Constructions

OBJECTIVE TYPE QUESTIONS

Multiple Choice Questions (MCQs)

1. If we bisect a line segment of length 3.5 cm, then the measure of each of equal parts will be

(a) 7 cm (b) 1.75 cm
(c) 1.25 cm (d) 5.5 cm

2. Perpendicular bisector of a line segment divides it into

(a) infinite equal parts
(b) two equal parts
(c) three equal parts
(d) four equal parts

3. Bisector of an angle divides the angle into

(a) two equal parts
(b) three equal parts
(c) infinite equal parts
(d) ten equal parts

4. An angle can be constructed with the help of ruler and compasses only, if

(a) It is divisible by 15
(b) It can be written in terms of 30°, 45°, 60°, 90° or in some combination that involve these
(c) Both (a) and (b)
(d) None of these

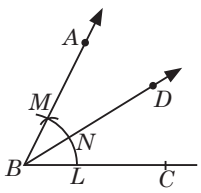
5. Which of the following angles can be constructed using ruler and compasses only?

(a) 25° (b) 50° (c) 52.5° (d) 42.5°

6. When we bisect an angle of 65°, the measure of each equal part is

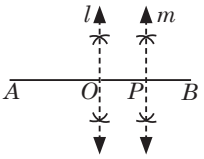
(a) 30.5° (b) 32.5° (c) 130° (d) 43.5°

7. In figure, $\overset{\frown}{LM}$ is an arc of a circle having radius a and centre B. If $LN = NM$ and $BL = BM = LM = a$ and $\overset{\frown}{LM} = 2\ \overset{\frown}{MN}$, then $\angle CBD$ equals



(a) 15° (b) 25°
(c) 30° (d) 45°

8. In the given figure, line l is the perpendicular bisector of AB and m is the perpendicular bisector of OB. If $OP = 3.2$ cm, then the length of AP is



(a) 7 cm (b) 6.4 cm
(c) 8.65 cm (d) 9.6 cm

9. For which of the following conditions the construction of a triangle is not possible?

(a) If two sides and one angle is given.
(b) If two sides and included angle between them is given.
(c) If three sides are given.
(d) If two angles and side between them is given.

10. While constructing a triangle, sum of angles of the triangle must be

(a) equal to 180° (b) less than 180°
(c) greater than 180° (d) equal to 360°

11. The construction of a ΔABC, in which $AB = 6$ cm, $\angle B = 60°$, is not possible when $BC + CA$ is

(a) 10 cm (b) 9 cm
(c) 10.5 cm (d) 5.9 cm

12. The construction of a ΔABC in which $AB = 7$ cm and $\angle A = 75°$, is possible when $(BC - AC)$ is equal to

(a) 6 cm (b) 7 cm
(c) 8 cm (d) 8.5 cm

13. In which of the following conditions, it is possible to construct the triangle?

(a) ΔABC, $BC = 8$ cm, $\angle B = 90°$, $\angle C = 90°$

(b) ΔABC, $BC = 6$ cm, $\angle B = 60°$, $AC - AB = 7$ cm

(c) ΔLMN, $LN = 8$ cm, $\angle L = 55°$, $LM + MN = 10$ cm

(d) ΔPQR, $QR = 10$ cm, $\angle R = 80°$, $PQ - PR = 12$ cm

14. Which of the following steps is incorrect while constructing an equilateral triangle one of whose altitudes measures 6 cm?

Step I : Draw a line XY.

Step II : Mark any point P on it.

Step III : From P, draw $PQ \perp XY$.

Step IV : From P, set off $PA = 6$ cm, cutting PQ at A.

Step V : Construct $\angle PAB = 30°$ and $\angle PAC = 30°$, meeting XY at B and C respectively.

Then, ΔABC is the required equilateral triangle.

(a) Step IV (b) Step V

(c) Step III (d) None of these

15. Let ABC be a triangle in which $BC = 5$ cm, $\angle B = 60^o$ and $AC + AB = 7.5$ cm. Given below are the steps of constructing the triangle ABC. Which of the following steps is incorrect?

Step I : Draw a line segment BC of length 5 cm.

Step II : Draw an $\angle XBC = 60°$ at point B of line segment BC.

Step III : Cut off $PB = 3.5$ cm on the ray BX.

Step IV : Join PC.

Step V : Draw perpendicular bisector of BC which intersect ray BX at A. Join AC.

Step VI : ABC is the required triangle.

(a) Step II only (b) Step III only

(c) Step II and V (d) Step III and V

16. Which of the following angles cannot be constructed by using ruler and compass only?

(a) 30° (b) 45° (c) 70° (d) 90°

17. Arrange the following steps of construction of a ΔABC, in which $BC = 3.8$ cm, $\angle B = 45°$ and $AB + AC = 6.8$ cm in correct sequence.

Step I : Draw the perpendicular bisector of CD meeting BD at A.

Step II : Draw $BC = 3.8$ cm.

Step III : Join CD.

Step IV : From ray BX, cut-off line segment BD equal to $AB + AC$ *i.e.*, 6.8 cm.

Step V : Draw $\angle CBX = 45°$

Step VI : Join CA to obtain the required ΔABC.

(a) II, IV, V, III, I, VI

(b) II, V, III, I, IV, VI

(c) II, V, IV, I, III, VI

(d) II, V, IV, III, I, VI

18. Arrange the following steps of construction of a ΔABC in which $BC = 8$ cm, $\angle B = 60°$ and the difference between the other two sides is 3 cm in correct sequence.

Step I : Cut off $BP = 3$ cm.

Step II : Draw $BC = 8$ cm.

Step III : Construct $\angle CBX = 60°$.

Step IV : Join AC.

Step V : Draw the right bisector of PC, meeting PB produced at A.

Step VI : Join PC.

Then, ΔABC is the required triangle.

(a) II, III, I, VI, V, IV

(b) II, III, VI, V, IV, I

(c) II, IV, V, VI, I, III

(d) I, IV, V, VI, III, II

19. Arrange the following steps of construction of ΔABC in which $AB = 5.8$ cm, $BC + CA = 8.4$ cm and $\angle B = 60°$ in correct sequence.

Step I : Join AD.

Step II : From ray BX, cut off line segment $BD = BC + CA = 8.4$ cm.

Step III : Draw a line segment AB of length 5.8 cm.

Step IV : Draw a perpendicular bisector of AD meeting BD at point C. Join AC to obtain ΔABC.

Step V : Draw $\angle ABX = 60°$ at point B of line segment AB.

(a) V, III, I, II, IV (b) III, I, II, V, IV

(c) III, V, II, I, IV (d) III, II, I, V, IV

20. To construct an angle of 67.5°, we bisect angle between

(a) 0° and 90° (b) 60° and 120°

(c) 0° and 135° (d) 60° and 135°

SUBJECTIVE TYPE QUESTIONS

Very Short Answer Type Questions (VSA)

1. If we draw a perpendicular bisector of a line segment $AB = 9$ cm which bisects AB at M, then find AM and BM.

2. Find the measure of each of the two angles formed by bisecting an angle of measure 135°.

3. Can a ΔXYZ be constructed, in which $XY = 5$ cm, $\angle X = 50°$ and $YZ + XZ = 5$ cm?

4. Draw a straight angle. Using compass bisect it. Name the angles obtained.

5. What is the length of bisected part of a line segment 7.8 cm?

6. If we bisect a line segment AB, then each of the equal part we get measures 3.8 cm. Find the length of AB.

7. In order to construct a triangle uniquely, how many minimum parts of triangle are required to be given?

Short Answer Type Questions (SA-I)

8. Draw a line segment of length 6 cm. Draw perpendicular bisector of this line segment.

9. Can a ΔABC be constructed in which $\angle B = 110°$, $\angle C = 95°$ and $AB = 10$ cm? Justify your answer.

10. Draw a perpendicular bisector of line segment PQ of length 8.4 cm.

11. Draw line segment $AB = 8.8$ cm and draw its perpendicular bisector and measure the length of each part.

12. Draw a line segment of length 6.4 cm. Bisect it and measure the length of each part.

13. Construct a square of side 3 cm.

14. Draw lines PQ and RS intersecting at point O. Measure a pair of vertically opposite angles. Bisect them. Are the bisecting rays forming a straight line?

Short Answer Type Questions (SA-II)

15. Construct a triangle with base length 5 cm, the sum of other two sides is 7 cm and one base angle is 60°.

16. Using ruler and compass only, draw a right angle.

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

18. Draw a line segment $AB = 16$ cm. Divide it into $\left(\frac{3}{4}\right)^{\text{th}}$ part. Measure the length of $\left(\frac{3}{4}\right)^{\text{th}}$ part of AB.

19. Draw a line segment $AB = 13.2$ cm. Divide it into 4 equal parts using ruler and compass. Also, measure the length of each part.

20. By using protractor, draw an angle of 108° and taking this angle as given, construct an angle of 54°.

21. Construct a ΔSTU, in which $\angle T = 100°$, $TU = 5$ cm and $ST + US = 8$ cm.

22. Construct an equilateral triangle, the sum of its two sides is 8 cm.

23. Construct ΔABC such that $BC = 6$ cm, $\angle B = 45°$ and $AB - AC = 3$ cm.

24. Construct a right angled triangle whose base is 6 cm and sum of its hypotenuse and the other side is 10 cm.

25. Construct ΔABC such that $AB = 5.8$ cm, $BC + CA = 7$ cm and $\angle B = 60°$.

Long Answer Type Questions (LA)

26. Construct a ΔABC in which $BC = 5.6$ cm, $AC - AB = 1.6$ cm and $\angle B = 45°$. Justify your construction.

27. Using a protractor, draw an angle of measure 128°. With this angle construct an angle of measure 96°.

28. Construct a triangle having sides of length 6.2 cm, 7.3 cm and 6 cm. Measure all the three angles. Bisect the smallest and the largest angles. Measure any acute angle formed by the bisecting rays at the point of intersection. Also, verify your answer.

29. Give reason:

(i) Construction of an angle of 22.5° is possible with the help of ruler and compass.

(ii) It is not possible to construct a ΔABC given that $BC = 7$ cm, $\angle B = 45°$ and $AB - AC = 10$ cm.

(iii) We can construct an angle of 67.5° using ruler and compass.

(iv) Construction of ΔDEF, if $EF = 5.5$ cm, $\angle E = 75°$ and $DE - DF = 3$ cm is possible.

30. Construct a ΔPQR, in which $QR = 6.5$ cm, $\angle Q = 60°$ and $PR - PQ = 1.5$ cm. Also, justify the construction.

ANSWERS

OBJECTIVE TYPE QUESTIONS

1. (b) : If we bisect a line segment of length 3.5 cm, then measure of each part of it equals $\frac{1}{2} \times 3.5$ *i.e.*, 1.75 cm.

2. (b) : Perpendicular bisector of a line segment divides it into two equal parts.

3. (a) : Bisector of an angle divides the angle in two equal parts.

4. (c)

5. (c) : First we construct an angle of 105° and bisect it to get an angle of 52.5°.

6. (b) : When we bisect an angle, then we get two equal angles measuring half of the given angle.

$\therefore$ The measure of each equal angle = 65° ÷ 2 = 32.5°

7. (c) : In the given figure,

$BL = BM = LM = a$

$\therefore$ BLM is an equilateral triangle.

$\Rightarrow$ $\angle ABC = 60°$

Now, $\overset{\frown}{LM} = 2\overset{\frown}{MN} \Rightarrow \overset{\frown}{MN} = \frac{1}{2}\overset{\frown}{LM}$

$\Rightarrow$ $\angle CBD = \frac{1}{2}\angle ABC = \frac{1}{2} \times 60° = 30°$

8. (d) : We have, $PB = OP = 3.2$ cm

$\therefore$ $OB = 2 \times OP = 2 \times 3.2 = 6.4$ cm

Also, $OA = OB = 6.4$ cm

Now, $AP = OA + OP = 6.4 + 3.2 = 9.6$ cm

9. (a) : A triangle can not be constructed if two sides and one angle is given.

10. (a) : We know by the angle sum property of a triangle that sum of all angles of a triangle is 180°.

11. (d) : To construct the ΔABC, we must have $BC + CA > AB$.

(a) $BC + CA = 10$ cm > 6 cm, so construction of triangle is possible.

(b) $BC + CA = 9$ cm > 6 cm, so construction of triangle is possible.

(c) $BC + CA = 10.5$ cm > 6 cm, so construction of triangle is possible.

(d) $BC + CA = 5.9$ < 6 cm, so construction of triangle is not possible.

12. (a) : We know that, to construct a triangle difference of two sides of a triangle must be less than the third side.

(a) $BC - AC = 6$ cm < 7 cm, thus triangle is possible.

(b) $BC - AC = 7$ cm, thus triangle is not possible.

(c) $BC - AC = 8$ cm > 7 cm, thus triangle is not possible.

(d) $BC - AC = 8.5$ cm > 7 cm, thus triangle is not possible.

13. (c) : (a) In ΔABC, $\angle B + \angle C = 90° + 90° = 180°$

But we know,

$\angle A + \angle B + \angle C = 180° \Rightarrow \angle A = 0°$, which is not possible

Thus, triangle is not possible.

(b) In ΔABC, $AC - AB = 7$ cm > 6 cm

Thus, ΔABC is not possible. ($\because$ Difference of two sides of a triangle is less than the third side)

(c) In ΔLMN, $LM + MN = 10$ cm > 8 cm

Thus, ΔLMN is possible. ($\because$ Sum of two sides of a triangle is greater than the third side)

(d) In ΔPQR, $PQ - PR = 12$ cm > 10 cm

Thus, ΔPQR is not possible. ($\because$ Difference of two sides of a triangle is less than the third side)

14. (d) : All steps are correct.

15. (d) : Step III and V are incorrect.

The correct steps are :

Step III : Cut off $PB = 7.5$ cm on the ray BX.

Step V : Draw perpendicular bisector of PC which intersect ray BX at A. Join AC.

16. (c) : Angle 70° cannot be constructed by using ruler and compass only.

17. (d) : The correct sequence is II, V, IV, III, I, VI.

18. (a) : The correct sequence is II, III, I, VI, V, IV.

19. (c) : The correct sequence of steps of construction is III, V, II, I, IV.

20. (c) : Since, $135° \div 2 = 67.5°$

There, we will bisect the angle between 0° and 135° to construct an angle of 67.5°.

SUBJECTIVE TYPE QUESTIONS

1. Since, perpendicular bisector of a line segment divides it into two equal parts.

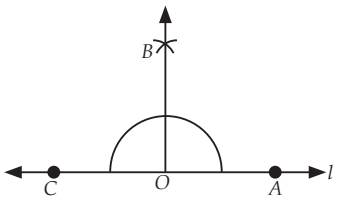
$\therefore \quad AM = BM = \frac{9}{2}\text{cm} = 4.5 \text{ cm}$

2. The measure of each of the two angles formed by bisecting an angle of measure $135° = \frac{1}{2} \times 135° = 67.5°$.

3. No, ΔXYZ can't be constructed.

Since, sum of two sides of triangle must be greater than third side, but here, $XY = YZ + XZ$.

4.



Steps of construction :

Step I : Draw any straight angle (say $\angle AOC$)

Step II : Draw $\overrightarrow{OB}$, the bisector of $\angle AOC$.

Then, $\angle AOB$ and $\angle BOC$ are the required angles obtained by bisecting straight $\angle AOC$.

5. We know that bisector of the line, divides it into two equal parts.

$\therefore$ Length of bisected part of a line segment measuring 7.8 cm $= \frac{1}{2}(7.8) \text{ cm} = 3.9$ cm.

6. If we bisect line segment AB, then we get each part equal to 3.8 cm.

$\therefore$ Length of $AB = 2 \times 3.8 \text{ cm} = 7.6$ cm

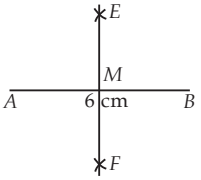
7. To construct a triangle uniquely, we are required at least three values like, 2 sides and 1 included angle or 2 angles and 1 included side or all three sides.

8. Steps of construction :

Step I : Draw a line segment $AB = 6$ cm by using a ruler.

Step II : With A as centre and radius more than half of AB, draw arcs on both sides of AB.

Step III : With B as centre and the same radius (as taken in previous step), draw arcs cutting the previous arcs drawn in Step II at E and F respectively.



Step IV : Join EF intersecting AB at M.

Thus, EF is perpendicular bisector of the line segment AB.

9. No, as we know that sum of all three angles of a triangle is 180°.

But, here $\angle B + \angle C = 110° + 95° = 205° > 180°$

$\therefore \quad \Delta ABC$ cannot be constructed with given conditions.

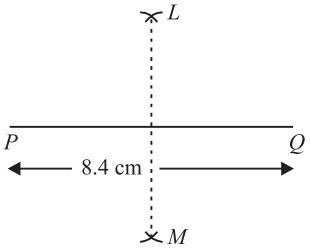
10. Steps of construction :

Step I : Draw a line segment $PQ = 8.4$ cm.

Step II : With P as centre and radius more than half of PQ, draw two arcs, one on each side of PQ.

Step III : With Q as centre and the same radius as in Step II, draw arcs cutting the arcs drawn in the previous step at L and M respectively.

Step IV : Join LM.



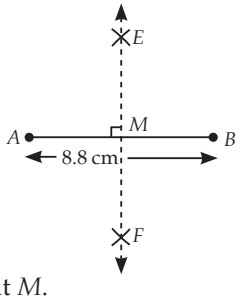
Thus, the line segment LM is required perpendicular bisector of PQ.

11. Steps of construction :

Step I : Draw a line segment $AB = 8.8$ cm by using graduated ruler.

Step II : Taking A as centre and radius equal to more than half of AB, draw arcs on both sides of line segment AB.

Step III : Taking B as centre and same radius as in Step II, draw arcs on both sides of AB cutting the previous arcs at E and F.



Step IV : Join EF intersecting AB at M.

Then, EF is the required perpendicular bisector of AB. On measuring by graduated ruler, we find that $AM = MB = 4.4$ cm.

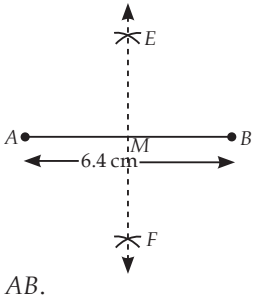
12. Steps of construction :

Step I : Draw a line segment AB = 6.4 cm by using a graduated ruler.

Step II : Taking A as centre and radius equal to more than half of AB, draw arcs on both sides of line segment AB.

Step III : Taking B as centre and same radius as in Step II, draw arcs on both sides of the line segment AB, cutting the previous arcs at E and F.

Step IV : Join EF, intersecting AB at M.



Then, M bisects the line segment AB.

On measuring with graduated ruler, we find that $AM = MB$ = 3.2 cm

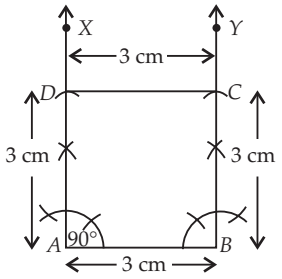
13. Steps of construction :

Step I : Draw a line segment AB = 3 cm.

Step II : Draw angle of 90° at points A and B of the line segment AB. Also draw $\overrightarrow{AX}$ parallel to $\overrightarrow{BY}$.

Step III : Cut AD and BC of length 3 cm on $\overrightarrow{AX}$ and $\overrightarrow{BY}$, respectively.

Step IV : Join CD.



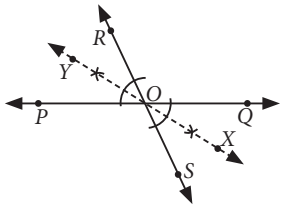
Then, $ABCD$ is the required square of side 3 cm.

14. Steps of construction :

Step I : Draw a line PQ.

Step II : Draw another line RS intersecting PQ at point O.

Step III : Measure pair of vertically opposite angles.



Step IV : Construct OX bisector of $\angle QOS$ and OY bisector of $\angle POR$.

Yes, from the construction it is clear that the bisecting rays are forming a straight line.

15. Steps of construction :

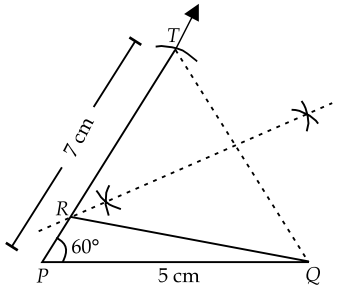
Step I : Draw PQ = 5 cm.

Step II : At P, construct $\angle P = 60°$.

Step III : From P, cut line segment PT = 7 cm (= $PR + RQ$)

Step IV : Join TQ.

Step V : Draw the perpendicular bisector of TQ which meets PT at R.



Step VI : Join RQ.

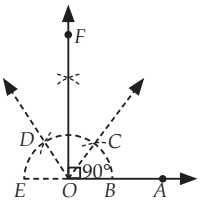
Thus, ΔPQR is the required triangle.

16. Steps of construction :

Step I : Draw a ray $\overrightarrow{OA}$.

Step II : Taking O as centre and suitable radius, draw a semicircle, which cuts OA at B.

Step III : With B as centre and the same radius, as in Step II, draw an arc cutting the semicircle at C. Again, with C as centre, draw an arc cutting the semicircle at D.



Step IV : Draw $\overrightarrow{OC}$ and $\overrightarrow{OD}$.

Step V : Draw $\overrightarrow{OF}$, the bisector of $\angle COD$.

Thus, $\angle AOF = 90°$

17. Steps of construction :

Step I : Draw a ray OP.

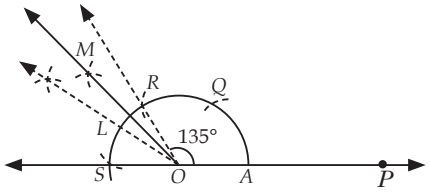
Step II : With centre O and a suitable radius, draw an arc which cuts OP at A.

Step III : With the same radius and starting from A, mark points Q, R and S on the arc drawn in Step II such that $\overset{\frown}{AQ} = \overset{\frown}{QR} = \overset{\frown}{RS}$

Step IV : Draw $\overrightarrow{OL}$, the bisector of $\angle ROS$.

Step V : Draw $\overrightarrow{OM}$, the bisector of $\angle ROL$.

Thus, $\angle POM = \angle POR + \angle ROM = 120° + 15° = 135°$



18. Since, $\frac{3}{4} = \frac{2+1}{4} = \frac{2}{4} + \frac{1}{4} = \frac{1}{2} + \frac{1}{4}$

So, to get $\left(\frac{3}{4}\right)^{\text{th}}$ of AB, we should bisect AB and then again bisect one of the bisected part of AB.

Steps of construction :

Step I : Draw a line segment AB = 16 cm.

Step II : Draw the perpendicular bisector PQ of AB such that PQ intersects AB at point M.

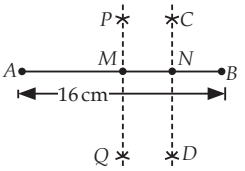
Step III : Now, draw the perpendicular bisector CD of MB.

Thus, $AM + MN$ *i.e.*, AN is the required line segment.

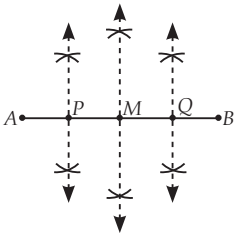
$\therefore \quad AN = \frac{3}{4} AB = \frac{3}{4} \times 16$

$= 3 \times 4 = 12$ cm

Hence, the measure of AN is 12 cm.



19. Steps of construction :



Step I : Draw a line segment AB = 13.2 cm.

Step II : Draw a perpendicular bisector of AB, which intersect AB at M.

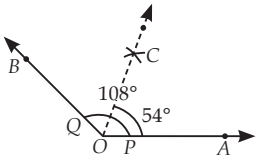
Step III : Again, draw a perpendicular bisector of AM; which intersects AM at P.

Step IV : Also, draw a perpendicular bisector of BM, which intersects BM at Q.

Thus, AB is divided into four equal parts, where $AP = PM = MQ = QB$

$$= \frac{1}{4}AB = \frac{13.2}{4} = 3.3 \text{ cm}$$

20. Steps of construction :



Step I : Draw a ray $\overrightarrow{OA}$.

Step II : By using protractor, draw $\angle AOB = 108° = 2 \times 54°$.

Step III : With O as centre and any convenient radius, draw an arc cutting OA and OB at P and Q respectively.

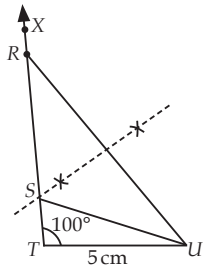
Step IV : With P as centre and radius more than half of PQ, draw an arc.

Step V : With Q as centre and the same radius as taken in Step IV, draw another arc intersecting the previous arc at C. Join OC.

Thus, $\overrightarrow{OC}$ is the bisector of $\angle AOB$, such that

$$\angle AOC = \frac{1}{2}\angle AOB = \frac{108°}{2} = 54°$$

21. Steps of construction :



Step I : Draw TU = 5 cm.

Step II : Draw $\angle UTX = 100°$

Step III : Along $\overrightarrow{TX}$, cut off a line segment $TR = ST + US = 8$ cm.

Step IV : Join UR.

Step V : Draw the perpendicular bisector of UR, meeting TR at S.

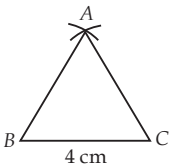
Step VI : Join US.

Hence, ΔSTU is the required triangle.

22. We know that, in equilateral triangle, all the angles are of equal measure and all sides are of equal length.

Since, sum of two-sides of triangle is 8 cm, therefore each side of equilateral triangle will be 4 cm.

Steps of construction :



Step I : Draw the line segment BC = 4 cm.

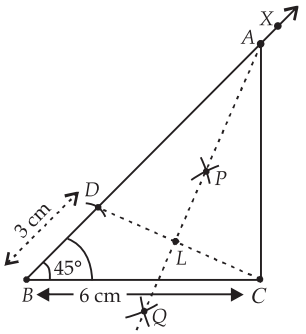
Step II : Taking B as centre and radius = 4 cm draw an arc.

Step III : Taking C as centre and same radius as in Step II, draw an arc cutting the previous arc at A.

Step IV : Join AB and AC.

Then, ABC is the required equilateral triangle.

23. Steps of Construction :



Step I : Draw BC = 6 cm and $\angle CBX = 45°$.

Step II : On $\overrightarrow{BX}$, cut BD = 3 cm.

Step III : Join CD.

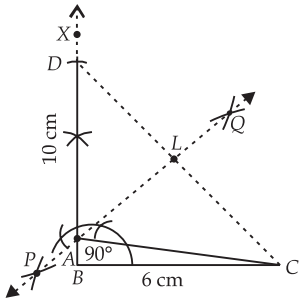
Step IV : Draw PQ, perpendicular bisector of CD.

Step V : PQ intersects $\overrightarrow{BX}$ at A and CD at L.

Step VI : Join AC.

Hence, ΔABC is the required triangle.

24. Steps of construction :



Step I : Draw a base BC equal to 6 cm.

Step II : Construct $\angle CBX = 90°$.

Step III : Cut line segment BD = 10 cm along $\overrightarrow{BX}$.

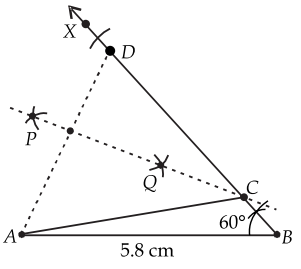
Step IV : Join CD and draw PQ, perpendicular bisector of CD.

Step V : PQ intersects BD at A and CD at L.

Step VI : Join AC.

Hence, ΔABC is the required right triangle.

25. Steps of Construction :



Step I : Draw a line segment AB = 5.8 cm and $\angle ABX = 60°$.

Step II : Cut line segment BD = 7 cm along $\overrightarrow{BX}$.

Step III : Join AD and draw PQ, perpendicular bisector of AD.

Step IV : Let PQ intersects BD at C.

Step V : Join AC.

Hence, ΔABC is the required triangle.

26. Steps of construction :

Step I : Draw BC = 5.6 cm.

Step II : At B, construct $\angle CBX = 45°$.

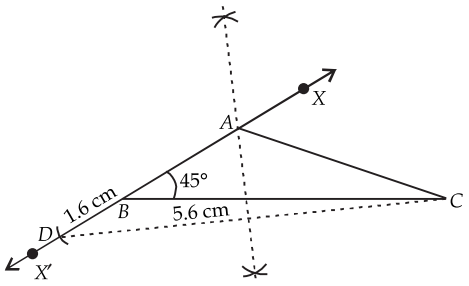
Step III : Produce XB to X' to form line $\overrightarrow{XBX'}$.

Step IV : Along ray BX', cut-off a line segment BD = 1.6 cm.

Step V : Join CD.

Step VI : Draw perpendicular bisector of CD which cuts $\overrightarrow{BX}$ at A.

Step VII : Join CA to obtain required triangle BAC.



Justification:

Since A lies on the perpendicular bisector of CD.

$\therefore \quad AC = AD = AB + DB = AB + 1.6 \Rightarrow AC - AB = 1.6$ cm which justified the construction.

27. 3In order to construct an angle of measure 96° from an angle of measure 128°, we use the following steps :

Steps of construction :

Step I : Draw an angle $\angle AOB$ of measure 128° by using a protractor.

Step II : With centre O and a convenient radius, draw an arc cutting OA and OB at P and Q respectively.

Step III : With centre P and radius more than $\frac{1}{2}(PQ)$, draw an arc.

Step IV : With centre Q and the same radius, as in Step III, draw another arc intersecting the previously drawn arc at R.

Step V : Join OR and produce it to form ray $\overrightarrow{OX}$. $\overrightarrow{OX}$ cuts arc $\overset{\frown}{PQ}$ at S. Then $\angle AOX$ so obtained is equal to $\left(\frac{128°}{2}\right) = 64°$.

Step VI : With S as a centre and radius more than half of QS, draw an arc.

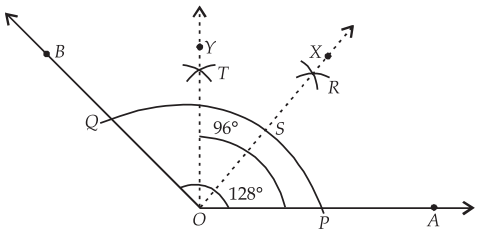
Step VII : With centre Q and the same radius, as in Step VI, draw another arc intersecting the arc drawn in Step VI at T.

Step VIII : Join OT and produce it to form a ray $\overrightarrow{OY}$.

Clearly, $\angle XOY = \frac{1}{2}\angle XOB = \frac{1}{2}(64°) = 32°$

$\therefore \quad \angle AOY = \angle AOX + \angle XOY = 64° + 32° = 96°$

Thus, $\angle AOY$ is the desired angle of measure 96°.

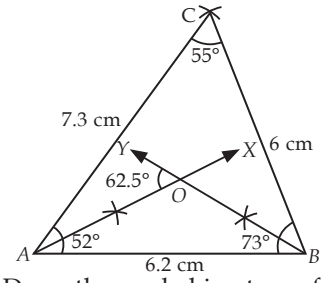


28. Steps of construction :

Step I : Draw a line segment $AB = 6.2$ cm.

Step II : Draw an arc with A as centre and 7.3 cm as radius and draw another arc with B as centre and 6 cm as radius to intersect each other at C.

Step III : Join AC and BC. Thus, we get the required triangle ABC. On measuring all the three angles, we get $\angle A = 52°$, $\angle B = 73°$ and $\angle C = 55°$.



Step IV : Since, $\angle A$ is the smallest angle and $\angle B$ is the largest angle in ΔABC. Draw the angle bisectors of $\angle A$ and $\angle B$, which intersect each other at O.

Step V : On measuring the acute $\angle AOY$ formed by the bisecting rays AX and BY at the point of intersection O, we get $\angle AOY = 62.5°$.

Verification : In ΔAOB,

$\angle AOY = \angle OAB + \angle OBA$ (Exterior angle property)

$\Rightarrow \quad \angle AOY = \frac{1}{2}\angle A + \frac{1}{2}\angle B$ ($\because$ AO and BO are the bisectors of $\angle A$ and $\angle B$ respectively)

$\Rightarrow \quad \angle AOY = \frac{52°}{2} + \frac{73°}{2} = 26 + 36.5° = 62.5°$

29. (i) Yes, because 22.5° = 45° ÷ 2 and 45° can be constructed.

(ii) Yes, it is not possible to construct a ΔABC in which $BC = 7$ cm and $AB - AC = 10$ cm with $\angle B = 45°$ because the difference between the given two sides is not less than the third side.

(iii) Yes, we can construct an angle of 67.5°, because 67.5° = 135° ÷ 2 and 135° = 90° + 45°, which can be constructed.

(iv) Yes, it is possible to construct a ΔDEF in which $EF = 5.5$ cm, $\angle E = 75°$ and $DE - DF = 3$ cm because the difference between the given two sides is less than the third side.

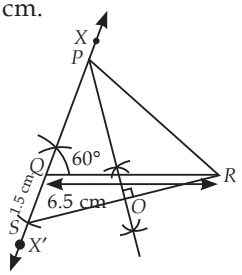
30. Here, $PR - PQ = 1.5$ cm $\therefore \quad PR > PQ$

i.e., The side containing the base angle Q is less than third side, so it is the case II.

Steps of construction :

Step I : Draw the base $QR = 6.5$ cm.

Step II : Construct a ray QX making an angle 60° with QR and extent XQ on opposite side of line segment QR, to form a line XQX'.



Step III : From $\overrightarrow{QX'}$, cut-off the line segment $QS = 1.5$ cm $(= PR - PQ)$.

Step IV : Join SR.

Step V : Draw the perpendicular bisector of SR intersecting $\overrightarrow{QX}$ at point P.

Step VI : Join PR.

Then, PQR is the required triangle.

Justification : Since, point P lies on the perpendicular bisector of SR.

$\therefore \quad PS = PR \Rightarrow PQ + QS = PR \Rightarrow PR - PQ = QS = 1.5$ cm, which justified the construction.

☺☺☺