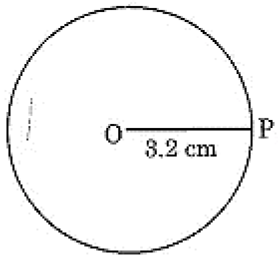
Board –CBSE	Class – 6th	Topic – Practical Geometry

Exercise 14.1

1. Draw a circle of radius 3.2 cm.

Ans. Step I: Mark a point O as the center.

Step II: Open the compass up to the given radius of 3.2 cm.

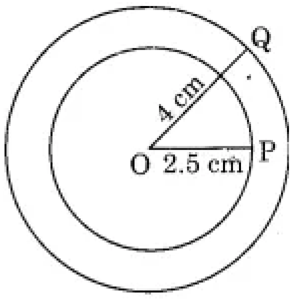


Step III: Put the needle of the compass at the center O.

Step IV: Holding the top of the compass take one full round with a pencil. The figure thus obtained is the required circle of radius 3.2 cm.

2. With the same center O, Draw two circles of radius 4 cm and 2.5 cm.

Ans. Step I: Take center O and open the compass up to 4 cm.



Step II: Draw a circle keeping the needle fixed at O.

Step III: Take the same center O and open the compass up to 2.5 cm, and draw another circle.

The figure shows the required two circles with the same center.

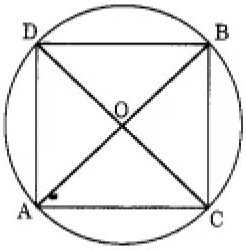
3. Draw a circle and any two of its diameters. If you join the ends of these diameters, what is the figure obtained? What figure is obtained if the diameters are perpendicular to each other? How do you check your answer?

Ans. (i) Draw a circle with center 0 with a suitable radius.

(ii) AB and CD are any two diameters.

(iii) On joining the endpoints of the diameters, we get a quadrilateral ACBD.

(iv) We note that OA = OB = OC = OD [Same radius]



(i) Draw a circle with center 0 with a suitable radius.

(ii) AB and CD are any two diameters.

(iii) On joining the endpoints of the diameters, we get a quadrilateral ACBD.

(iv) We note that OA = OB = OC = OD [Same radius]

and AC = DB, AD = BC

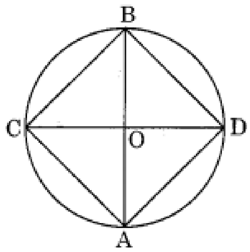
$\angle A = \angle C = \angle B = \angle D = 90°$

Thus ACBD is a rectangle.

Again if the diameters are perpendicular to each other, then on measuring, we get

AC = DB = AD = BC

Thus, ACBD is a square.



4. Draw any circle and mark points A, B, and C such that

(a) A is on the circle

(b) B is in the interior of the circle

(c) C is in the exterior of the circle.

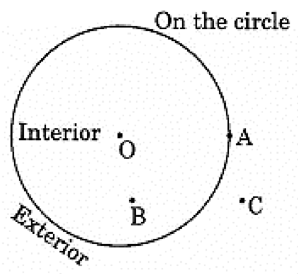
Ans. Draw a circle with a center O and a suitable radius.

Here

(a) A is on the circle.

(b) B is in the interior of the circle.

(c) C is on the exterior of the circle.



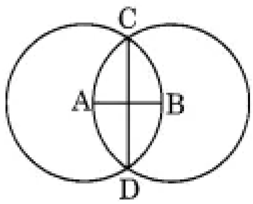
5. Let A, B be the centers of the two circles of equal radii.

Draw them so that each one of them passes through the center of the other.

Let them intersect at C and D.

Examine whether $\overline{AB}$ and $\overline{CD}$ are at right angles.

Ans. In the given figure two circles of equal radii intersect each other at C and D on measuring,



we see that $\overline{AB}$ and $\overline{CD}$ intersect each other at right angles.

Exercise 14.2

1. Draw a line segment of length 7.3 cm using a ruler.

Ans. Step I: Mark at point P.

Step II: Place the O mark of the ruler against point P.

Step III: Mark a point Q at a distance of 7.3 cm from P.

Step IV: Join P and Q.

Thus $\overline{PQ}$ is the line segment of length 7.3 cm.

2. Construct a line segment of length 5.6 cm using a ruler and compass.

Ans. Step I: Draw any line L of suitable lengths.

Step II: Place the needle of the compass on the zero mark of the ruler and open it up to the 5.6 mark.

Step III: Place the needle at any point A at the line and draw an arc to cut l at B.

Thus, $\overline{AB}$ is the required line segment of length 5.6 cm.

3. Construct $\overline{AB}$ of length 7.8 cm. From this, cut off $\overline{AC}$ of length 4.7 cm. Measure $\overline{BC}$.

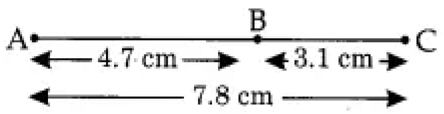
Ans. Given that $\overline{AB}$ = 7.8 cm and $\overline{AC}$ = 4.7 cm.

Step I: Place zero mark of the ruler at A.

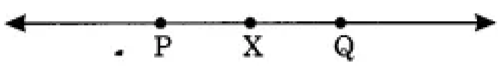
Step II: Mark a point B at a distance of 7.8 cm from A.

Step III: Mark another point C at a distance of 4.7 cm from A such that AC = 4.7 cm.

Step IV: On measuring the length of BC, we find that $\overline{BC}$ = 3.1 cm.



4. Given $\overline{AB}$ of length 3.9 cm. Construct $\overline{PQ}$ such that the length of $\overline{PQ}$ is twice that of $\overline{AB}$. Verify by measurement.



(Hint: Construct $\overline{PX}$ such that the length of $\overline{PX}$ = length of $\overline{AB}$ then cut off $\overline{XQ}$ such that $\overline{XQ}$ also has the length of $\overline{AB}$.

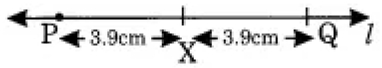
Ans. Step I: Draw a line l of suitable length.

Step II: Draw $\overline{AB}$ = 3.9 cm

Step III: From the line, construct $\overline{PX}$ = $\overline{AB}$ = 3.9 cm.

Step IV: Again construct $\overline{XQ} = \overline{AB}$ =3.9 cm

Verification: $\overline{PX} + \overline{XQ} = \overline{AB} + \overline{AB}$

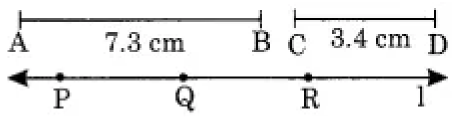


$\therefore$ $\overline{PQ}$ = 3.9 + 3.9 = 7.8 cm

Thus twice of $\overline{AB}$ is equal to $\overline{PQ}$

5. Given $\overline{AB}$ of length 7.3 cm and $\overline{CD}$ of length 3.4 cm, construct a line segment $\overline{XY}$ such that the length of XY is equal to the difference between the length of $\overline{AB}$ and $\overline{CD}$. Verify the measurement.

Ans. Step I : Construct $\overline{AB}$ = 7.3 cm and $\overline{CD}$ = 3.4 cm.



Step II: Take a point P on the given line l.

Step III: Construct $\overline{PR}$ such that $\overline{PR} = \overline{AB} = \overline{AB}$ = 7.3 cm.

Step IV: Construct $\overline{RQ} = \overline{CD}$ = 3.4 cm such that PQ = $\overline{AB} - \overline{CD}$.

Verification : On measuring, we observe that $\overline{PQ}$ = 3.9 cm = 7.3 cm 3.4 cm.

$= \overline{AB} - \overline{CD}$

Thus, $\overline{PQ} = \overline{AB} - \overline{CD}$.

Exercise 14.3

1. Draw any line segment $\overline{PQ}$. Without measuring $\overline{PQ}$, construct a copy of $\overline{PQ}$.

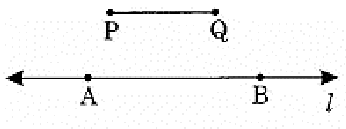
Ans. Step I: Draw $\overline{PQ}$ of unknown length.

Step II: Draw a line l and mark a point A on it.

Step III: Open the compass equal to PQ.

Step IV: Place the needle of the compass at A and mark a point B on l.

Thus, $\overline{AB}$ is a copy of $\overline{PQ}$.



2. Given some line segment $\overline{AB}$ whose length you do not know, construct $\overline{PQ}$ such that the length of $\overline{PQ}$ is twice that of $\overline{AB}$.

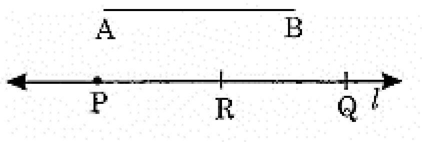
Ans. Step I: Draw $\overline{AB}$ of any suitable length.

Step II: Place the needle of the compass at A and the other pencil end at B.

Step III: Draw a line l and take a point P on it.

Step IV: With the same opening of the compass, place the needle at P and mark another point Q on l.

Thus $\overline{PQ}$ is the required line segment whose length is twice the length of $\overline{AB}$ i.e $\overline{PQ} = \overline{2AB}$.

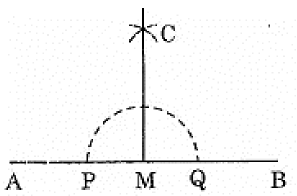


Exercise 14.4

1. Draw any line segment $\overline{AB}$. Make any point M on it. Through M, draw a perpendicular to $\overline{AB}$. (Use ruler and Compasses)

Ans. Step I: Draw a line segment $\overline{AB}$ and mark any point M on it.

Step II: Put the pointer of the compass at M and draw an arc of suitable radius such that it intersects $\overline{AB}$ at P and Q.



Step III: Take P and Q as centers and radius greater than PM, draw two arcs such that they intersect each other at C.

Step IV: Join M and C.

Thus CM is perpendicular to $\overline{AB}$.

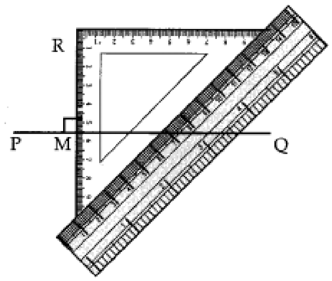
2. Draw any line segment $\overline{PQ}$. Take any point R, not on it. Through R, draw a perpendicular to $\overline{PQ}$. (Use a ruler and set square).

Ans. Step I: Draw a line segment $\overline{PQ}$ and a point R outside of $\overline{PQ}$.

Step II: Place a set square on $\overline{PQ}$ such that one side of its right angle is along it.

Step III: Place a ruler along the longer side of the set square.

Step IV: Hold the ruler fix and slide the set square along the ruler till it touches the point R.



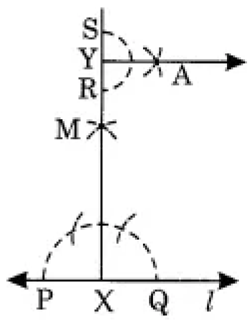
Step V : Join RM along the edge through R. Thus $\overline{RM} \perp \overline{PQ}$.

3. Draw a line l and a point X on it. Through X, draw a line segment $\overline{XY}$ perpendicular to l.

Now draw a perpendicular to $\overline{XY}$ at y. (Use ruler and compasses)

Ans. Step I: Draw a line l and take a point X on it.

Step II: Draw an arc with center X and of suitable radius to intersect the line l at two points P and Q.



Step III: With P and Q as centers and a radius greater than P draw two arcs to intersect each other at M.

Step IV: Join XM and produce to Y.

Step V: With Y as the center and a suitable radius, draw an arc to intersect XY at two points R and S.

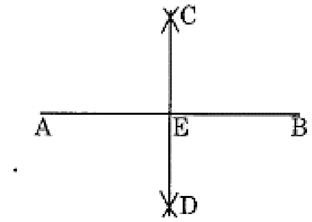
Step VI: With R and S as centers and radius greater than YR, draw two arcs to intersect each other at A.

Step VII: Join Y and A. Thus YA ⊥ XY.

Exercise 14.5

1. Draw AB of length 7.3 cm and find its axis of symmetry.

Ans. Step I: Draw $\overline{AB}$ = 7.3 cm



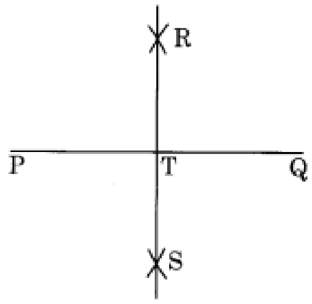
Step II: Taking A and B as center and radius more than half $\overline{AB}$, draw two arcs which intersect each other at C and D.

Step III: Join C and D to intersect $\overline{AB}$ at E.

Thus, CD is the perpendicular bisector or axis of symmetry of $\overline{AB}$.

2. Draw a line segment of length 9.5 cm and construct its perpendicular bisector.

Ans. Step I: Draw a line segment $\overline{PQ}$ = 9.5 cm



Step II: With centers P and Q and radius more than half of PQ, draw two arcs which meet each other at R and S.

Step III: Join R and S to meet $\overline{PQ}$ at T.

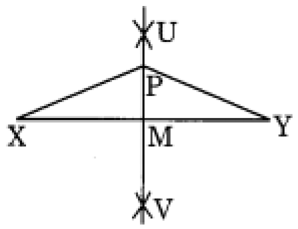
Thus, RS is the perpendicular bisector of PQ.

3. Draw the perpendicular bisector of $\overline{XY}$ whose length is 10.3 cm.

(a) Take any point P on the bisector drawn. Examine whether PX = PY.

(b) If M is the midpoint of $\overline{XY}$. What can you say about the length of MX and MY?

Ans. Step I: Draw a line segment $\overline{XY}$ = 10.3 cm.



Step II: With center X and Y and radius more than half of XY, draw two arcs which meet each other at U and V.

Step III: Join U and V which meets $\overline{XY}$ at M.

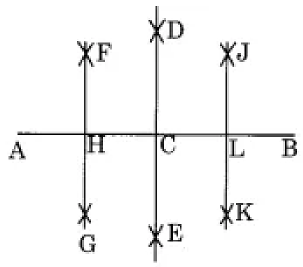
Step IV: Take a point P on $\overline{UV}$.

(a) On measuring, PX = PY = 5.6 cm.

(b) On measuring, $\overline{MX} = \overline{MY} = \frac{1}{2}$ XY = 5.15 cm.

4. Draw a line segment of length 12.8 cm. Using a compass, divide it into four equal parts. Verify by actual measurement.

Ans. Step I: Draw a line segment $\overline{AB}$ = 12.8 cm



Step II: With center A and B and radius more than half of AB, draw two arcs that meet each other at D and E.

Step III: Join D and E which meets $\overline{AB}$ at C which is the midpoint of $\overline{AB}$.

Step IV: With center A and C and radius more than half of AC, draw two arcs that meet each other at F and G.

Step V: Join F and G which meets $\overline{AC}$ at H which is the midpoint of $\overline{AC}$.

Step VI: With center C and B and radius more than half of CB, draw two arcs that meet each other at J and K.

Step VII: Join J and K which meets $\overline{AB}$ at L which is the midpoint of $\overline{AB}$.

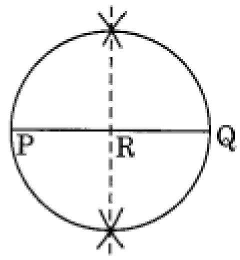
Thus, on measuring, we find

$\overline{AH} = \overline{HC} = \overline{CL} = \overline{LB} = 3.2$ cm.

5. With $\overline{PQ}$ of length 6.1 cm as diameter, draw a circle.

Ans. Step I: Draw $\overline{PQ}$ = 6.1 cm

Step II: Draw a perpendicular bisector of $\overline{PQ}$ which meets $\overline{PQ}$ at R i.e. R is the midpoint of $\overline{PQ}$.



Step III: With center R and radius equal to $\overline{RP}$, draw a circle passing through P and Q.

Thus, the circle with diameter $\overline{PQ}$ = 6.1 cm is the required circle.

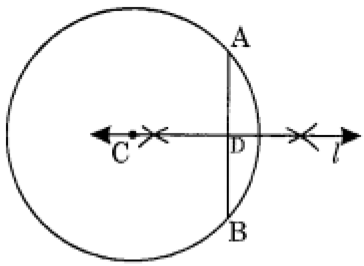
6. Draw a circle with center C and radius 3.4 cm. Draw any chord $\overline{AB}$.

Construct the perpendicular bisector of $\overline{AB}$ and examine if it passes through C.

Ans. Step I: Draw a circle with center C and a radius of 3.4 cm.

Step II: Draw any chord $\overline{AB}$.

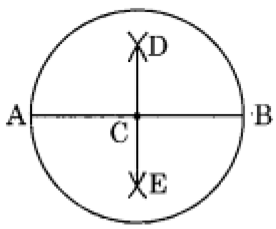
Step III: Draw the perpendicular bisector of $\overline{AB}$ which passes through the center C.



7. Repeat Question number 6, if $\overline{AB}$ happens to be a diameter.

Ans. Step I: Draw a circle with center C and a radius of 3.4 cm.

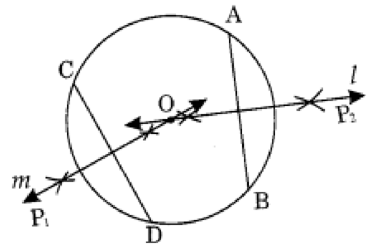
Step II: Draw a diameter AB of the circle.



Step III: Draw a perpendicular bisector of AB which passes through the center C and on measuring, we find that C is the midpoint of $\overline{AB}$.

8. Draw a circle of radius 4 cm. Draw any two of its chords.
Construct the perpendicular bisectors of these chords. Where do they meet?

Ans. Step I: Draw a circle with center O and radius 4 cm.



Step II: Draw any two chords $\overline{AB}$ and $\overline{CD}$ of the circle.

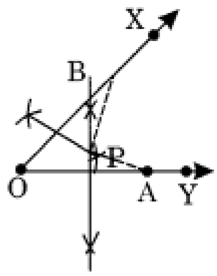
Step III: Draw the perpendicular bisectors of $\overline{AB}$ and $\overline{CD}$ i.e. I and m.

Step IV: On producing the two perpendicular bisectors meet each other at the center O of the circle.

9. Draw any angle with vertex O. Take a point A on one of its arms and B on another such that OA = OB. Draw the perpendicular bisectors of $\overline{OA}$ and $\overline{OB}$. Let them meet at P. Is PA = PB?

Ans. Step I: Draw an angle XOY with O as its vertex.

Step II: Take any point A on OY and B on OX, such that OA + OB.



Step III: Draw the perpendicular bisectors of OA and OB which meet each other at a point P.

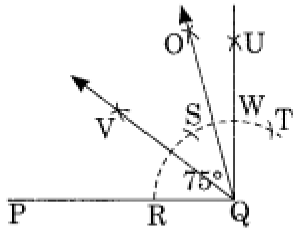
Step IV: Measure the lengths of $\overline{PA}$ and $\overline{PB}$. Yes, $\overline{PA} = \overline{PB}$.

Exercise 14.6

1. Draw ∠POQ of measure 75° and find its line of symmetry.

Ans. Step I: Draw a line segment $\overline{PQ}$.

Step II: With center Q and suitable radius, draw an arc to cut PQ at R.



Step III: With center R and radius of the same length, mark S and T on the former arc.

Step IV: With centers S and T and with the same radius, draw two arcs that meet each other at U.

Step V: Join QU such that ∠PQU = 90°.

Step VI: With centers S and W, draw two arcs of the same radius which meet each other at Q.

Step VII: Join Q and O such that ∠PQO = 75°.

Step VIII: Bisect ∠PQO with QV.

Thus, OV is the line of symmetry of ∠PQO.

2. Draw an angle of measure 147° and construct its bisector.

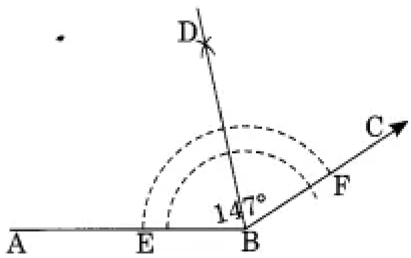
Ans. Step I: Draw ∠ABC = 147° with the help of a protractor.

Step II: With centers B and radius of proper length, draw an arc that meets AB and AC at E and F respectively.

Step III: With centers E and F and the radius more than half of the length of arc EF, draw two arcs which meet each other at D.

Step IV: Join B and D.

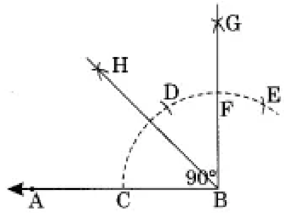
Thus, BD is the bisector of ∠ABC.



3. Draw a right angle and construct its bisector.

Ans. Step I: Draw a line segment AB.

Step II: With center B and proper radius draw an arc to meet AB at C.



Step III: With center C and same radius, mark two marks D and E on the former arc.

Step IV: With centers D and E and the same radius, draw two arcs that meet each other at G.

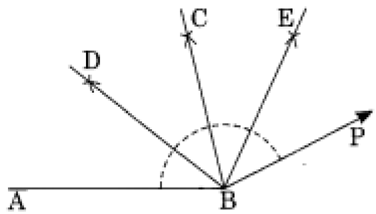
Step V: Join B and G such that $\angle ABG = 90°$

Step VI: Draw BH as the bisector of $\angle ABG$ such that $\angle ABH = 45°$.

Thus $\angle ABG$ is the right angle and BH is the bisector of $\angle ABG$.

4. Draw an angle of 153° and divide it into four equal parts.

Ans. Step I: Draw $\angle ABP = 153°$ with the help of a protractor.



Step II: Draw BC as the bisector of $\angle ABP$ which dividers $\angle ABP$ into two equal parts.

Step III: Draw BD and BE as the bisector of $\angle ABC$ and $\angle CBP$ respectively.

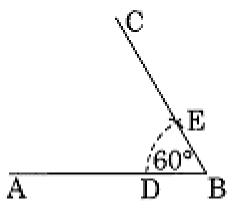
Thus, the bisectors BD, BC, and BE divide $\angle ABP$ into four equal parts.

5. Construct with ruler and compasses, angles of the following measures:

(a) 60° (b) 30° (c) 90° (d) 120°

(e) 45° (f) 135°

Ans. (a) Angle of 60°



Step I: Draw a line segment $\overline{AB}$.

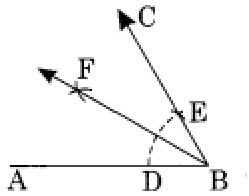
Step II: With center B and proper radius draw an arc.

Step III: With center D and radius of the same length, mark a point E on the former arc.

Step IV: Join B to E and product to C. Thus $\angle ABC$ is the required angle of measure 60°.

(b) Step I: Draw ∠ABC = 60° as we have done in section (a).

Step II: Draw BF as the bisector of ∠ABC.

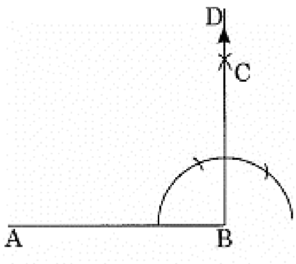


Thus ∠ABF = $\frac{60}{2}$ = 30°.

(c) Angle of 90°

In the given figure,

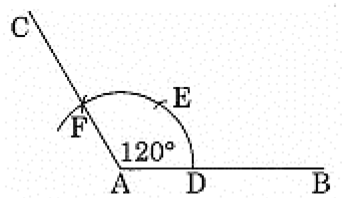
∠ABC = 90° (Refer to solution 3)



(d) Angle of 120°.

Step I: Draw $\overline{AB}$

Step II: With center A and radius of proper length, draw an arc.

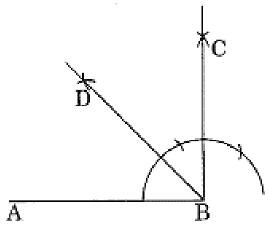


Step III: With center D and the same radius, draw two marks E and F on the former arc.

Step IV: Join A to F and produce to C. Thus ∠CAB = 120°

(e) Angle of 45s, i.e., $\frac{90}{2}$ = 45°

In the figure ∠ABD = 45° (Refer to solution 3)

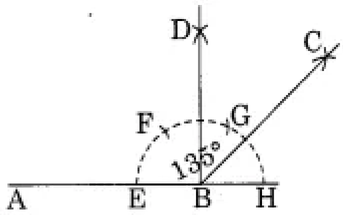


(f) An angle of 135°

Since 135° = 90° + 45°

$= 90° + (\frac{90}{2})°$

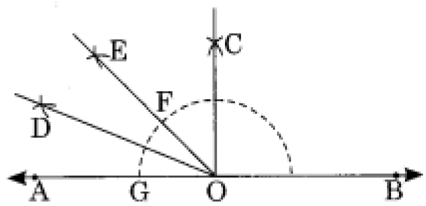
In this figure ∠ABC = 135°



6. Draw an angle of measure 45° and bisect it.

Ans. Step I: Draw a line AB and take any point O on it.

Step II: Construct ∠AOE = 45° at O.



Step III: With center O and proper radius, draw an arc GF.

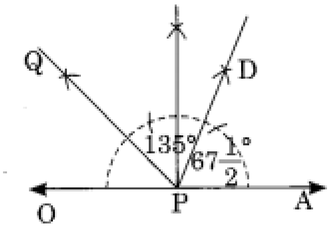
Step IV: With centers G and F and proper radius, draw two arcs that intersect each other at D.

Step V: Join O to D.

Thus ∠AOE = 45° and OD is its bisector.

7. Draw an angle of measure 135° and bisect it.

Ans. Steps I: Draw a line OA and take any point P on it.



Step II: Construct ∠APQ = 135°.

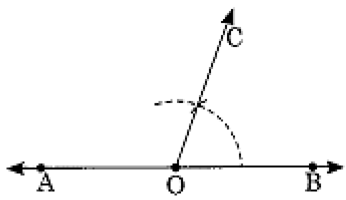
Step III: Draw PD as the bisector of angle APQ.

Thus ∠APQ = $\frac{135°}{2} = 67\frac{1°}{2}$.

8. Draw an angle of 70°. Make a copy of it using only a straight edge and compasses.

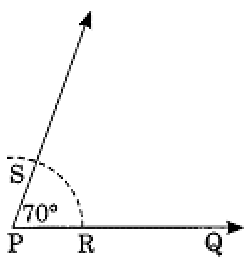
Ans. Step I: Draw a line AB and take any point 0 on it.

Step II: Draw ∠COB = 70° using a protractor.



Step III: Draw a ray $\overrightarrow{PQ}$.

Step IV: With center O and proper radius, draw an arc that meets $\overrightarrow{OA}$ and $\overrightarrow{OB}$ at E and F respectively.



Step V: With the same radius and center at P, draw an arc meeting $\overrightarrow{PQ}$ at R.

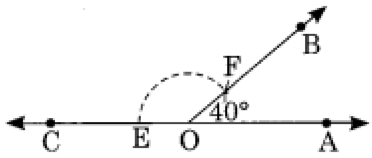
Step VI: With center R and keeping and radius equal to EF, draw an arc intersecting the former arc at S.

Step VII: Join P and S and produce it. Thus, QPS is the copy of AOB = 70°.

9. Draw an angle of 40°. Copy its supplementary angle.

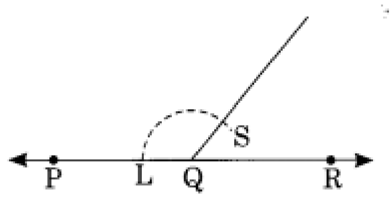
Ans. Step I: Construct ∠AOB = 40° using a protractor.

∠COF is the supplementary angle of ∠AOB.



Step II: Draw a ray $\overrightarrow{PR}$ and take any point Q on it.

Step III: With center O and proper radius, draw an arc that intersects $\overrightarrow{OC}$ and $\overrightarrow{OB}$ at E and F respectively.



Step IV: With center Q and the same radius, draw an arc that intersects $\overrightarrow{PQ}$ at L.

Step V: With center L and radius equal to EF, draw an arc that intersects the former arc at S.

Step VI: Join Q and S and produce.

Thus, ∠PQS is the copy of the supplementary angle COB.,