Mathematics

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(Chapter – 14) (Practical Geometry)
(Class – VI)

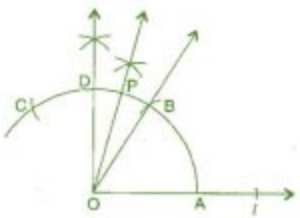
Exercise 14.6

Question 1:
Draw $\angle POQ$ of measure $75°$ and find its line of symmetry.

Answer 1:

Steps of construction:

(a) Draw a line l and mark a point O on it.
(b) Place the pointer of the compasses at O and draw an arc of any radius which intersects the line l at A.
(c) Taking same radius, with centre A, cut the previous arc at B.
(d) Join OB, then $\angle BOA = 60°$.
(e) Taking same radius, with centre B, cut the previous arc at C.
(f) Draw bisector of $\angle BOC$. The angle is of $90°$. Mark it at D.
Thus, $\angle DOA = 90°$
(g) Draw $\overline{OP}$ as bisector of $\angle DOB$.
Thus, $\angle POA = 75°$

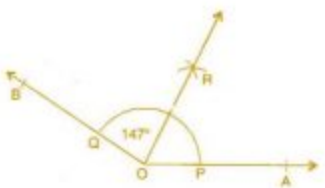


Question 2:
Draw an angle of measure $147°$ and construct its bisector.

Answer 2:

Steps of construction:

(a) Draw a ray $\overrightarrow{OA}$.
(b) With the help of protractor, construct $\angle AOB = 147°$.
(c) Taking centre O and any convenient radius, draw an arc which intersects the arms $\overline{OA}$ and $\overline{OB}$ at P and Q respectively.
(d) Taking P as centre and radius more than half of PQ, draw an arc.
(e) Taking Q as centre and with the same radius, draw another arc which intersects the previous at R.
(f) Join OR and produce it.
(g) Thus, $\overline{OR}$ is the required bisector of $\angle AOB$.

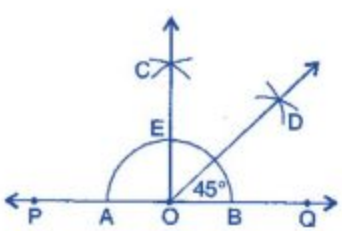


Question 3:
Draw a right angle and construct its bisector.

Answer 3:

Steps of construction:

(a) Draw a line PQ and take a point O on it.
(b) Taking O as centre and convenient radius, draw an arc which intersects PQ at A and B.
(c) Taking A and B as centres and radius more than half of AB, draw two arcs which intersect each other at C.
(d) Join OC. Thus, $\angle COQ$ is the required right angle.
(e) Taking B and E as centre and radius more than half of BE, draw two arcs which intersect each other at the point D.
(f) Join OD. Thus, $\overline{OD}$ is the required bisector of $\angle COQ$.



Question 4:

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

Answer 4:

Steps of construction:

(a) Draw a ray $\overrightarrow{OA}$.

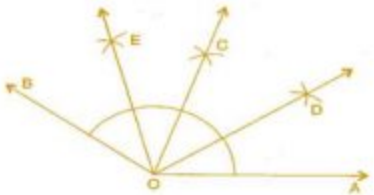
(b) At O, with the help of a protractor, construct $\angle AOB = 153°$.

(c) Draw $\overline{OC}$ as the bisector of $\angle AOB$.

(d) Again, draw $\overline{OD}$ as bisector of $\angle AOC$.

(e) Again, draw $\overline{OE}$ as bisector of $\angle BOC$.

(f) Thus, $\overline{OC}$, $\overline{OD}$ and $\overline{OE}$ divide $\angle AOB$ in four equal arts.



Question 5:

Construct with ruler and compasses, angles of following measures:

(a) 60° (b) 30° (c) 90° (d) 120° (e) 45° (f) 135°

Answer 5:

Steps of construction:

(a) 60°

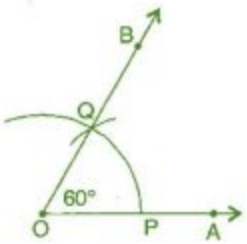
(i) Draw a ray $\overrightarrow{OA}$.

(ii) Taking O as centre and convenient radius, mark an arc, which intersects $\overrightarrow{OA}$ at P.

(iii) Taking P as centre and same radius, cut previous arc at Q.

(iv) Join OQ.

Thus, $\angle BOA$ is required angle of 60°.



(b) 30°

(i) Draw a ray $\overrightarrow{OA}$.

(ii) Taking O as centre and convenient radius, mark an arc, which intersects $\overrightarrow{OA}$ at P.

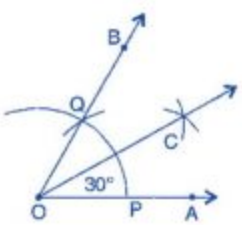
(iii) Taking P as centre and same radius, cut previous arc at Q.

(iv) Join OQ. Thus, $\angle BOA$ is required angle of 60°.

(v) Put the pointer on P and mark an arc.

(vi) Put the pointer on Q and with same radius, cut the previous arc at C.

Thus, $\angle COA$ is required angle of 30°.



(c) 90°

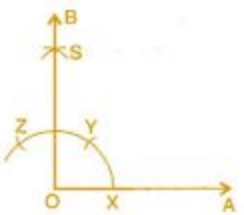
(i) Draw a ray $\overrightarrow{OA}$.

(ii) Taking O as centre and convenient radius, mark an arc, which intersects $\overrightarrow{OA}$ at X.

(iii) Taking X as centre and same radius, cut previous arc at Y.

(iv) Taking Y as centre and same radius, draw another arc intersecting the same arc at Z.

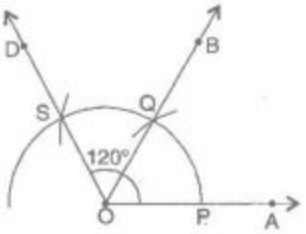
(v) Taking Y and Z as centres and same radius, draw two arcs intersecting each other at S.



(vi) Join OS and produce it to form a ray OB.

Thus, $\angle$ BOA is required angle of 90°.

(d) 120°



(i) Draw a ray $\overrightarrow{OA}$.

(ii) Taking O as centre and convenient radius, mark an arc, which intersects $\overrightarrow{OA}$ at P.

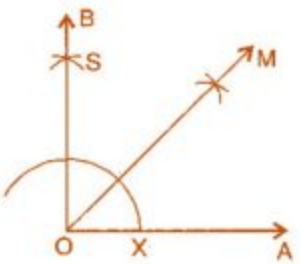
(iii) Taking P as centre and same radius, cut previous arc at Q.

(iv) Taking Q as centre and same radius cut the arc at S.

(v) Join OS.

Thus, $\angle$ AOD is required angle of 120°.

(e) 45°



(i) Draw a ray $\overrightarrow{OA}$.

(ii) Taking O as centre and convenient radius, mark an arc, which intersects $\overrightarrow{OA}$ at X.

(iii) Taking X as centre and same radius, cut previous arc at Y.

(iv) Taking Y as centre and same radius, draw another arc intersecting the same arc at Z.

(v) Taking Y and Z as centres and same radius, draw two arcs intersecting each other at S.

(vi) Join OS and produce it to form a ray OB. Thus, $\angle$ BOA is required angle of 90°.

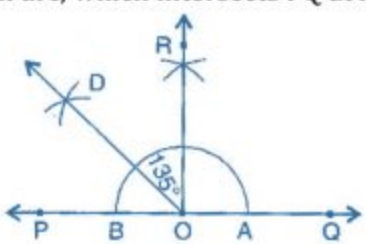
(vii) Draw the bisector of $\angle$ BOA.

Thus, $\angle$ MOA is required angle of 45°.

(f) 135°

(i) Draw a line PQ and take a point O on it.

(ii) Taking O as centre and convenient radius, mark an arc, which intersects PQ at A and B.



(iii) Taking A and B as centres and radius more than half of AB, draw two arcs intersecting each other at R.

(iv) Join OR. Thus, $\angle$ QOR = $\angle$ POQ = 90°.

(v) Draw $\overrightarrow{OD}$ the bisector of $\angle$ POR.

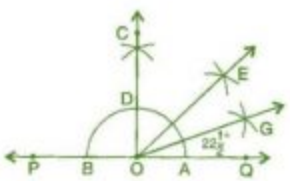
Thus, $\angle$ QOD is required angle of 135°.

Question 6:

Draw an angle of measure 45° and bisect it.

Answer 6:

Steps of construction:



(a) Draw a line PQ and take a point O on it.

(b) Taking O as centre and a convenient radius, draw an arc which intersects PQ at two points A and B.

(c) Taking A and B as centres and radius more than half of AB, draw two arcs which intersect each other at C.

(d) Join OC. Then $\angle$ COQ is an angle of 90°

(e) Draw $\overrightarrow{OE}$ as the bisector of $\angle COE$. Thus, $\angle QOE = 45^\circ$

(f) Again draw $\overrightarrow{OG}$ as the bisector of $\angle QOE$. Thus, $\angle QOG = \angle EOG = 22\frac{1}{2}^\circ$.

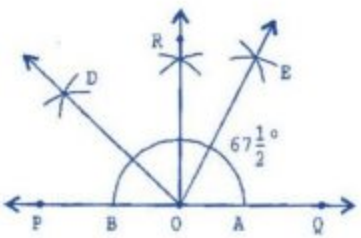
Question 7:

Draw an angle of measure 135° and bisect it.

Answer 7:

Steps of construction:

(a) Draw a line PQ and take a point O on it.
(b) Taking O as centre and convenient radius, mark an arc, which intersects PQ at A and B.
(c) Taking A and B as centres and radius more than half of AB, draw two arcs intersecting each other at R.
(d) Join OR. Thus, $\angle QOR = \angle POQ = 90^\circ$.
(e) Draw $\overrightarrow{OD}$ the bisector of $\angle POR$. Thus, $\angle QOD$ is required angle of 135°.



(f) Now, draw $\overrightarrow{OE}$ as the bisector of $\angle QOD$. Thus, $\angle QOE = \angle DOE = 67\frac{1}{2}^\circ$

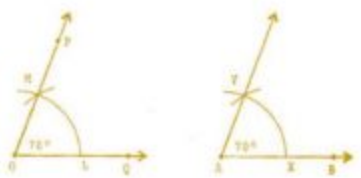
Question 8:

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

Answer 8:

Steps of construction:

(a) Draw an angle $70°$ with protractor, i.e., $\angle POQ = 70°$
(b) Draw a ray $\overrightarrow{AB}$.
(c) Place the compasses at O and draw an arc to cut the rays of $\angle POQ$ at L and M.
(d) Use the same compasses, setting to draw an arc with A as centre, cutting AB at X.
(e) Set your compasses setting to the length LM with the same radius.
(f) Place the compasses pointer at X and draw the arc to cut the arc drawn earlier at Y.
(g) Join AY. Thus, $\angle YAX = 70°$



Question 9:

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

Answer 9:

Steps of construction:

(a) Draw an angle of $40°$ with the help of protractor, naming $\angle AOB$.
(b) Draw a line PQ.
(c) Take any point M on PQ.
(d) Place the compasses at O and draw an arc to cut the rays of $\angle AOB$ at L and N.
(e) Use the same compasses setting to draw an arc O as centre, cutting MQ at X.
(f) Set your compasses to length LN with the same radius.
(g) Place the compasses at X and draw the arc to cut the arc drawn earlier Y.
(h) Join MY. Thus, $\angle QMY = 40°$ and $\angle PMY$ is supplementary of it.