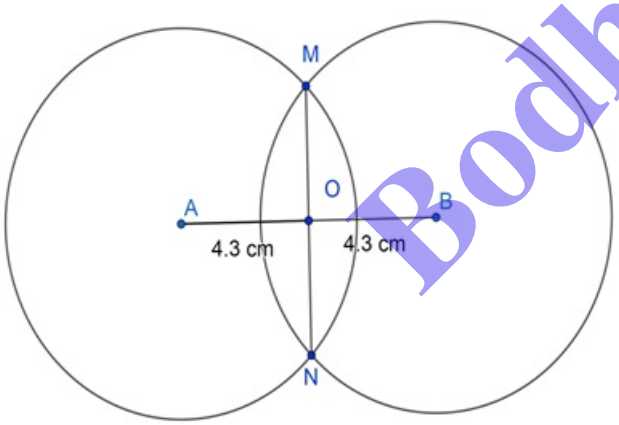


(ii) Draw a circle with centre A with radius 1/2 AB on upper and lower side of AB.

Similarly, Draw a circle with centre B with radius 1/2 AB on upper and lower side of AB which intersect above a circle at M and N respectively.



(iii) Draw line segment MN which intersect AB at point O.



On measuring,

AO=BO=1/2 AB=4.3

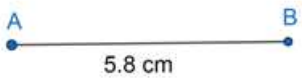
2. Question

Draw a line segment *AB* of length 5.8 cm. Draw the perpendicular bisector of this line segment.

Answer

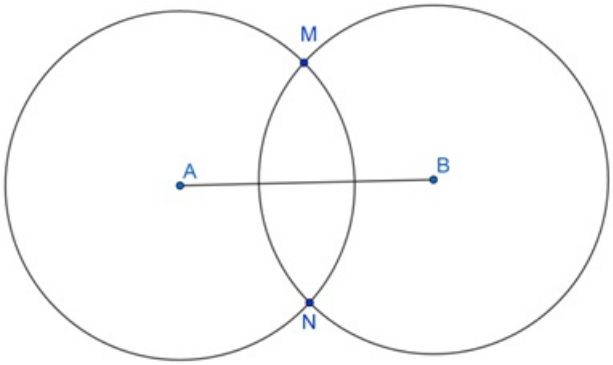
Steps of construction:

(i) Draw a line segment AB=5.8 cm.

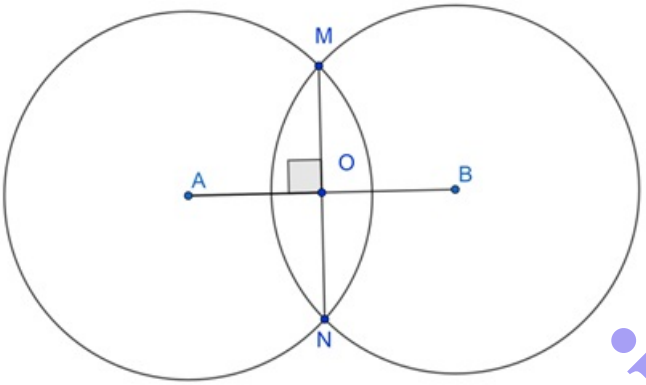


(ii) Draw a circle with centre A with radius more than 1/2 AB.

Similarly, Draw a circle with centre B with same radius which intersect above circle at M and N respectively.



(iii) Draw line segment MN which intersect AB at point O.



On measuring,

m∠AOM=m∠BOM=90°

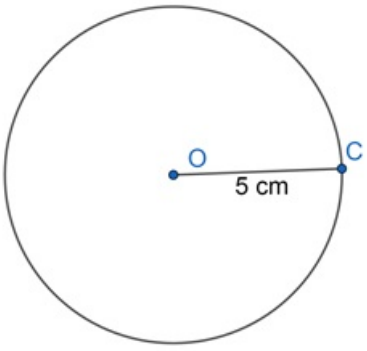
3. Question

Draw a circle with centre at point *O* and radius 5 cm. Draw its chord *AB*, draw the perpendicular bisector of line segment *AB.* Does it pass through the centre of the circle?

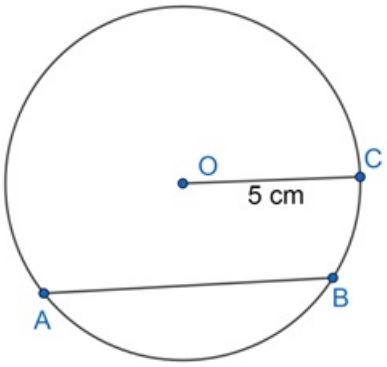
Answer

Steps of construction:

(i) Draw a circle with centre O and radius 5 cm.

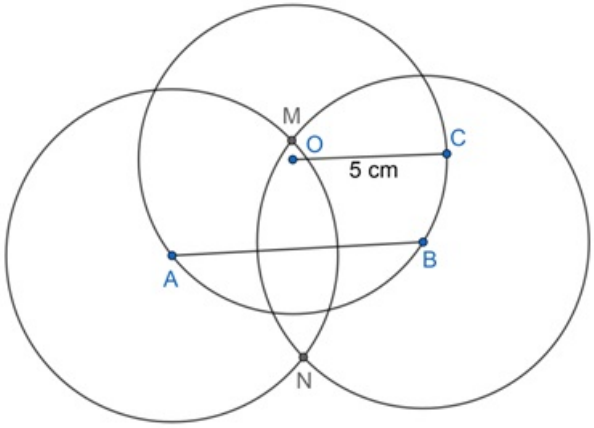


(ii) Draw its chord AB.

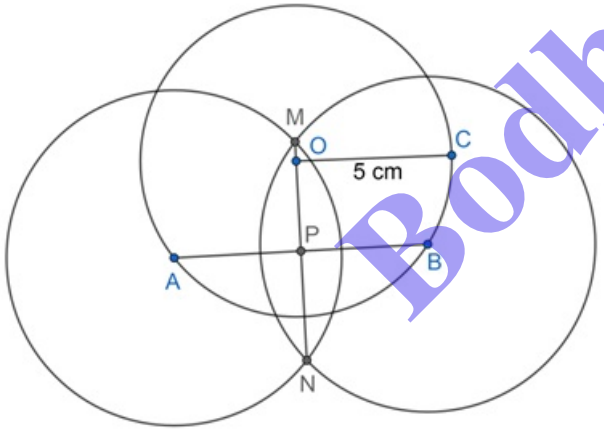


(iii) Draw a circle with centre A with radius more than 1/2 AB.

Similarly, Draw a circle with centre B with same radius 1/2 AB which intersect above circle at M and N respectively.



(iv) Draw line segment MN which intersect AB at point P.



We can see that, perpendicular bisector MN of AB passes through centre O.

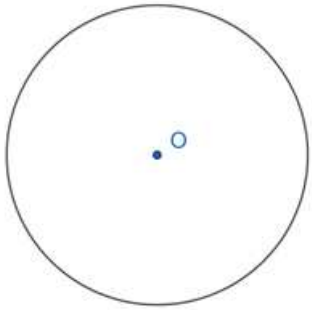
4. Question

Draw a circle with centre at point *O*. Draw its two chords *AB* and *CD* such that *AB* is not parallel to *CD.* Draw the perpendicular bisectors of *AB* and *CD.* At what point do they intersect?

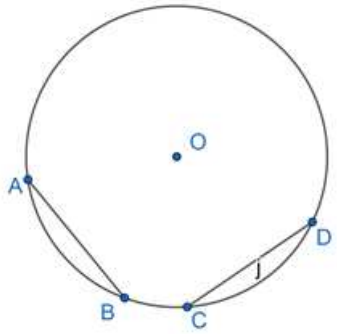
Answer

Steps of construction:

(i) Draw a circle with centre O.

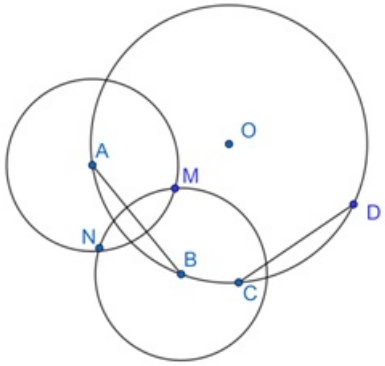


(ii) Draw its two chords AB and CD such that AB is not parallel to CD.

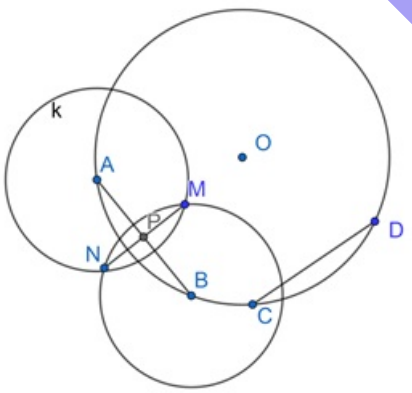


(iii) Draw a circle with centre A with radius more than 1/2 AB.

Similarly, Draw a circle with centre B with same radius which intersect above circle at M and N respectively.

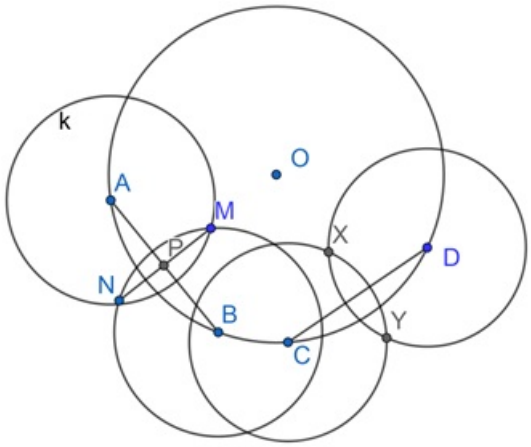


(iv) Draw line segment MN which intersect AB at point P.

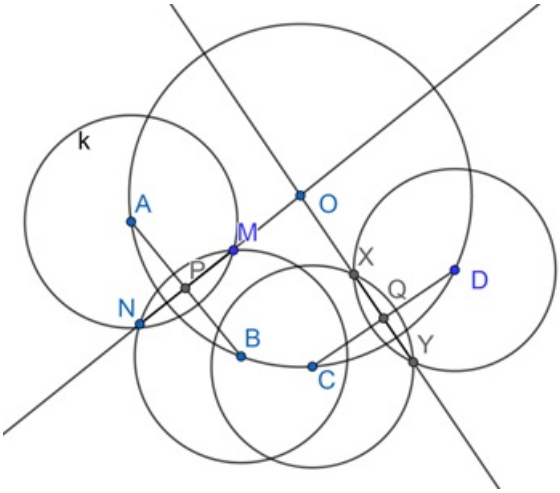


(v) Similarly, Draw a circle with centre C with radius more than 1/2 CD.

Similarly, Draw a circle with centre D with same radius which intersect above circle at X and Y respectively.



(vi) Draw line segment XY which intersect CD at point Q.



We can see that two bisectors MN and XY intersects at centre O.

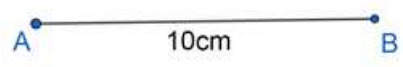
5. Question

Draw a line segment of length 10 cm and bisect it. Further bisect one of the equal parts and measure its length.

Answer

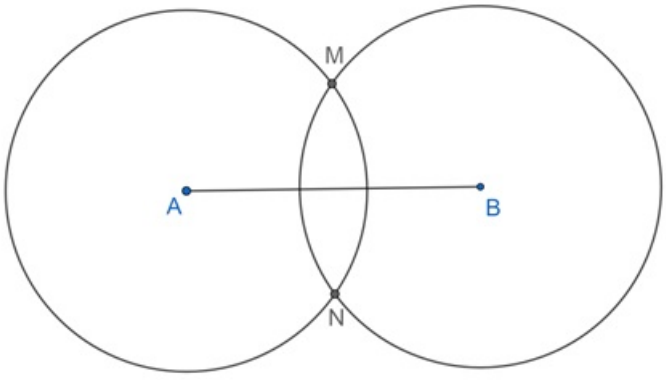
Steps of construction:

(i) Draw a line segment AB=10 cm.



(ii) Draw a circle with centre A with radius more than 1/2 AB.

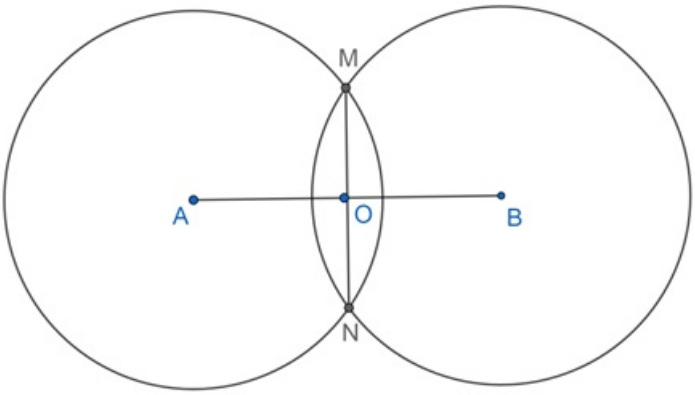
Similarly, Draw a circle with centre B with same radius which intersect above circle at M and N respectively.



(iii) Draw line segment MN which intersect AB at point O.

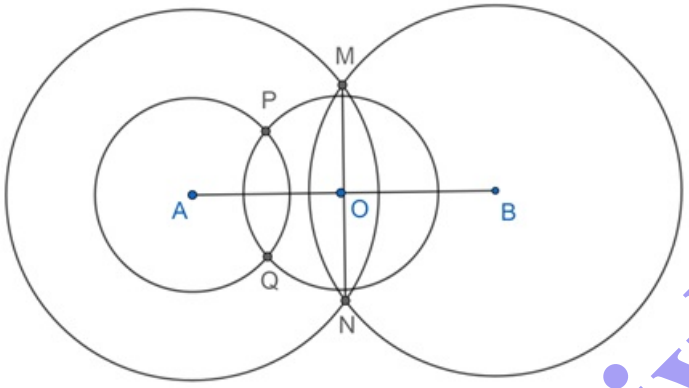
On measuring,

AO=BO=1/2 AB=5 cm

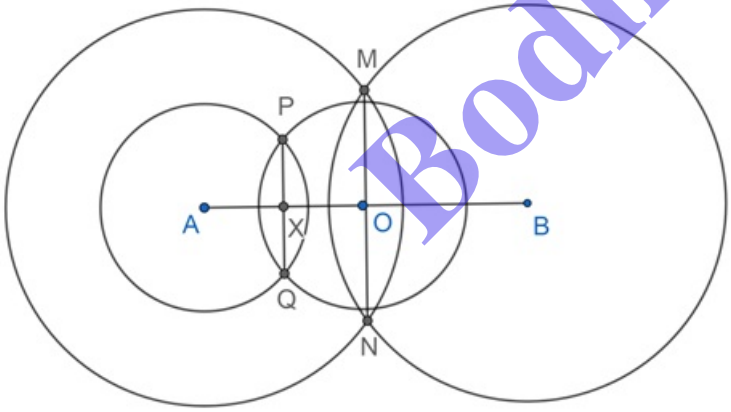


(iv) Draw a circle with centre A with radius more than 1/2 AO.

Similarly, Draw a circle with centre O with same radius which intersect above circle at P and Q respectively.



(v) Draw line segment PQ which intersect AO at X.



On measuring,

AX=XO=1/2 AO=2.5 cm

6. Question

Draw a line segment *AB* and bisect it. Bisect one of the equal parts to obtain a line segment of length $\frac{1}{2}$ (*AB*).

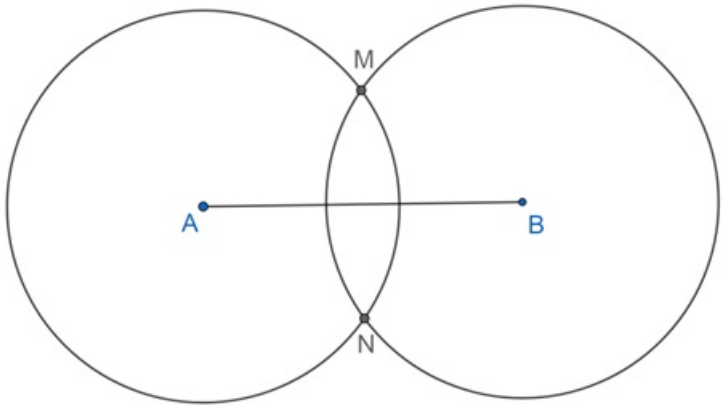
Answer

Steps of construction:

(i) Draw a line segment AB.

(ii) Draw a circle with centre A with radius more than 1/2 AB.

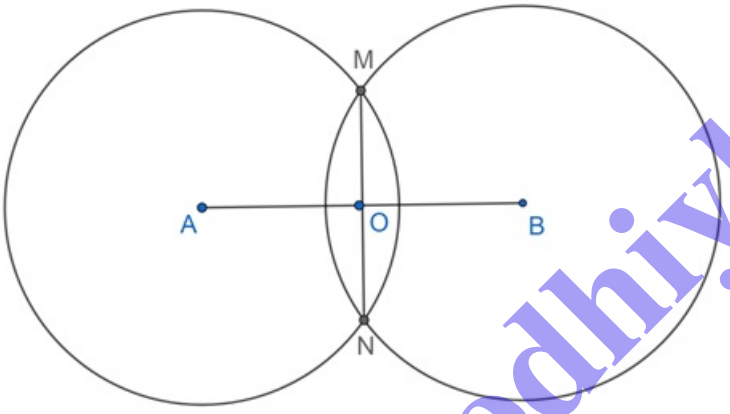
Similarly, Draw a circle with centre B with same radius which intersect above circle at M and N respectively.



(iii) Draw line segment MN which intersect AB at point O.

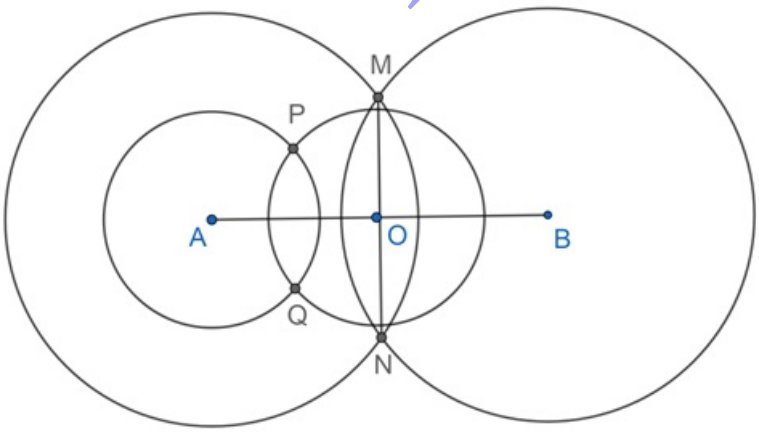
On measuring,

AO=BO=1/2 AB

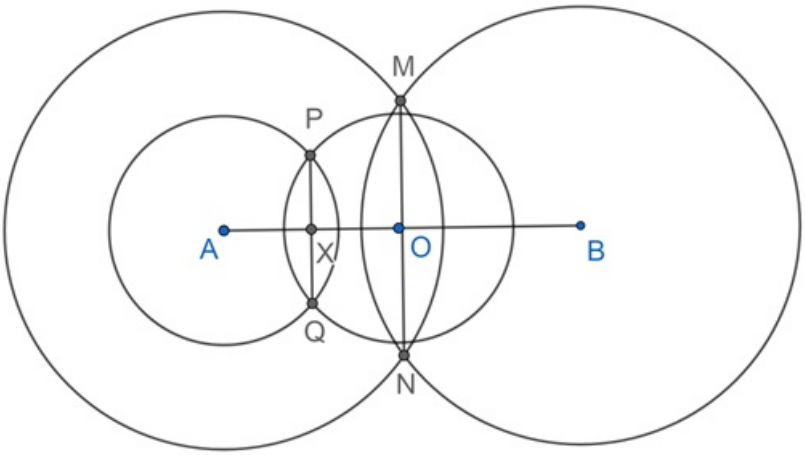


(iv) Draw a circle with centre A with radius more than 1/2 AO.

Similarly, Draw a circle with centre O with same radius which intersect above circle at P and Q respectively.



(v) Draw line segment PQ which intersect AO at X.



On measuring,

AX=XO=1/2 AO=1/4 AB

7. Question

Draw a line segment *AB* and by ruler and compasses, obtain a line segment of length $\frac{3}{4}$ (*AB*).

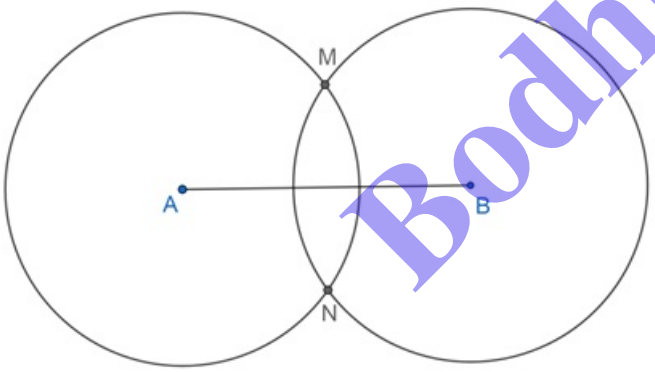
Answer

Steps of construction:

(i) Draw a line segment AB.

(ii) Draw a circle with centre A with radius more than 1/2 AB.

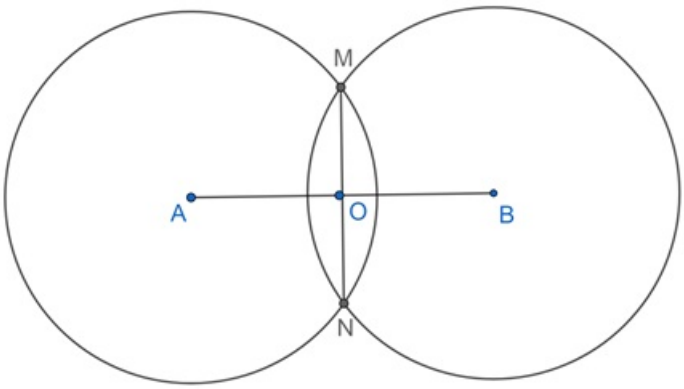
Similarly, Draw a circle with centre B with same radius which intersect above circle at M and N respectively.



(iii) Draw line segment MN which intersect AB at point O.

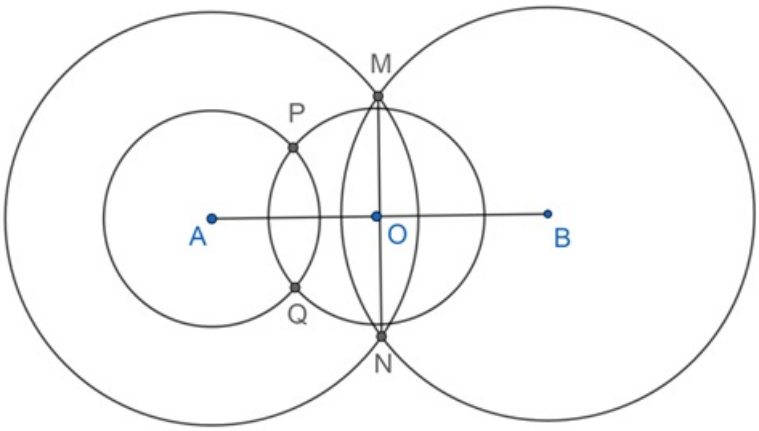
On measuring,

AO=BO=1/2 AB

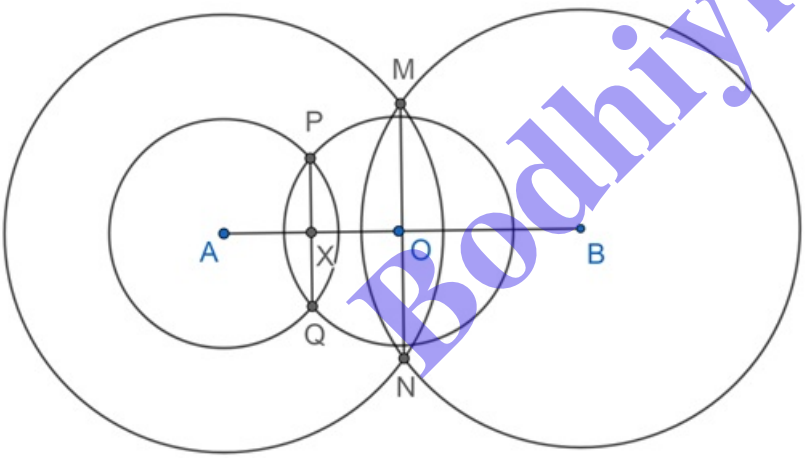


(iv) Draw a circle with centre A with radius more than 1/2 AO.

Similarly, Draw a circle with centre O with same radius which intersect above circle at P and Q respectively.



(v) Draw line segment PQ which intersect AO at X.



On measuring,

AX=XO=1/2 AO=1/4 AB

∴ XB=XO+BO=1/4 AB+1/2 AB=3/4 AB

Exercise 17.2

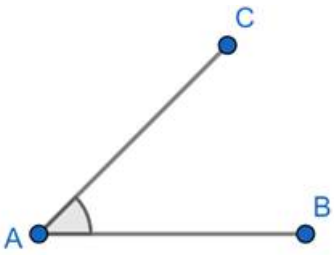
1. Question

Draw an angle and label it as $\angle BAC$. Construct another angle, equal to $\angle BAC$.

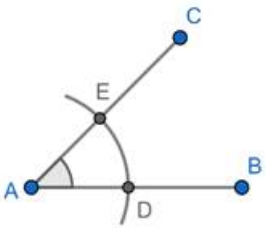
Answer

The steps of the required construction are:

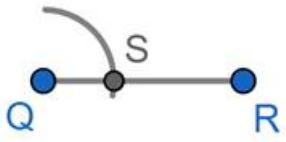
1) Draw an arbitrary angle ∠BAC.



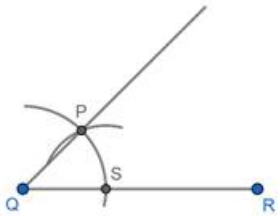
2) Taking A as the center and any radius draw an arc which intersects AB and AC at point D and E respectively.



3) Draw a line segment QR of arbitrary length. With Q as the center and Radius AD, draw a circular arc, intersecting QR at S.



4) Taking S as the center and radius DE, draw another circular arc, intersecting the previous arc at P. Join QP.



5) ∠RQP=∠BAC

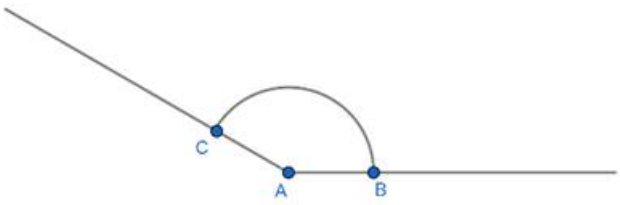
2. Question

Draw an obtuse angle. Bisect it. Measure each of the angles so obtained.

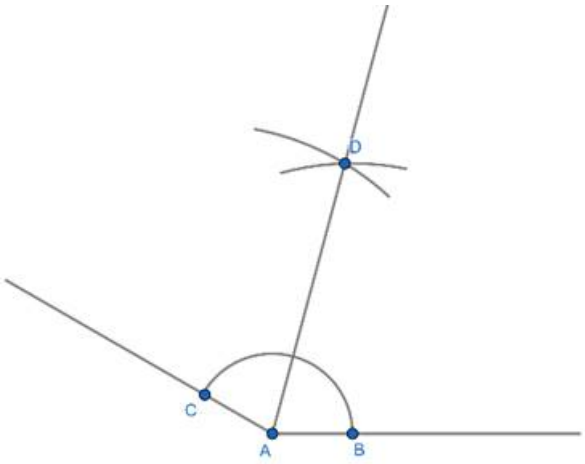
Answer

The steps of the required construction are:

1) Draw an angle ∠BAC=150° using protractor.



2) Taking B as the center draw an arc of any radius greater than $\frac{BC}{2}$. Now, Taking C as the center and the keeping the same radius, draw another arc, intersecting the previous arc at D. Join AD.



3) $\angle BAD = \angle CAD = \frac{\angle BAC}{2} = 75°$

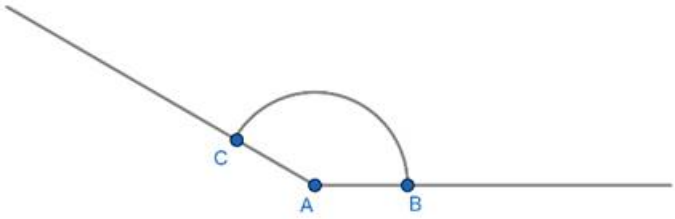
3. Question

Using your protractor, draw an angle of measure 108°. With this angle as given, draw an angle of 54°.

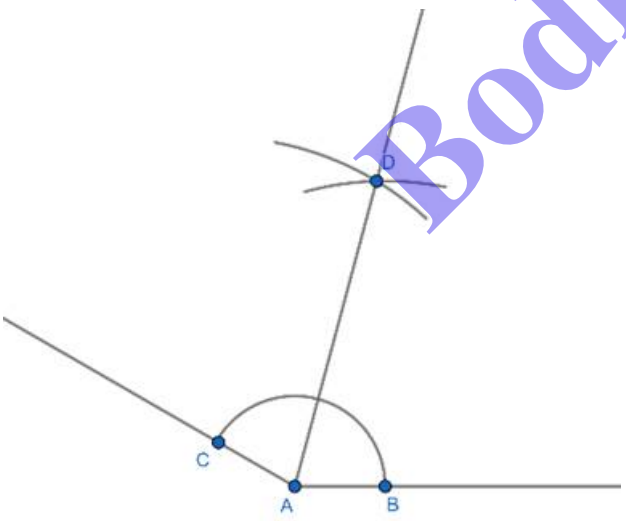
Answer

The steps of the required construction are:

1) Draw an angle ∠BAC=108° using a protractor.



2) Taking B as the center draw an arc of any radius greater than $\frac{BC}{2}$. Now, Taking C as the center and the keeping the same radius, draw another arc, intersecting the previous arc at D. Join AD.



3) $\angle BAD = \angle CAD = \frac{\angle BAC}{2} = 54°$

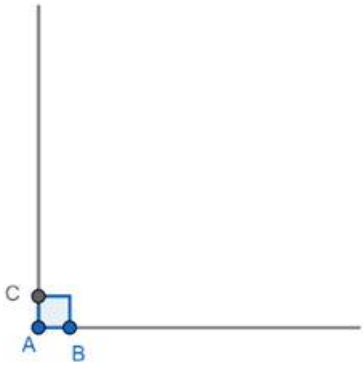
4. Question

Using protractor, draw a right angle. Bisect it to get an angle of measure 45°.

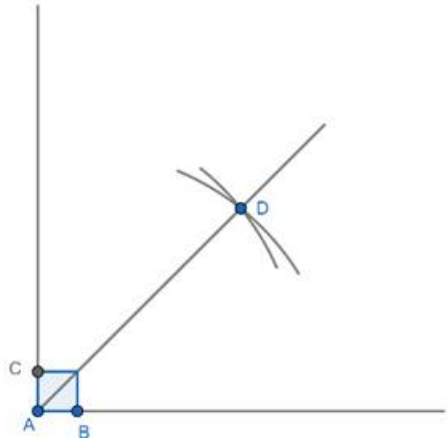
Answer

The steps of the required construction are:

1) Draw an angle ∠BAC=90° using a protractor.



2) Taking B as the center draw an arc of any radius greater than $\frac{BC}{2}$. Now, Taking C as the center and the keeping the same radius, draw another arc, intersecting the previous arc at D. Join AD.



3) $\angle BAD = \angle CAD = \frac{\angle BAC}{2} = 45°$

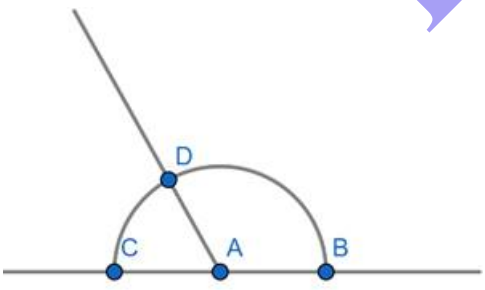
5. Question

Draw a linear pair of angles. Bisect each of the two angles. Verify that the two bisecting rays are perpendicular to each other.

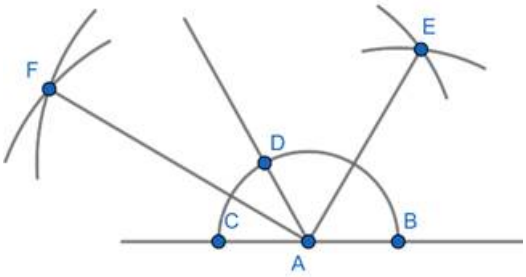
Answer

The steps of the required construction are:

1) Draw a line segment and choosing an arbitrary point A on it as the center and with any radius, draw a semi-circle, intersecting the line segment at point B and C. Choosing any arbitrary point D on the semi-circle, join AD. Thus, ∠BAD and ∠CAD are a linear pair of angles.



2) Taking B as the center draw an arc of any radius greater than $\frac{BD}{2}$. Now, Taking D as the center and the keeping the same radius, draw another arc, intersecting the previous arc at E. Join AE. Similarly, Taking C as the center draw an arc of any radius greater than $\frac{CD}{2}$. Now, Taking D as the center and the keeping the same radius, draw another arc, intersecting the previous arc at F. Join AF.



3) AE and AF are angle bisectors of ∠BAD and ∠CAD respectively. Measure ∠FAE using a protractor. It comes out to be 90°.

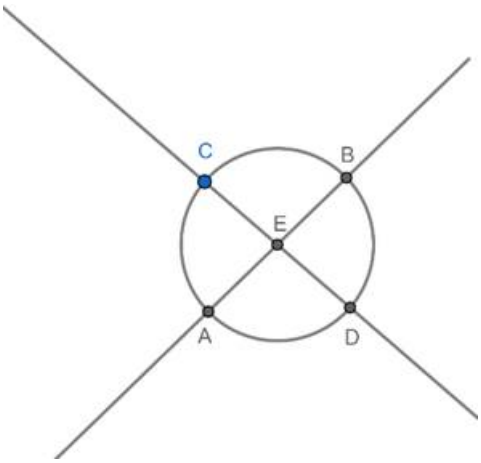
6. Question

Draw a pair of vertically opposite angles. Bisect each of the two angles. Verify that the bisecting rays are in the same line.

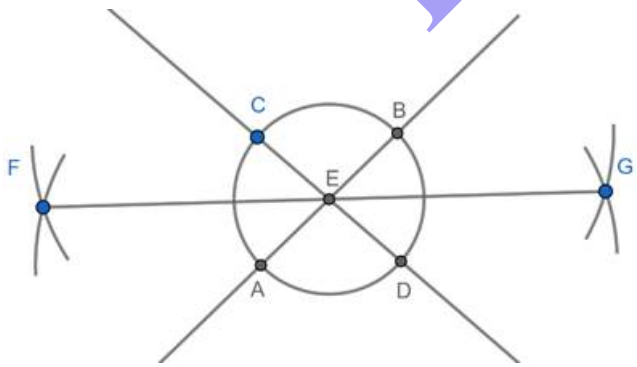
Answer

The steps of the required construction are:

1) Draw two intersecting line segments, intersecting at E. Taking E as center and any radius, draw a circle, intersecting the line segments at A, B, C and D. Thus ∠AEC and ∠BED are vertically opposite angles.



2) Taking A as the center draw an arc of any radius greater than $\frac{AC}{2}$. Now, Taking C as the center and the keeping the same radius, draw another arc, intersecting the previous arc at F. Join EF. Similarly, Taking B as the center draw an arc of any radius greater than $\frac{BD}{2}$. Now, Taking D as the center and the keeping the same radius, draw another arc, intersecting the previous arc at G. Join EG.



3) Measure ∠FEG using a protractor. It comes out to be 180°. Hence, FEG is a straight line.

7. Question

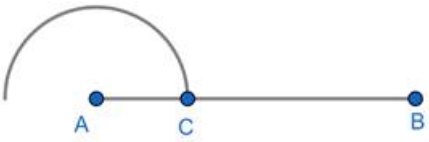
Using ruler and compasses only, draw a right angle.

Answer

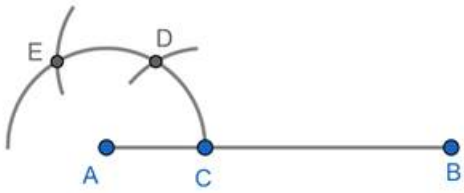
The steps of the required construction are:

1) Draw a line segment AB. Keeping A as the center and any radius draw a semicircle, intersecting AB at

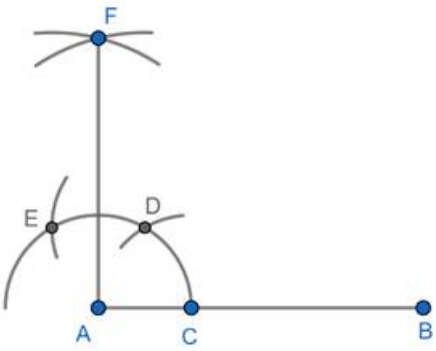
point C.



2) Keeping C as the center and radius AC, draw an arc, cutting the semicircle at point D. Keeping D as the center and radius AC, draw an arc, cutting the semicircle at point E.



3) Taking D as the center draw an arc of any radius greater than $\frac{DE}{2}$. Now, Taking E as the center and the keeping the same radius, draw another arc, intersecting the previous arc at F. Join AF.



4) ∠BAF=90°.

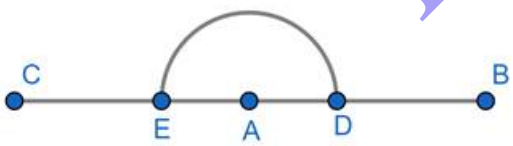
8. Question

Using ruler and compasses only, draw an angle of measure 135°.

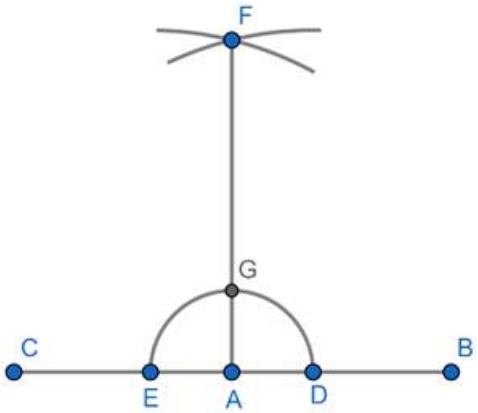
Answer

The steps of the required construction are:

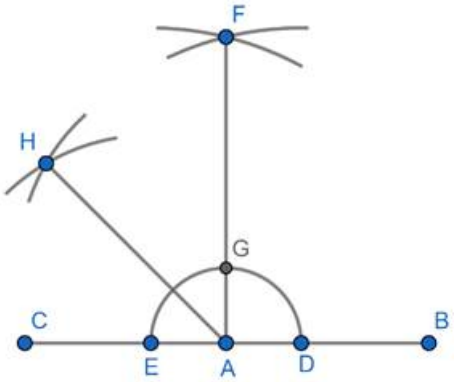
1) Draw a line segment BC. Taking any arbitrary point A on line segment BC as the center and any radius draw a semicircle, intersecting BC at points D and E.



2) Taking D as the center draw an arc of any radius greater than $\frac{DE}{2}$. Now, Taking E as the center and the keeping the same radius, draw another arc, intersecting the previous arc at F. Join AF, which intersects the semicircle at point G.



3) Taking G as the center draw an arc of any radius greater than $\frac{GE}{2}$. Now, Taking E as the center and keeping the same radius, draw another arc, intersecting the previous arc at H. Join AH.



4) ∠BAF=135°.

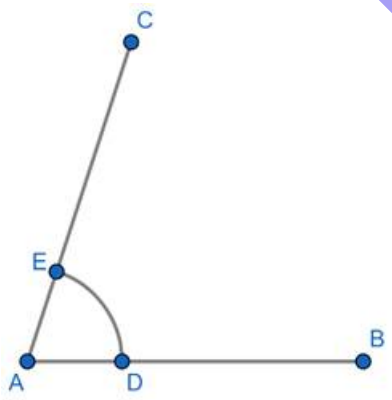
9. Question

Using a protractor, draw an angle of measure 72°. With this angle as given, draw angles of measure 36° and 54°.

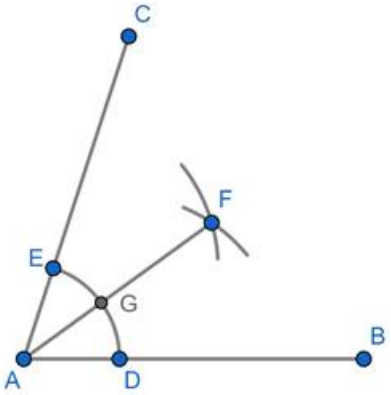
Answer

The steps of the required construction are:

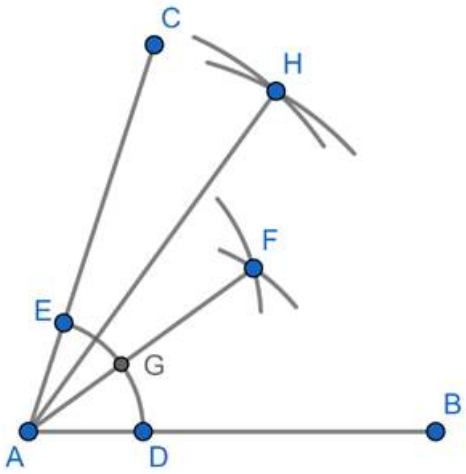
1) Draw ∠BAC=72° using a protractor. Using A as the center and radius less than AB and AC, draw a circular arc, intersecting AB and AC at D and E respectively.



2) Taking D as the center draw an arc of any radius greater than $\frac{DE}{2}$. Now, Taking E as the center and the keeping the same radius, draw another arc, intersecting the previous arc at F. Join AF, which intersects the arc DE at point G. ∠BAF=36°.



3) Taking G as the center draw an arc of any radius greater than $\frac{GE}{2}$. Now, Taking E as the center and keeping the same radius, draw another arc, intersecting the previous arc at H. Join AH.



4) ∠BAH=54°.

10. Question

Construct the following angles at the initial point of a given ray and justify the construction:

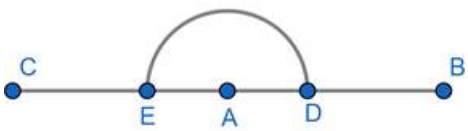
(i) 45°

(ii) 90°

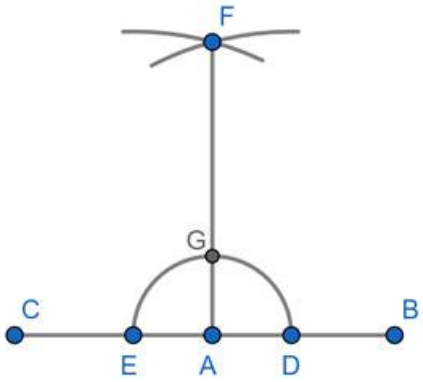
Answer

i) The steps of the required construction are:

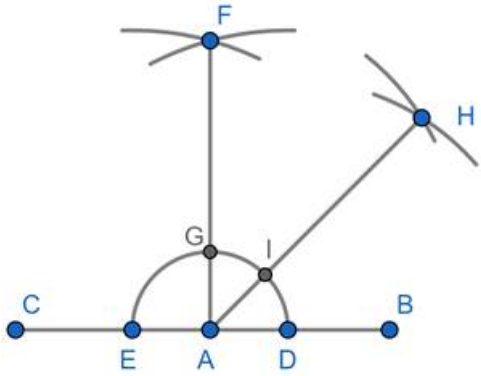
1) Draw a line segment BC. Taking any arbitrary point, A on line segment BC as the the center and any radius draw a semicircle, intersecting BC at points D and E.



2) Taking D as the center draw an arc of any radius greater than $\frac{DE}{2}$. Now, Taking E as the center and the keeping the same radius, draw another arc, intersecting the previous arc at F. Join AF, which intersects the semicircle at point G.



3) Taking D as the center draw an arc of any radius greater than $\frac{DG}{2}$. Now, Taking G as the center and the keeping the same radius, draw another arc, intersecting the previous arc at H. Join AH, which intersects the semicircle at point I.



4) ∠DAI=45°.

Justification:

Since DAE is a straight line therefore ∠DAE=180°.

Consider ΔEAF and ΔDAF

AE=AD (Radius of semi-circle)

EF=DF (By construction)

AF=AF (Common side)

Hence, By SSS criteria, ΔEAF≅ΔDAF.

Therefore, by C.P.C.T. $\angle EAF = \angle DAF = \frac{1}{2}\angle DAE = 90°$.

Consider ΔGAH and ΔDAH

AG=AD (Radius of semi-circle)

GH=DH (By construction)

AH=AH (Common side)

Hence, By SSS criteria, ΔGAH≅ΔDAH.

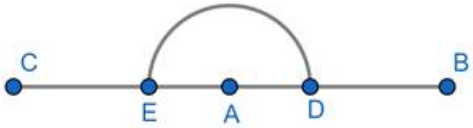
Therefore, by C.P.C.T. $\angle GAH = \angle DAH = \frac{1}{2}\angle DAG = \frac{1}{2}\angle DAF = 45°$

Hence, ∠DAI=∠DAH=45°.

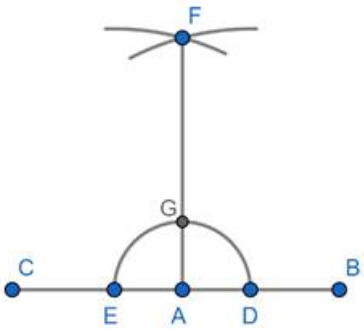
ii) The steps of the required construction are:

The steps of the required construction are:

1) Draw a line segment BC. Taking any arbitrary point, A on line segment BC as the the center and any radius draw a semicircle, intersecting BC at points D and E.



2) Taking D as the center draw an arc of any radius greater than $\frac{DE}{2}$. Now, Taking E as the center and the keeping the same radius, draw another arc, intersecting the previous arc at F. Join AF, which intersects the semicircle at point G.



3) ∠DAG=90°.

Justification:

Since DAE is a straight line therefore ∠DAE=180°.

Consider ΔEAF and ΔDAF

AE=AD (Radius of semi-circle)

EF=DF (By construction)

AF=AF (Common side)

Hence, By SSS criteria, ΔEAF≅ΔDAF.

Therefore, by C.P.C.T. $\angle EAF = \angle DAF = \frac{1}{2}\angle DAE = 90°$

Hence, ∠DAG=∠DAF=90°.

11. Question

Construct the angles of the following measurements:

(i) 30°

(ii) 75°

(iii) 105°

(iv) 135°

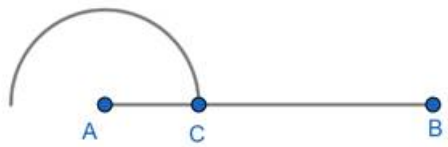
(v) 15°

(vi) $22\frac{1}{2}^{\circ}$

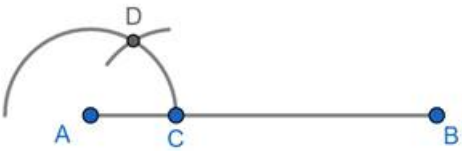
Answer

i) The steps of the required construction are:

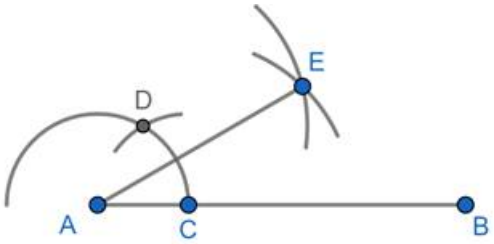
1) Draw a line segment AB. Keeping A as the center and any radius draw a semicircle, intersecting AB at point C.



2) Keeping C as the center and radius AC, draw an arc, cutting the semicircle at point D.



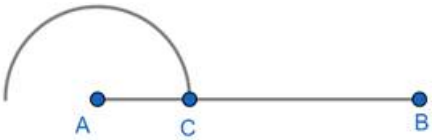
3) Taking C as the center draw an arc of any radius greater than $\frac{CD}{2}$. Now, Taking D as the center and the keeping the same radius, draw another arc, intersecting the previous arc at E. Join AE.



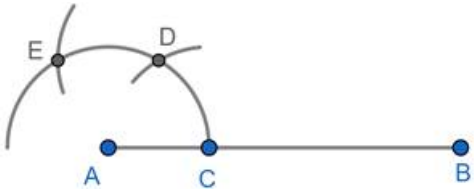
4) ∠BAE=30°.

ii) The steps of the required construction are:

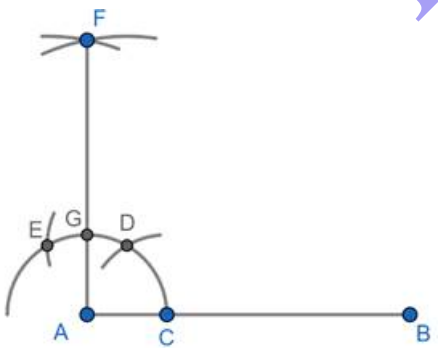
1) Draw a line segment AB. Keeping A as the center and any radius draw a semicircle, intersecting AB at point C.



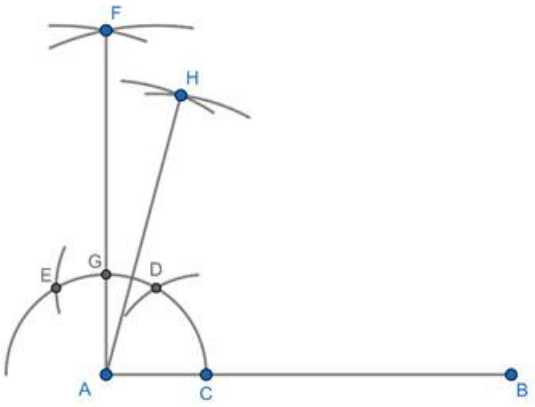
2) Keeping C as the center and radius AC, draw an arc, cutting the semicircle at point D. Keeping D as the center and radius AC, draw an arc, cutting the semicircle at point E.



3) Taking D as the center draw an arc of any radius greater than $\frac{DE}{2}$. Now, Taking E as the center and the keeping the same radius, draw another arc, intersecting the previous arc at F. Join AF, intersecting the semi-circle at G.



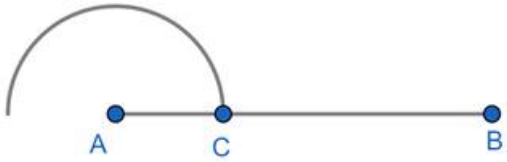
4) Taking D as the center draw an arc of any radius greater than $\frac{DG}{2}$. Now, Taking G as the center and the keeping the same radius, draw another arc, intersecting the previous arc at H. Join AH.



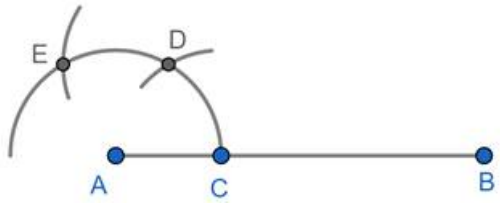
5) ∠BAH=75°.

iii) The steps of the required construction are:

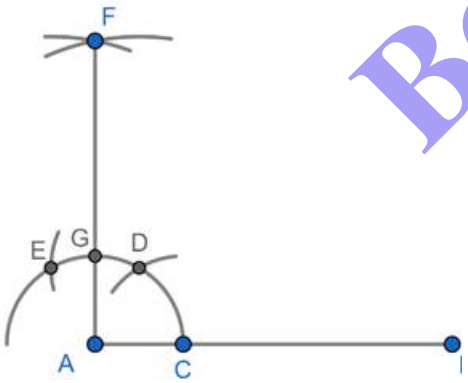
1) Draw a line segment AB. Keeping A as the center and any radius draw a semicircle, intersecting AB at point C.



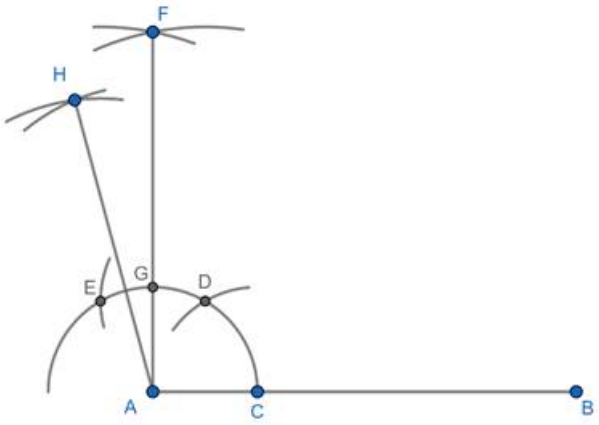
2) Keeping C as the center and radius AC, draw an arc, cutting the semicircle at point D. Keeping D as the center and radius AC, draw an arc, cutting the semicircle at point E.



3) Taking D as the center draw an arc of any radius greater than $\frac{DE}{2}$. Now, Taking E as the center and the keeping the same radius, draw another arc, intersecting the previous arc at F. Join AF, intersecting the semi-circle at G.



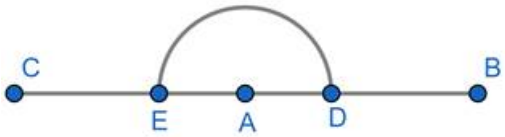
4) Taking E as the center draw an arc of any radius greater than $\frac{GE}{2}$. Now, Taking G as the center and the keeping the same radius, draw another arc, intersecting the previous arc at H. Join AH.



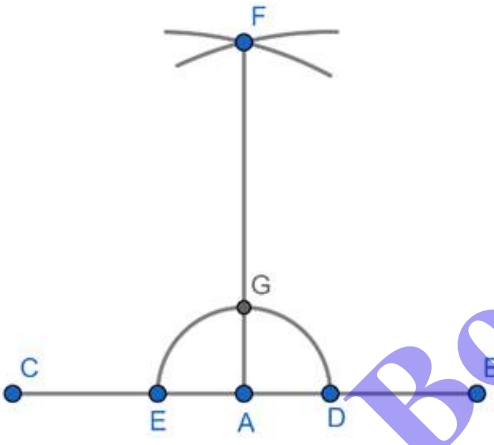
5) ∠BAH=105°.

iv) The steps of the required construction are:

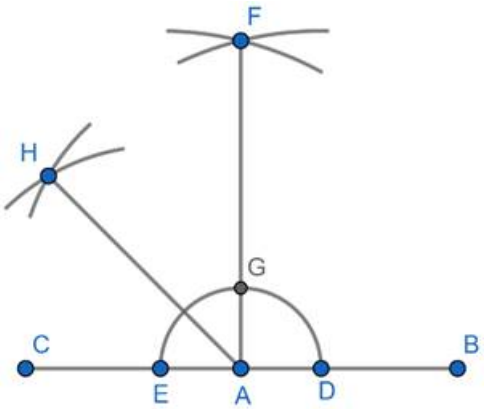
1) Draw a line segment BC. Taking any arbitrary point A on line segment BC as the center and any radius draw a semicircle, intersecting BC at points D and E.



2) Taking D as the center draw an arc of any radius greater than $\frac{DE}{2}$. Now, Taking E as the center and the keeping the same radius, draw another arc, intersecting the previous arc at F. Join AF, which intersects the semicircle at point G.



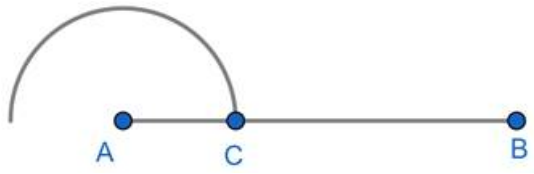
3) Taking G as the center draw an arc of any radius greater than $\frac{GE}{2}$. Now, Taking E as the center and keeping the same radius, draw another arc, intersecting the previous arc at H. Join AH.



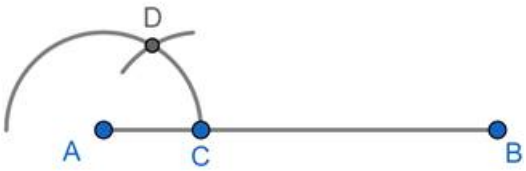
4) ∠BAF=135°.

v) The steps of the required construction are:

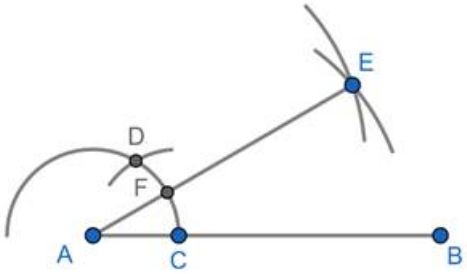
1) Draw a line segment AB. Keeping A as the center and any radius draw a semicircle, intersecting AB at point C.



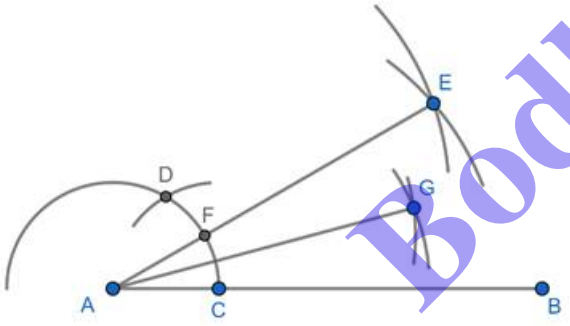
2) Keeping C as the center and radius AC, draw an arc, cutting the semicircle at point D.



3) Taking C as the center draw an arc of any radius greater than $\frac{CD}{2}$. Now, Taking D as the center and the keeping the same radius, draw another arc, intersecting the previous arc at E. Join AE, intersecting the semi-circle at F.



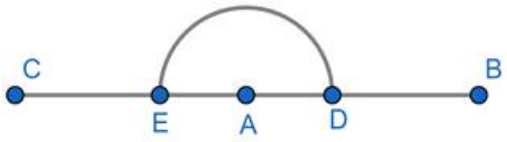
4) Taking C as the center draw an arc of any radius greater than $\frac{CF}{2}$. Now, Taking F as the center and the keeping the same radius, draw another arc, intersecting the previous arc at G. Join AG.



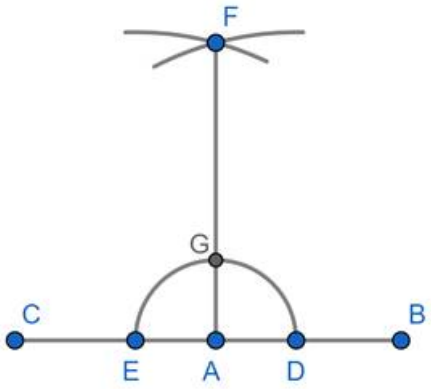
5) ∠BAG=15°.

vi) The steps of the required construction are:

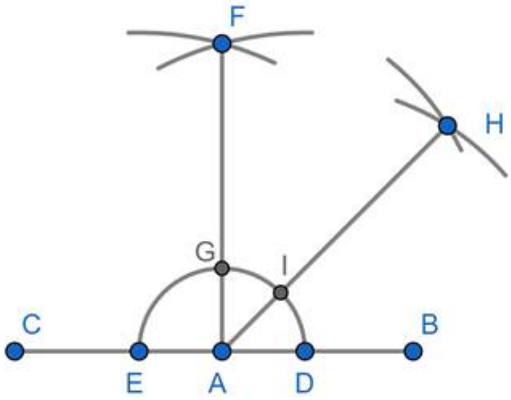
1) Draw a line segment BC. Taking any arbitrary point, A on line segment BC as the the center and any radius draw a semicircle, intersecting BC at points D and E.



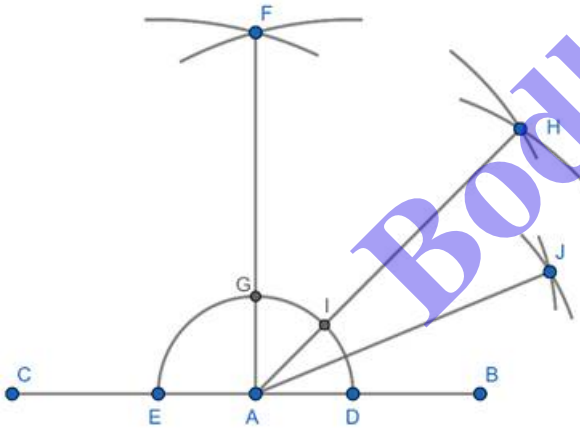
2) Taking D as the center draw an arc of any radius greater than $\frac{DE}{2}$. Now, Taking E as the center and the keeping the same radius, draw another arc, intersecting the previous arc at F. Join AF, which intersects the semicircle at point G.



3) Taking D as the center draw an arc of any radius greater than $\frac{DG}{2}$. Now, Taking G as the center and the keeping the same radius, draw another arc, intersecting the previous arc at H. Join AH, which intersects the semicircle at point I.



4) Taking D as the center draw an arc of any radius greater than $\frac{DI}{2}$. Now, Taking I as the center and the keeping the same radius, draw another arc, intersecting the previous arc at J. Join AJ.



5) $\angle BAJ = 22\frac{1}{2}^{\circ}$.

Exercise 17.3

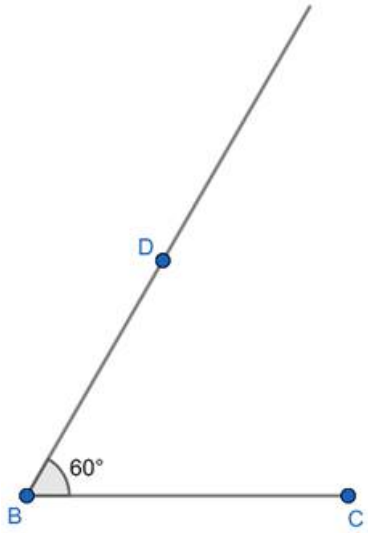
1. Question

Construct a Δ*ABC* in which *BC*=3.6 cm, *AB*+*AC*=4.8 cm and ∠B = 60°.

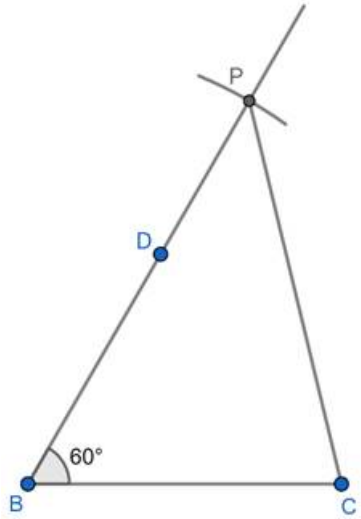
Answer

The steps of the required construction are:

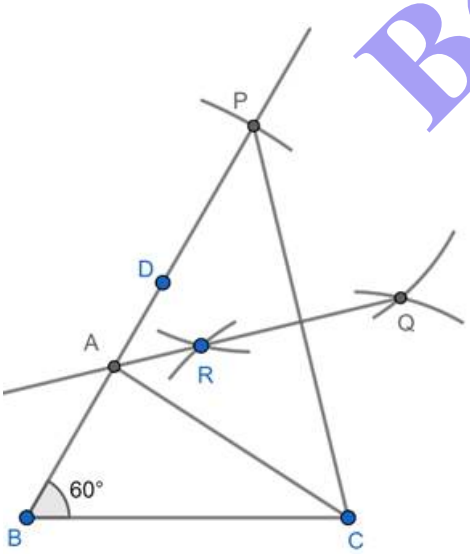
1) Draw a line segment BC=3.6cm. Using a protractor, draw ∠CBD=60°. Join and extend BD.



2) Taking B as the center and radius=4.8cm, draw an arc, intersecting extended BD at point P. Join PC.



3) Taking P as the center and radius greater than $\frac{PC}{2}$, draw arcs on each side of PC. Now, taking C as the center and same radius, draw arcs, intersecting the previous arcs at points Q and R. Join and extend QR. Extended QR intersects line segment DB at point A. Join AC.



4) ΔABC is the required triangle.

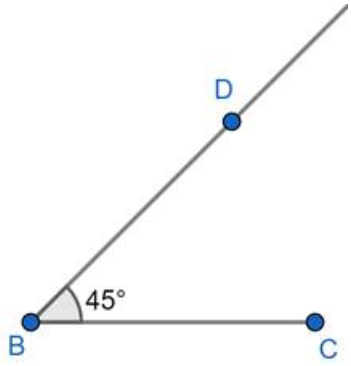
2. Question

Construct a Δ*ABC* in which *AB*+*AC*=5.6 cm, *BC*=4.5 cm, and ∠B = 45°.

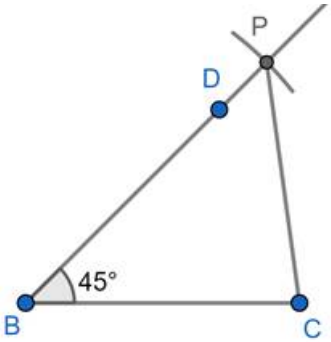
Answer

The steps of the required construction are:

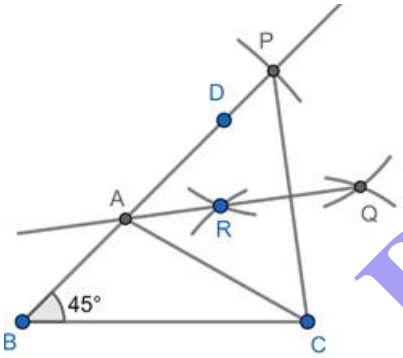
1) Draw a line segment BC=4.5cm. Using a protractor, draw ∠CBD=45°. Join and extend BD.



2) Taking B as the center and radius=5.6cm, draw an arc, intersecting extended BD at point P. Join PC.



3) Taking P as the center and radius greater than $\frac{PC}{2}$, draw arcs on each side of PC. Now, taking C as the center and same radius, draw arcs, intersecting the previous arcs at points Q and R. Join and extend QR. Extended QR intersects line segment DB at point A. Join AC.



4) ΔABC is the required triangle.

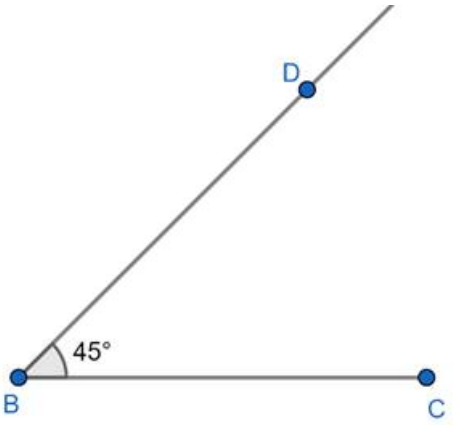
3. Question

Construct a Δ*ABC* in which *BC*=3.4 cm, *AB*-*AC*=1.5 cm and ∠B = 45°.

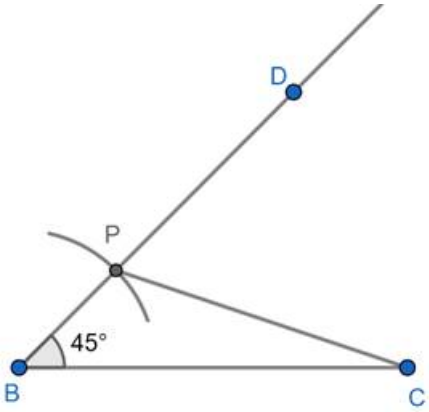
Answer

The steps of the required construction are:

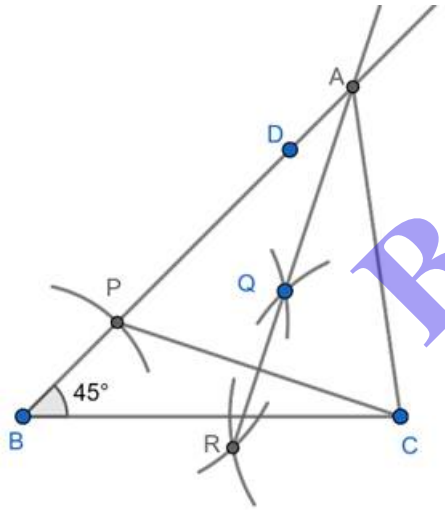
1) Draw a line segment BC=3.4cm. Using a protractor, draw ∠CBD=45°. Join BD and extend it.



2) Taking B as the center and radius=1.5cm, draw an arc, intersecting BD at point P. Join PC.



3) Taking P as the center and radius greater than $\frac{PC}{2}$, draw arcs on each side of PC. Now, taking C as the center and same radius, draw arcs, intersecting the previous arcs at points Q and R. Join and extend QR. Extended QR intersects extended line segment DB at point A. Join AC.



4) ΔABC is the required triangle.

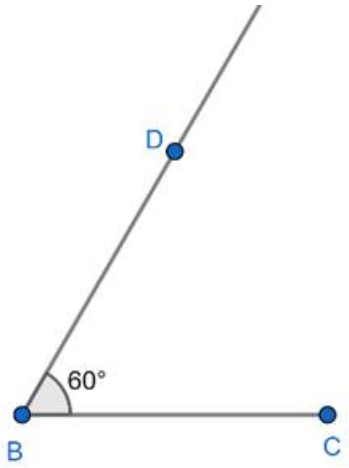
4. Question

Using ruler and compasses only, construct an Δ*ABC,* given base *BC* = 7 cm, ∠*ABC* = 60° and *AB+AC*=12 cm.

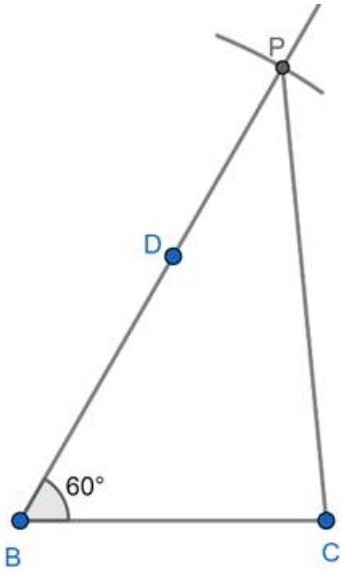
Answer

The steps of the required construction are:

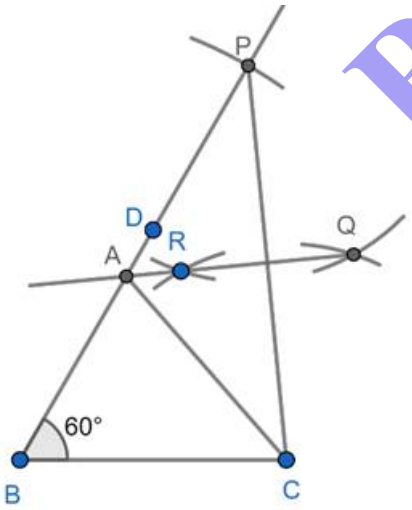
1) Draw a line segment BC=7cm. Using a protractor, draw ∠CBD=60°. Join and extend BD.



2) Taking B as the center and radius=12cm, draw an arc, intersecting extended BD at point P. Join PC.



3) Taking P as the center and radius greater than $\frac{PC}{2}$, draw arcs on each side of PC. Now, taking C as the center and same radius, draw arcs, intersecting the previous arcs at points Q and R. Join and extend QR. Extended QR intersects line segment DB at point A. Join AC.



4) ΔABC is the required triangle.

5. Question

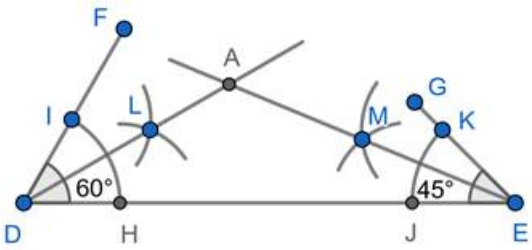
Construct a triangle whose perlmeter is 6.4 cm, and angles at the base are 60° and 45°.

Answer

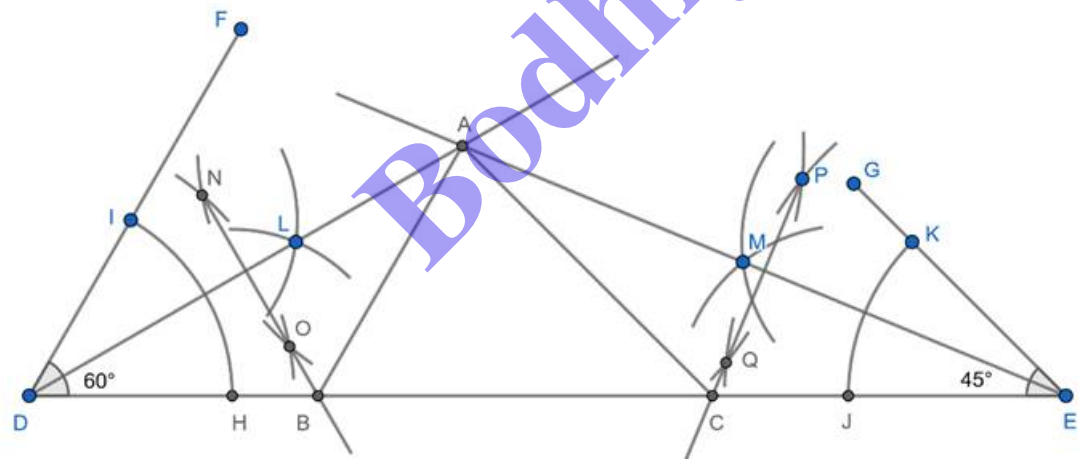
The steps of the required construction are:

1) Draw a line segment DE=6.4cm. Using a protractor, draw ∠EDF=60° and ∠DEG=45°. Join DF and EG. Taking D as the center and any radius, draw an arc, intersecting DE at H and DF at I. Similarly, Taking E as the center and any radius, draw an arc, intersecting DE at J and EG at K.

2) Taking H as the center draw an arc of any radius greater than $\frac{HI}{2}$. Now, Taking I as the center and the keeping the same radius, draw another arc, intersecting the previous arc at L. Join and extend DL. Similarly, Taking J as the center draw an arc of any radius greater than $\frac{JK}{2}$. Now, Taking K as the center and the keeping the same radius, draw another arc, intersecting the previous arc at M. Join and extend EM, intersecting extended DL at A.



3) Taking D as the center and radius greater than $\frac{AD}{2}$, draw arcs on each side of AD. Now, taking A as the center and same radius, draw arcs, intersecting the previous arcs at points N and O. Join and extend NO. Extended NO intersects line segment DE at point C. Join AC. Similarly, Taking E as the center and radius greater than $\frac{AE}{2}$, draw arcs on each side of AE. Now, taking A as the center and same radius, draw arcs, intersecting the previous arcs at points P and Q. Join and extend PQ. Extended NO intersects line segment DE at point B. Join AB.



4) ΔABC is the required triangle.

6. Question

Using ruler and compasses only, construct a Δ*ABC* from the following data:

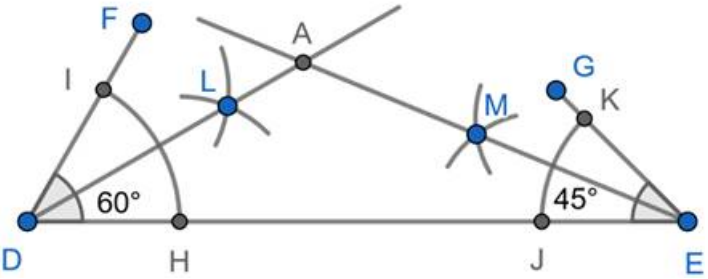
AB+*BC*+*CA*=12 cm, ∠B = 45° and ∠C = 60°.

Answer

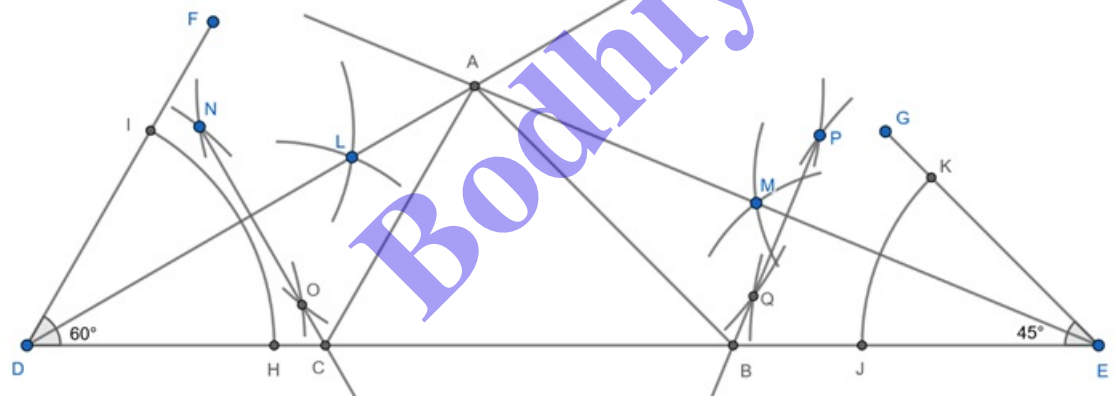
The steps of the required construction are:

1) Draw a line segment DE=12cm. Using a protractor, draw ∠EDF=60° and ∠DEG=45°. Join DF and EG. Taking D as the center and any radius, draw an arc, intersecting DE at H and DF at I. Similarly, Taking E as the center and any radius, draw an arc, intersecting DE at J and EG at K.

2) Taking H as the center draw an arc of any radius greater than $\frac{HI}{2}$. Now, Taking I as the center and the keeping the same radius, draw another arc, intersecting the previous arc at L. Join and extend DL. Similarly, Taking J as the center draw an arc of any radius greater than $\frac{JK}{2}$. Now, Taking K as the center and the keeping the same radius, draw another arc, intersecting the previous arc at M. Join and extend EM, intersecting extended DL at A.



3) Taking D as the center and radius greater than $\frac{AD}{2}$, draw arcs on each side of AD. Now, taking A as the center and same radius, draw arcs, intersecting the previous arcs at points N and O. Join and extend NO. Extended NO intersects line segment DE at point C. Join AC. Similarly, Taking E as the center and radius greater than $\frac{AE}{2}$, draw arcs on each side of AE. Now, taking A as the center and same radius, draw arcs, intersecting the previous arcs at points P and Q. Join and extend PQ. Extended NO intersects line segment DE at point B. Join AB.



4) ΔABC is the required triangle.