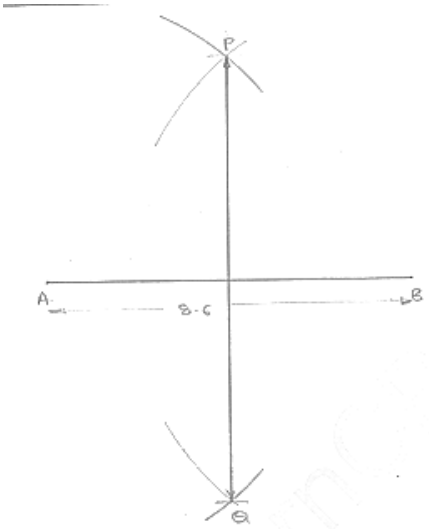
Exercise – 17.1

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

Sol:



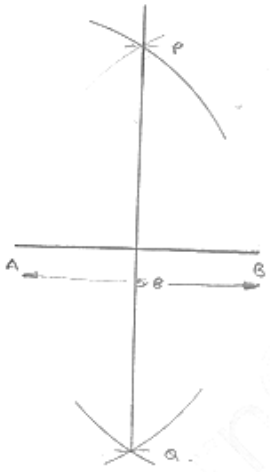
Steps of construction:

1. Draw a line segment AB of $8 \cdot 6cm$
2. With center A and radius more than $n\frac{1}{2}AB$, draw arcs, one on each side of AB
3. With center B and same radius, draw arcs cutting the previous arcs at P and Q respectively
4. Join PQ

$\therefore AC = BC = 4 \cdot 3cm$

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

Sol:



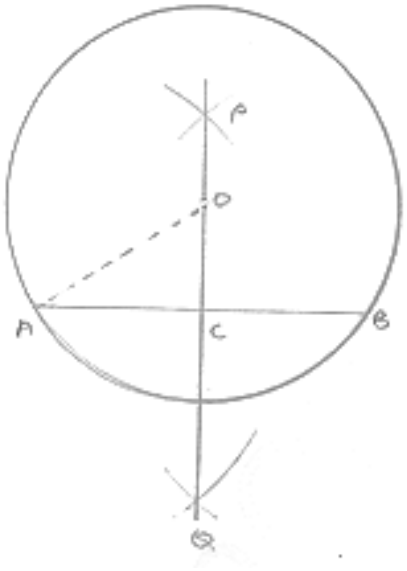
Steps of construction:

1. Draw a line segment AB of $5 \cdot 8cm$
2. With center A and radius more than $\frac{1}{2}AB,$ draw arcs with one on each side of AB
3. With center B and same radius draw arcs cutting the previous arcs at P and Q respectively.
4. Join PQ

Hence, PQ is the perpendicular bisector of AB.

3. 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?

Sol:



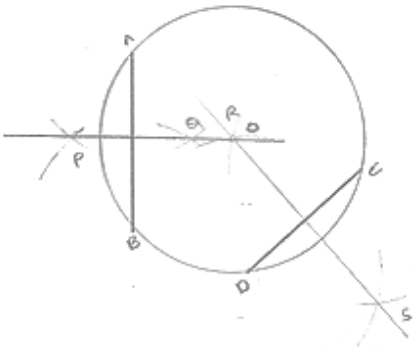
Steps of construction:

1. With center O and radius 5cm draw a circle
2. Draw a chord AB.
3. With center A and radius more than $\frac{1}{2}AB,$ draw arcs one on each side of
4. With center B and same radius draw arcs cutting previous arcs at P and Q respectively.
5. Join PQ

$\therefore$ yes perpendicular bisector PQ of AB passes through center of the circle.

4. 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?

Sol:



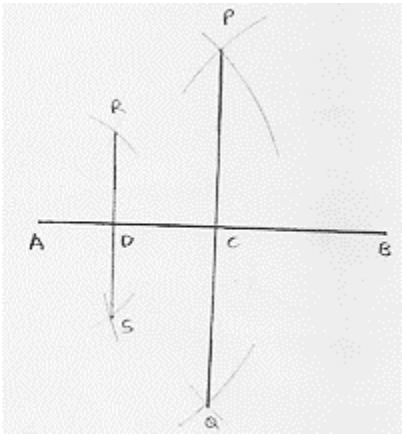
Steps of construction:

1. With center O and any radius, draw a circle
2. Draw two chords AB and CD.
3. With center A and radius more than $\frac{1}{2}AB,$ draw arcs, one on each side of AB
4. With center B and same radius draw arcs cutting previous arcs at P and Q respectively.
5. Join PQ
6. With center D and radius more than $\frac{1}{2}DC.$ draw arcs, one on each side of DC
7. With center C and same radius, draw arcs cutting previous arcs at R and S respectively
8. Join RS

Both perpendicular bisector PQ and RS intersect each other at the center O of he circle.

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

Sol:



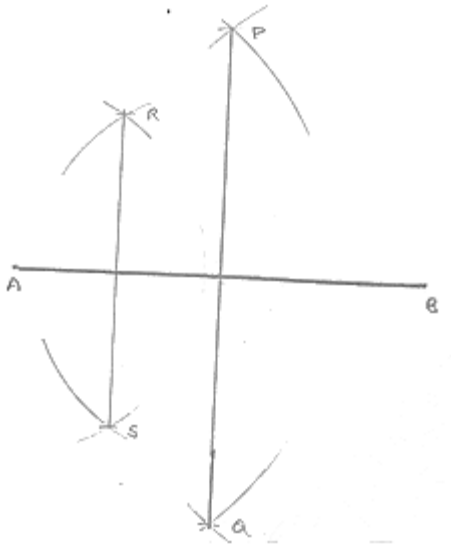
Steps of construction:

1. Draw a line segment AB of $10cm$
2. With center A and radius more than $\frac{1}{2}AB$, draw arcs one on each side of AB
3. With center B and same radius draw arcs cutting previous arcs at P and Q respectively.
4. Join PQ and which intersect AB at C
5. With center A and radius more than $\frac{1}{2}AC$, drawing on each side of AC.
6. With center C and same radius, draw arcs cutting previous arcs at R and S respectively.
7. Join RS and which intersect AC at b.

$\therefore AD = 2 \cdot 5cm.$

6. 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).

Sol:



Steps of construction:

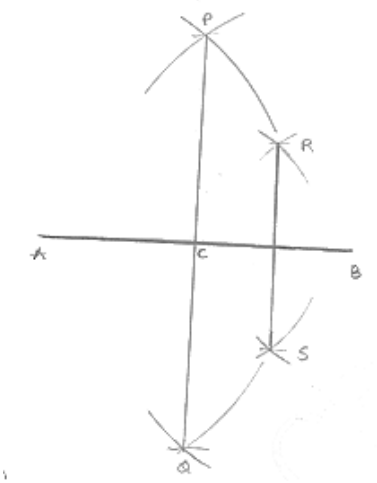
1. Draw a line segment AB
2. With center A and radius more than $\frac{1}{2}AB$, draw arcs one on each side of AB
3. With center B and same radius draw arcs cutting previous arcs at P and Q respectively.
4. Join PQ and which intersect AB at C
5. With center A and radius more than $\frac{1}{2}AC$, draw arcs, one on each side of AC.

6. With center C and same radius, draw arcs cutting previous arcs at R and S respectively.
7. Join RS and which intersect AC at D

$\therefore AD = \frac{1}{4} AB.$

7. Draw a line segment AB and by ruler and compasses1 obtain a line segment of length $\frac{3}{4} AB$.

Sol:



Steps of construction:

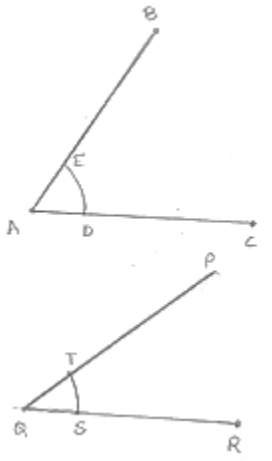
1. Draw a line segment AB
2. With center A and radius more than $\frac{1}{2} AB,$ draw arcs one on each side of AB.
3. With center B and same radius draw arcs cutting previous arcs at P and Q respectively.
4. Join PQ and which intersect AB at C
5. With center C and radius more than $\frac{1}{2} CB,$ draw arcs, one on each side of CB.
6. With center B and same radius, draw arcs cutting previous arcs at R and S respectively.
7. Join RS and which intersect CB at D

$\therefore AD = \frac{3}{4} AB.$

Exercise – 17.2

1. Draw an angle and label it as ∠BAC. Construct another angle, equal to ∠BAC.

Sol:



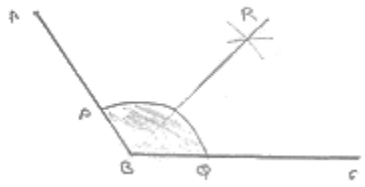
Steps of construction:

1. Draw an angle ABO and a Line segment QR
2. With center A and any radius, draw an arc which intersects $\angle BAC$ at E and O
3. With center Q and same radius draw arc which intersect QR at S.
4. With center S and radius equal to DE, draw an arc which intersect previous arc at T
5. Draw a line segment joining Q and T

$\therefore \angle PQR = \angle BAC$

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

Sol:



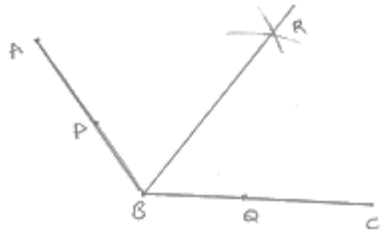
Steps of construction:

1. Draw angle ABC of $120°$
2. With center B and any radius, draw an arc which intersects AB at P and BC at Q
3. With center P and Q and radius more than $\frac{1}{2}PQ$, draw two arcs, with intersect each other at R.
4. Join BR

$\therefore \angle ABR = \angle RBC = 60°$

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

Sol:



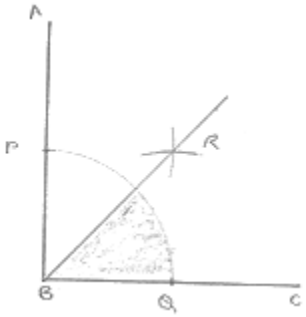
Steps of construction:

1. Draw an angle ABC of 108°
2. With center B and any radius, draw an arc which intersects AB at P and BC at Q
3. With center P and Q and radius more than $\frac{1}{2}PQ$, draw two arcs, which intersect each other at R.
4. Join BR

$\therefore \angle RBC = 54°$

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

Sol:



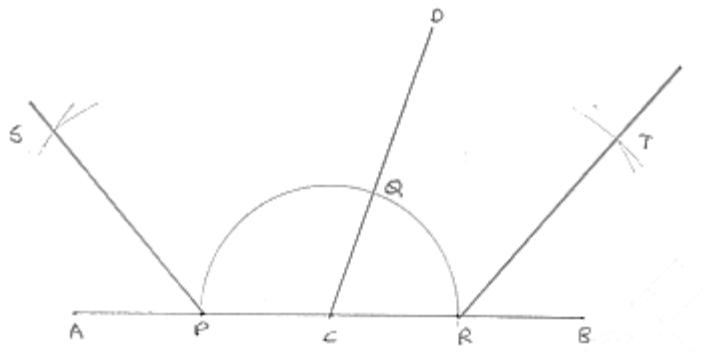
Steps of construction:

1. Draw an angle ABC of 90°
2. With center B and any radius, draw an arc which intersects AB at P and BC at Q
3. With center P and Q and radius more than $\frac{1}{2}PQ$, draw two arcs, which intersect each other at R.
4. Join RB

$\therefore \angle RBC = 45°$

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

Sol:



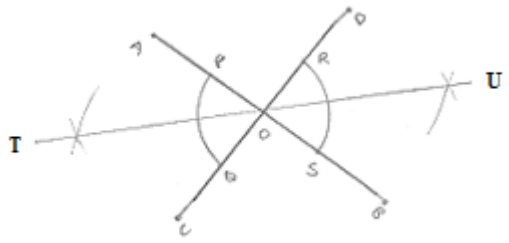
Steps of construction:

1. Draw two angle DCA and DCB forming Linear pair
2. With center C and any radius, draw an arc which intersects AC at P, CD at Q and CB at R.
3. With center P and Q and any radius draw two arcs which interest each other at S
4. Join SC
5. With center Q and R any radius draw two arcs, which intersect each other at T.
6. Join TC

$\angle SCT = 90°$ [By using protractor]

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

Sol:



Steps of construction:

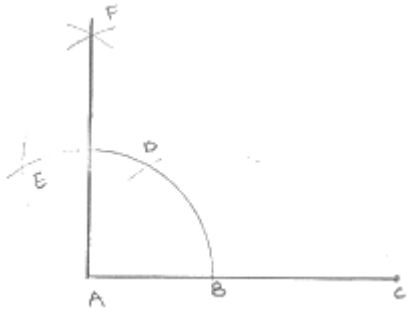
1. Draw a pair of vertically opposite angle AOC and DOB
2. With center O and any radius drawn two arcs which intersect OA at P, $Q \cdot OB$ at S and OD at R.
3. With center P and Q and radius more than $\frac{1}{2}PQ$, draw two arcs which intersect each other at 7.
4. Join to

5. With center R and S radius more than $\frac{1}{2}RS$, draw two arcs which intersect each other at U.
6. Join OU.

$\therefore TOU$ is a straight line

7. Using ruler and compasses only, draw a right angle.

Sol:



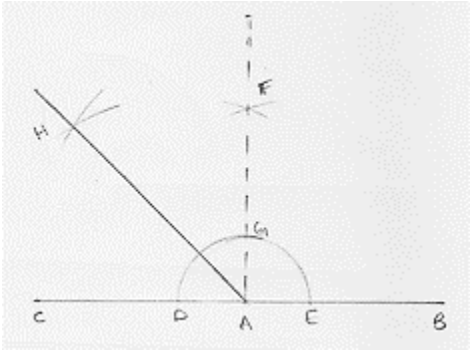
Steps of construction:

1. Draw a line segment AB
2. With center A and any radius draw arc which intersect AB at C.
3. With center C and same radius draw an arc which intersects AB at C.
4. With center D and same radius draw arc which intersect arc in (2) at E.
5. With centers E and C and any radius, draw two arcs which intersect each other at F.
6. Join FA

$\angle FAB = 90°$

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

Sol:



Steps of construction:

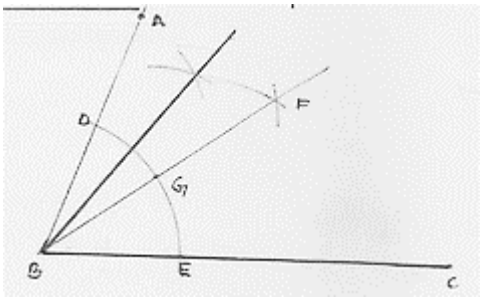
1. Draw a line segment AB and produce BA to point C.
2. With center A and any radius draw arc which intersect AC at D and AB at E.

3. With center D and E and radius more than $\frac{1}{2}DE$, draw two arcs which intersect each other at F.
4. Join FA which intersect the arc in (2) at G.
5. With centers G and D and radius more than $\frac{1}{2}GD$, draw two arcs which intersect each other at H.
6. Join HA

$\therefore \angle HAB = 135°$

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

Sol:



Steps of construction:

1. Draw an angle ABC of $72°$ with the help of protractor.
2. With center B and any radius, draw an arc which intersect AB at D and BC at E.
3. With center D and E and radius more than $\frac{1}{2}DE$, draw two arcs which intersect each other at F.
4. Join FB which intersect the arc in (2) at G.
5. With centers D and G and radius more than $\frac{1}{2}DE$, draw two arcs which intersect each other at F.
6. With centers D and G and radius more than $n\frac{1}{2}DG$ draw two arcs which intersect each other at H
7. Join HB

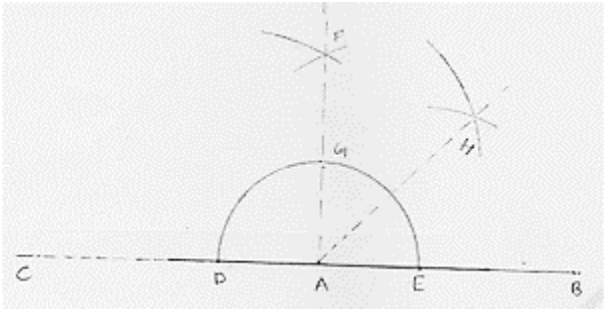
$\therefore \angle HBC = 54°$

$\angle FBC = 36°$

10. Construct the following angles at the initial point of a given ray and justify the construction:
(i) 45° (ii) 90°

Sol:

(i)

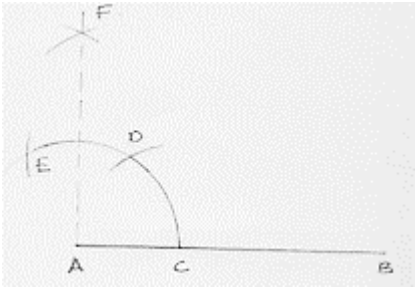


Steps of construction:

1. Draw a line segment AB and produce BA to point C.
2. With center A and any radius drawn an arc which intersect AC at D and AB at E.
3. With center D and E and radius more than $\frac{1}{2}DE$, draw arcs cutting each other at F.
4. Join FA which intersect arc in (2) at G.
5. With centers G and E and radius more than $\frac{1}{2}GE$, draw arcs cutting each other at H.
6. Join HA

$\therefore \angle HAB = 45°$

(ii)



Steps of construction:

1. Draw a line segment AB.
2. With center A and any radius draw in arc which intersect AB at C.
3. With center C and same radius draw an arc which intersects previous arc at D.
4. With centers D same radius draw an arc which intersects are in (2) at E.
5. With centers E and D same radius more than $\frac{1}{2}$ ED draw an arc cutting each other at F.
6. Join FA

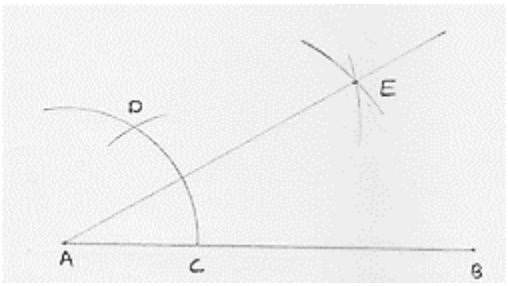
$\angle FAB = 90°$

11. Construct the angles of the following measurements:

(i) 30° (ii) 75° (iii) 105° (iv) 135° (v) 15° (vi) $22\frac{1^{\circ}}{2}$

Sol:

(i)

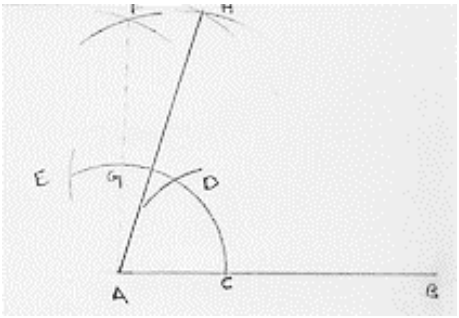


Steps of construction:

1. Draw a line segment AB.
2. With center A and any radius, draw an arc which intersect AB at C.
3. With center C and same radius, draw an arc which intersects previous arc at D.
4. With centers D and C and radius more than $\frac{1}{2}DC$, draw arcs intersecting each other at E
5. Join EA

$\therefore \angle EAB = 30^{\circ}$

(ii)



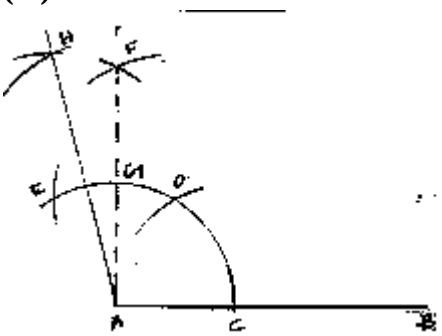
Steps of construction:

1. Draw a line segment AB.
2. With center A any radius, draw an arc which intersect AB at C.
3. With center C and same radius, draw an arc which intersects previous arc at D.
4. With center D and same radius, draw an arc which interest are in (2) at E
5. With centers E and D and radius more than $\frac{1}{2}ED$, draw arcs intersecting each other at F.
6. Join FA which intersects arc in (2) at G

7. With centers G and D, and radius more than $\frac{1}{2}GD$, draw arcs intersecting each other at H.
8. Join HA

   $\therefore \angle HAB = 75°$

(iii)

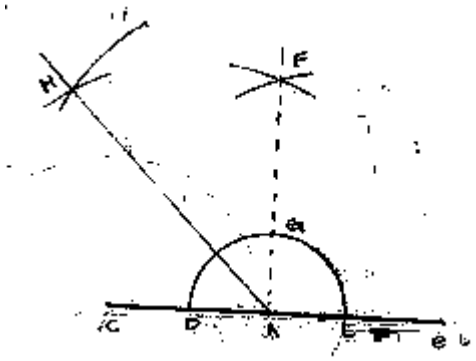


Steps of construction:

1. Draw a line segment AB.
2. With center A and any radius, draw an arc which intersect AB at C.
3. With center C and same radius, draw an arc which intersects previous arc at D.
4. With center D and same radius, draw an arc which interest are in (2) at E
5. With centers E and D and radius more than $\frac{1}{2}ED$, draw arcs intersecting each other at F.
6. Join FA which intersects arc in (2) at E
7. With centers E and G, and radius more than half of EG, draw arcs intersecting each other at H.
8. Join HA

   $\angle HAB = 105°$

(iv)



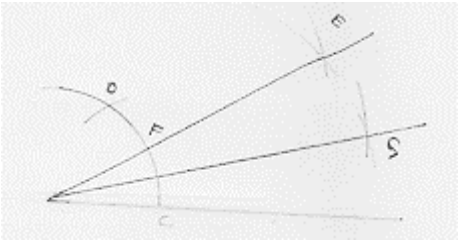
Steps of construction:

1. Draw a line segment AB and produce BA to pint C
2. With center A and any radius, draw an arc which intersect AC to D and AB at E.

3. With center D and E and radius more than half of DE, draw two arcs which intersects each other at F.
4. Join FA which intersect the arc in (2) at G
5. With center G and D radius more than $\frac{1}{2}GD$, draw two arcs which intersect each other at H
6. Join HA

$\angle HAB = 135°$

(v)



Steps of construction:

Step 1: Draw a line segment AB

Step 2: with center A and any radius, draw an arc which intersects previous arc at C

Step 3: with center C and same radius, draw an arc which intersect previous arc at D

Step 4: with center D and C radius more than half of DC draw arcs intersecting each other at E

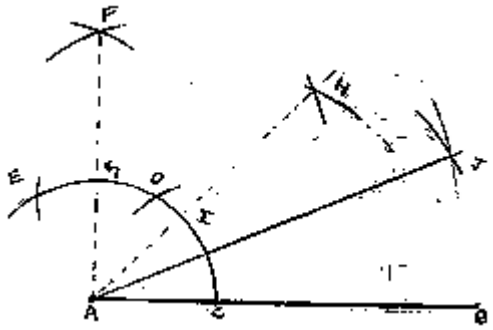
Step 5: Join EA which intersects arc in (2) at F.

Step 6: With centers F and C and radius more than $\frac{1}{2}FC$, draw arcs intersecting each other

Step 7: Join GA

$\therefore \angle GAB = 15°$

(vi)



Steps of construction:

Step 1: Draw a line segment AB

Step 2: with center A and any radius, draw an arc which intersects AB at C

Step 3: with center C and same radius, draw an arc which intersect previous arc at D

Step 4: with center D and same radius, draw an arc which intersects arc in (2) at E.

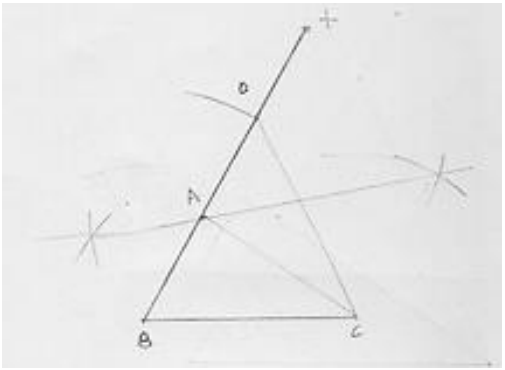
Step 5: with center E and D and radius more than half of ED, draw arcs intersecting each other at F.
Step 6: Join FA which intersects arc in (2) at G
Step 7: with center G and C and radius more than half of GC, draw arcs intersecting each other at H
Step 8: Join HA which intersects arc in (2) at 1.
Step 9: with centers I and C and radius more than half of IC, draw arcs intersecting each other
Step 10: Join JA

$\therefore \angle JAB = 22\frac{1^\circ}{2}$.

Exercise – 17.3

1. Construct a ΔABC in which BC = 3.6 cm, AB + AC = 4.8 cm and $\angle B = 60°$.

Sol:



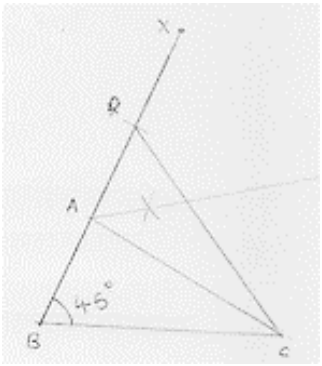
Steps of construction:

1. Draw a line segment BC of $3 \cdot 6 cm$.
2. At the point B, draw $\angle x$ BC of $60°$
3. With center B and radius $4 \cdot 8 cm$, draw an arc which intersects XB at D.
4. Join DC
5. Draw the perpendicular bisector of DC which intersects DB at A.
6. Join AC

Hence ΔABC is the required triangle

2. Construct a ΔABC in which AB + AC = 5.6 cm, BC = 4.5 cm, AB − AC = 1.5 cm and ∠B = 45°.

Sol:



Steps of construction:

Step 1: Draw a line segment BC of $4 \cdot 5 cm$.

Step 2: At B, draw an angle XBC of $45°$

Step 3: With center B and radius $5 \cdot 6 cm$, draw an arc which intersects BX at D.

Step 4: Join DC

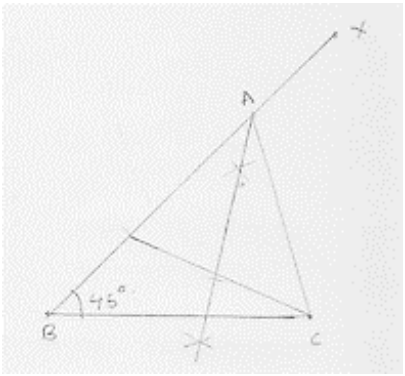
Step 5: Draw the perpendicular bisector of DC which intersects BD at A.

Step 6: Join AC

$\therefore \Delta ABC$ is a required triangle

3. Construct a ΔABC in which BC = 3.4 cm, AB − AC = 1.5 cm and ∠B = 45°.

Sol:



Steps of construction:

Step 1: Draw a line segment BC of $3 \cdot 5 cm$.

Step 2: At B, draw an angle XBC of $45°$

Step 3: With center B and radius $1 \cdot 5 cm$, draw an arc which intersects BX at D.

Step 4: Join DC

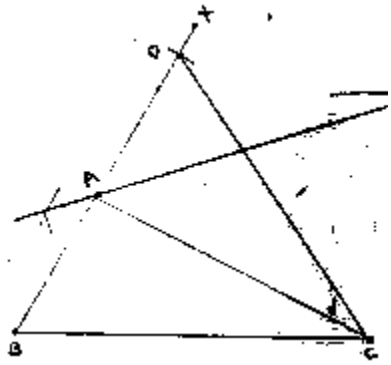
Step 5: Draw the perpendicular bisector of DC which intersects BD produced at A.

Step 6: Join AC

$\therefore \Delta ABC$ is the required triangle

4. Using ruler and compasses only, construct a ΔABC, given base BC = 7cm, ∠ABC = 60° and AB + AC = 12 cm.

Sol:



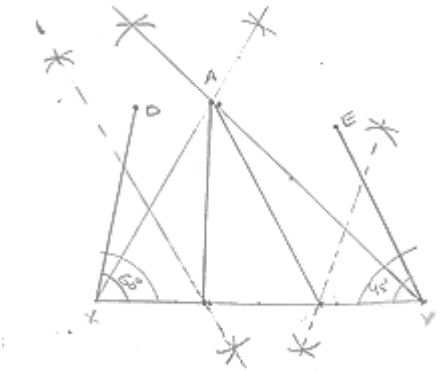
Steps of construction:

1. Draw a line segment BC of $7\,cm.$
2. At B, draw an angle XBC of $60°$
3. With center B and radius $12cm,$ draw an arc which intersects BX at D.
4. Join DC
5. Draw the perpendicular bisector of DC which intersects BD at A.
6. Join AC

$\therefore \Delta ABC$ is the required triangle.

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

Sol:

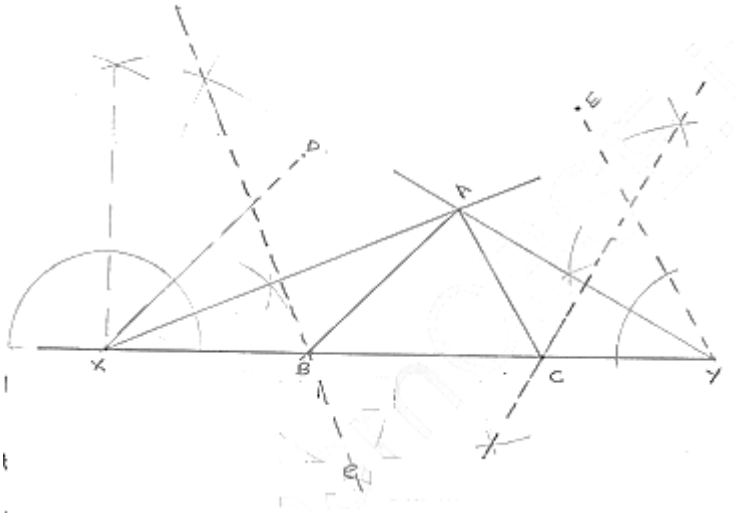


Steps of construction:

1. Draw a line segment XY of $6\cdot 4cm.$
2. Draw $\angle DXY = B = 60°$ *and* $\angle EYX = \angle C = 45°$
3. Draw the angle bisector of $\angle DXY$ *and* $\angle EYX$ which interest each other at A.
4. Draw the perpendicular bisector of AX and AY which interest XY at B and C respectively.
5. Join AB and AC

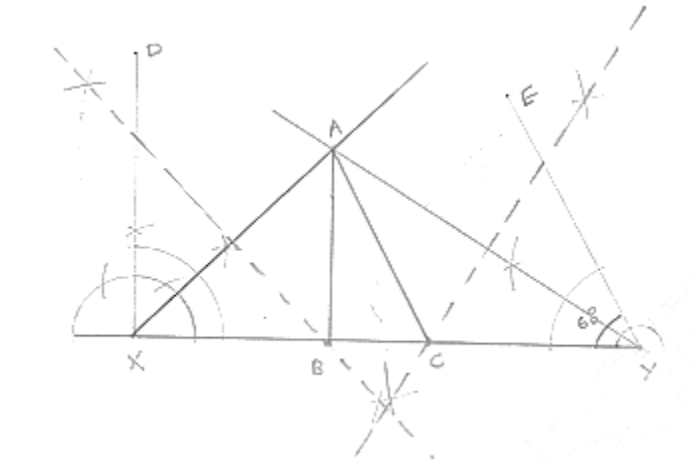
$\therefore \Delta ABC$ is the required triangle.

6. Using ruler and compasses only, construct a ΔABC from the following data:
AB + BC + CA = 12 cm, ∠B = 45° and ∠C = 60°.
Sol:



Steps of construction:
Step 1: Draw a line segment XY of 12cm.
Step 2: Draw $\angle DXY = \angle B = 45°$ *and* $\angle EYX = \angle C = 60°$
Step 3: Draw the angle bisectors of angles of DXY and EYX which intersects each other at A.
Step 4: Draw the perpendicular of AX and AY which intersect XY at B and C respectively.
Step 5: Join AB and AC
$\therefore \Delta ABC$ is the required triangle

7. Construct a right-angled triangle whose perimeter is equal to 10 cm and one acute angle equal to 60°.
Sol:



Steps of construction:

Step 1: Draw a line segment XY of 10cm.

Step 2: Draw $\angle DXY = \angle B = 90°$ *and* $\angle FYX = \angle C = 60°$

Step 3: Draw the angle bisectors of $\angle DXY$ and $\angle EYX$ which intersects each other at A.

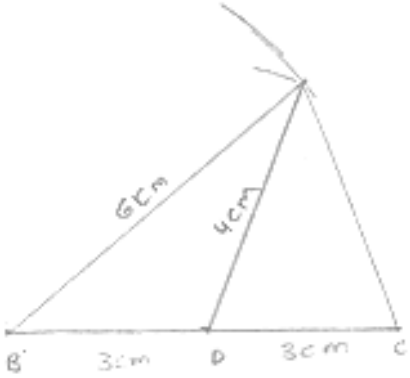
Step 4: Draw the perpendicular of AX and AY which intersect XY at B and C respectively.

Step 5: Join AB and AC

$\therefore \Delta ABC$ is the required triangle

8. Construct a triangle ABC such that BC = 6 cm, AB = 6 cm and median AD = 4 cm.

Sol:



Steps of construction:

Step 1: Draw a line segment BC of 6cm.

Step 2: Take midpoint D of BC.

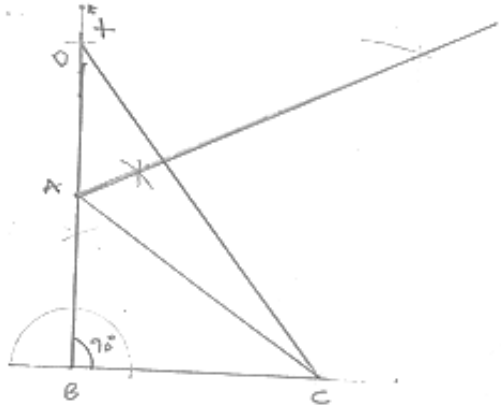
Step 3: with center B and D and radii 6cm and 4cm draw two arcs which intersects each other A

Step 4: Join AB, AD and AC

$\therefore \Delta ABC$ is the required triangle

9. Construct a right triangle ABC whose base BC is 6 cm and the sum of hypotenuse AC and other side AB is 10 cm.

Sol:



Steps of construction:

Step 1: Draw a line segment BC of 6cm.

Step 2: At B draw an angle $le \times BC$ of $90°$.

Step 3: with center B and radius 10cm draw an arc which intersects XB at D.

Step 4: Join DC.

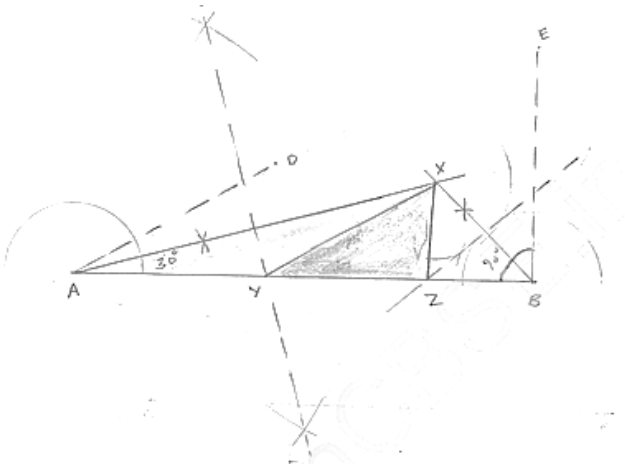
Step 5: Draw the perpendicular bisector of DC which intersects DB at A

Step 6: Join AC

$\therefore \Delta ABC$ is the required triangle

10. Construct a triangle XYZ in which ∠Y = 30°, ∠Z = 90° and XY + YZ + ZX = 11.

Sol:



Steps of construction:

Step 1: Draw a line segment AB of 11cm.

Step 2: Draw $\angle DAB = Y = 30°$ *and* $\angle FBA = \angle Z = 90°$

Step 3: Draw the angle bisector of $\angle DAB$ *and* $\angle EBA$ which intersect each other at *x*

Step 4: Draw the perpendicular bisector XA and XB which intersect AB at Y and Z respectively.

Step 5: Join XY and XZ

$\therefore \Delta XYZ$ is the required triangle