

Chapter 5 Constructions

Very Short Answer Type Questions

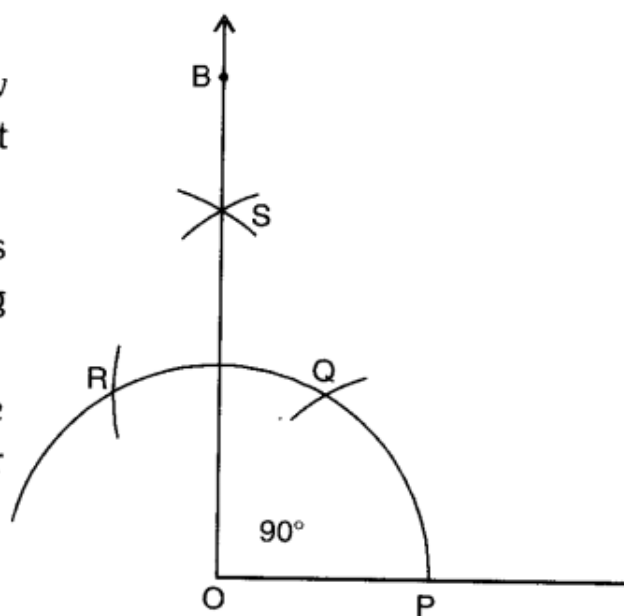
Q1. Construct an angle of 90° at the initial point of the given ray. [CBSE-15-6DWMW5A]

Answer.

Steps of construction :

1. Draw a ray OA.
2. With O as centre and any convenient radius draw an arc, cutting OA at P.
3. With P as centre and same radius, draw an arc cutting the arc drawn in step 2 at Q.
4. With Q as centre and the same radius as in steps 2 and 3, draw an arc, cutting the arc drawn in step 2 at R.
5. With Q and R as centres and same radius, draw two arcs, cutting each other in S.
6. Join OS and produce to B.

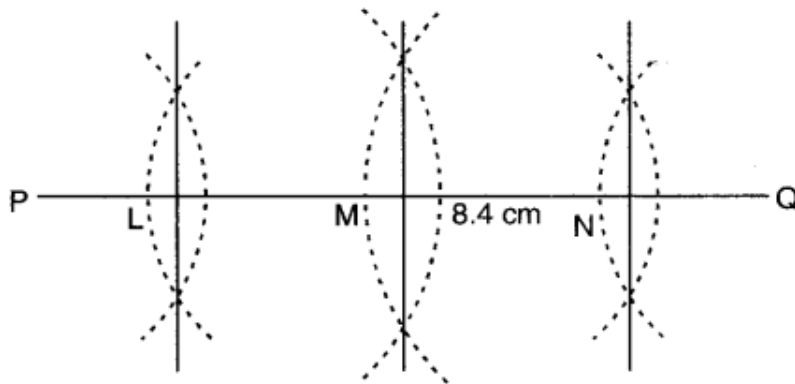
Thus, $\angle AOB$ is the required angle of 90°



Q2. Draw a line segment $PQ = 8.4$ cm. Divide PQ into four equal parts using ruler and compass. [CBSE-14-ERFKZ8H], [CBSE – 14-GDQNI3W], [CBSE-14-17DIG1U]

Answer. Steps of construction :

1. Draw a line segment $PQ = 8.4$ cm.
2. With P and Q as centres, draw arcs of radius little more than half of PQ. Let this line intersect PQ in M.
3. With M and Q as centres, draw arcs of radius little more than half of MQ. Let this line intersect PQ in N.
4. With P and M as centres, draw arcs of radius little more than half of PM. Let this line intersect PQ in L. Thus, L, M and N divide the line segment PQ in four equal parts.



Q3. Draw any reflex angle. Bisect it using compass. Name the angles so obtained. [CBSE-15-NS72LP7]

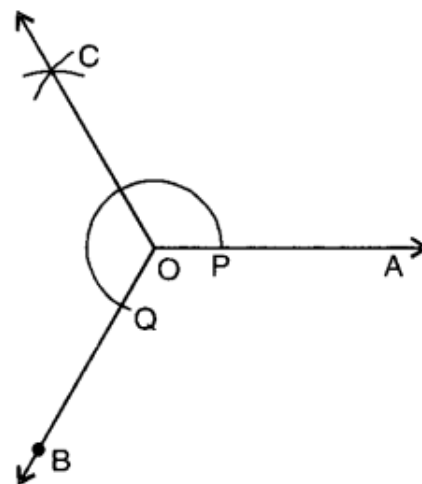
Answer.

Steps of construction :

1. Let $\angle AOB$ be any reflex angle.
2. With O as centre and any convenient radius draw an arc cutting OA in P and OB in Q.
3. With P and Q as centres draw two arcs of radius little more than half of it and let they intersect each other in C. Join OC.

Thus, OC is the required bisector.

Angles so obtained are $\angle AOC$ and $\angle COB$.



Q4. Why we cannot construct a $\triangle ABC$, if $\angle A = 60^\circ$, $AB = 6$ cm, $AC + BC = 5$ cm but construction of $\triangle ABC$ is possible if $\angle A = 60^\circ$, $AB = 6$ cm and $AC - BC = 5$ cm. [CBSE-14-GDQNI3W]

Answer. We know that, by triangle inequality property, construction of triangle is possible if sum of two sides of a triangle is greater than the third side.

Here, $AC + BC = 5$ cm which is less than AB (6 cm)

Thus, $\triangle ABC$ is not possible.

Also, by triangle inequality property, construction of triangle is possible, if difference of two sides of a triangle is less than the third side

Here, $AC - BC = 5$ cm, which is less than AB (6 cm)

Thus, $\triangle ABC$ is possible.

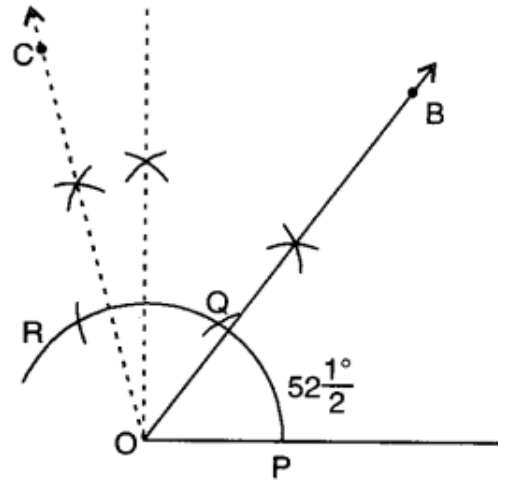
Q5. Construct angle of $\left[52\frac{1}{2}\right]^\circ$ using compass only. [CBSE-14-17DIG1U]

Answer.

Steps of construction :

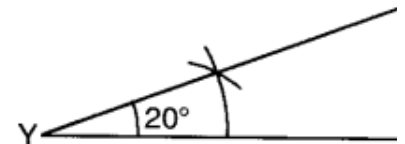
1. Construct an angle $\angle AOC = 105^\circ$ with the help of compass and ruler.
2. Bisect $\angle AOC$ with the help of compass and ruler, let OB be the bisector of $\angle AOC$.

Thus, $\angle AOB = \left(52\frac{1}{2}\right)^\circ$.

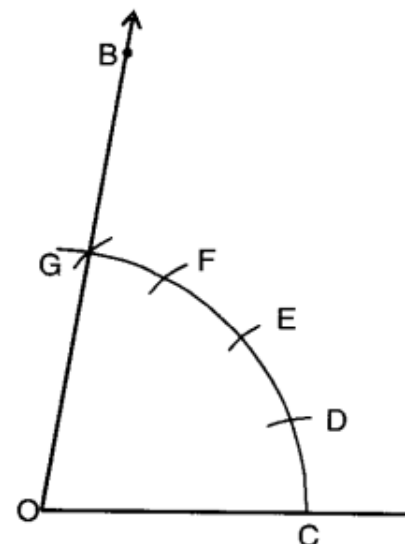
**SHORT ANSWER QUESTIONS TYPE-I**

Q6. Using ruler and compass, construct $4\angle XYZ$, if $\angle XYZ = 20^\circ$ [CBSE-14-ERFKZ8H]

Answer.

Steps of construction :

1. Construct an angle $\angle XYZ = 20^\circ$.
2. Draw any ray OA.
3. With Y and O as centres, draw arcs of any convenient radius.
4. Measure $\angle XYZ$ with the help of compass.
5. With C as centre and radius measured in step 4, draw an arc D.
6. With D as centre and radius measured in step 4, draw an arc E. Similarly draw arcs F and G of same radius as in step 4.
7. Join OG and produced to B.



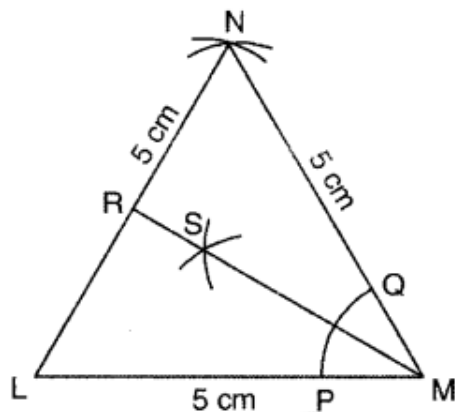
Thus, $\angle AOB$ is the required angle of measure $4\angle XYZ$.

Q7. Construct an equilateral triangle LMN, one of whose side is 5 cm. Bisect $\angle M$ of the triangle. [CBSE March 2012]

Answer. Steps of construction :

1. Draw a line segment $LM = 5$ cm.

2. Taking L as centre and radius 5 cm draw an arc.
3. Taking M as centre and radius draw an other arc intersecting previous arc at N.
4. Join LN and MN. Thus, $\triangle LMN$ is the required equilateral triangle.
5. Taking M as centre and any suitable radius, draw an arc intersecting LM at P and MN at Q.
6. Taking P and Q as centres and same radii, draw arcs intersecting at S.
7. Join MS and produce it meet LN at R. Thus, MSR is the required bisector of $\angle M$.



SHORT ANSWER QUESTIONS TYPE-II

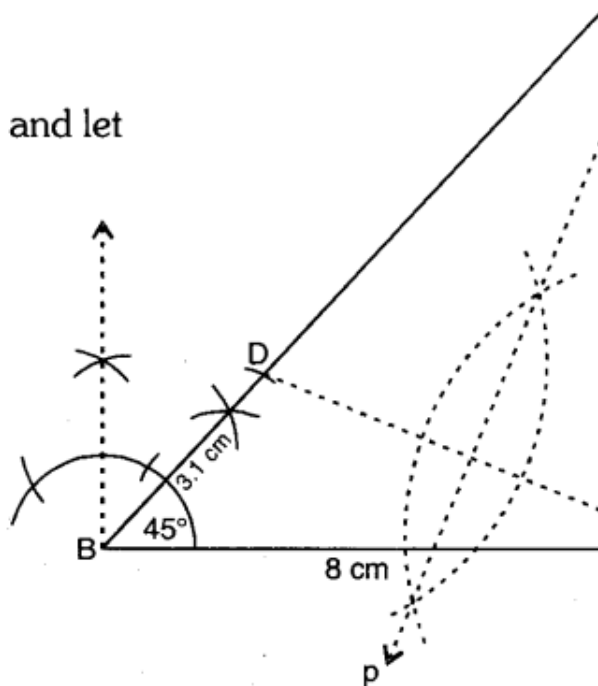
Q8. Construct a $\triangle ABC$ with $BC = 8$ cm, $\angle B = 45^\circ$ and $AB - AC = 3.1$ cm. [CBSE-15-NS72LP7]

Answer.

Steps of construction :

1. Draw any line segment $BC = 8$ cm.
2. At B, construct an angle $\angle CBX = 45^\circ$.
3. From BX, cut off $BD = 3.1$ cm.
4. Join DC.
5. Draw the perpendicular bisector 'p' of DC and let it intersect BX in A.
6. Join AC.

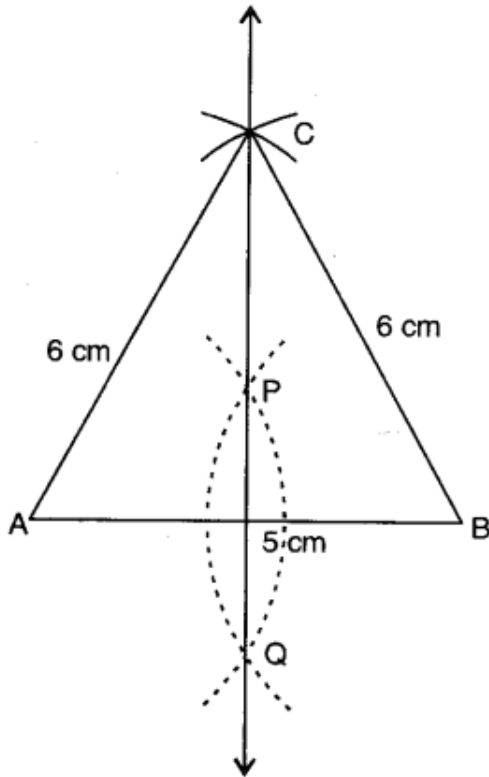
Thus, $\triangle ABC$ is the required triangle.



Q9. Construct an isosceles triangle whose two equal sides measure 6 cm each and whose base is 5 cm. Draw the perpendicular bisector of its base and show that it passes through the opposite vertex [CBSE-15-6DWMW5A]

Answer. Steps of construction :

1. Draw a line segment $AB = 5 \text{ cm}$.
2. With A and B as centres, draw two arcs of radius 6 cm and let them intersect each other in C.
3. Join AC and BC to get $\triangle ABC$.
4. With A and B as centres, draw two arcs of radius little more than half of AB. Let them intersect each other in P and Q. Join PQ and produce, to pass through C.



Q10. Construct a right triangle whose base is 8 cm and sum of the hypotenuse and other side is 16 cm.

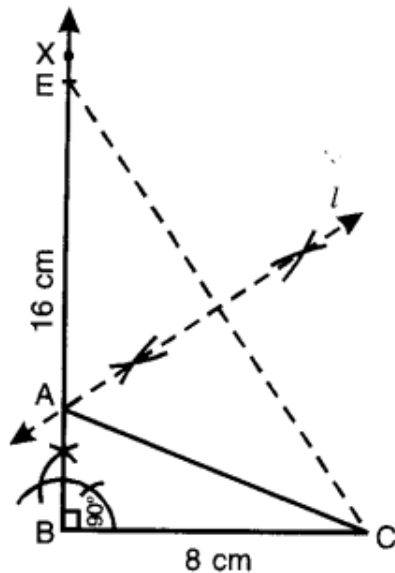
Answer. Given : In $\triangle ABC$, $BC = 8 \text{ cm}$, $\angle B = 90^\circ$ and $AB + AC = 16 \text{ cm}$.

Required : To construct $\triangle ABC$.

Steps of construction:

1. Draw a line segment $BC = 8 \text{ cm}$.
2. At B, Draw $\angle CBX = 90^\circ$.
3. From ray BX, cut off $BE = 16 \text{ cm}$.
4. Join CE .
5. Draw the perpendicular bisector of EC meeting BE at A.

6. Join AC to obtain the required $\triangle ABC$.



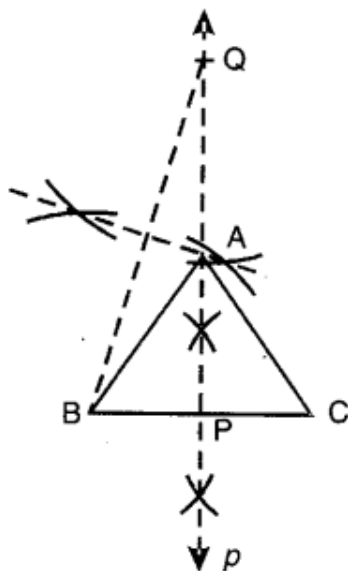
Q11. To construct an isosceles $\triangle ABC$ in which base $BC = 4$ cm, sum of the perpendicular from A to BC and side $AB = 6.5$ cm.

Answer. Given : In $\triangle ABC$, $BC = 4$ cm and sum of the perpendicular from A to BC and side $AB = 6.5$ cm.

Required : To construct $\triangle ABC$.

Steps of construction :

1. Draw any line segment $BC = 4$ cm.
2. Draw 'p' the perpendicular bisector of BC and let it intersect BC in R
3. Cut off $PQ = 6.5$ cm.
4. Join QB.
5. Draw the perpendicular bisector of BQ and let it intersect PQ in A.
6. Join AB and AC. Thus, $\triangle ABC$ is the required triangle.

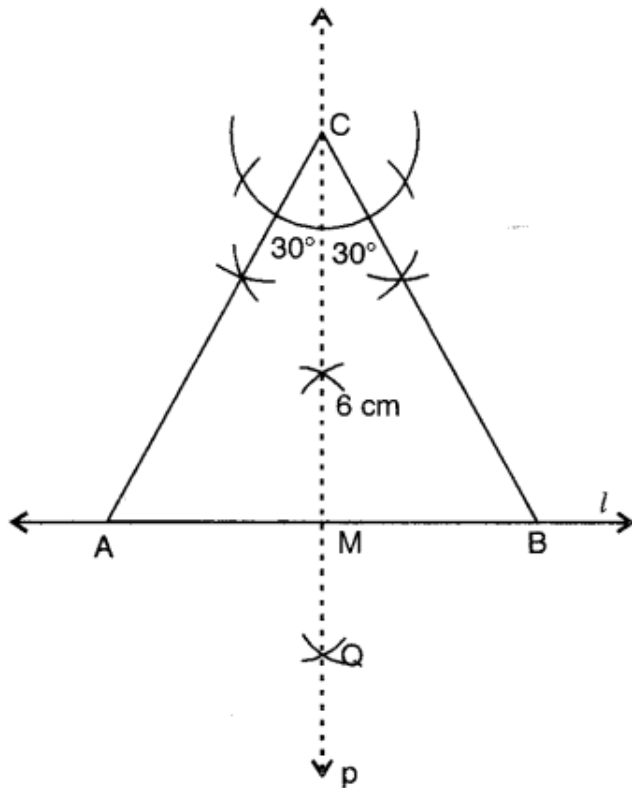


Q12. Construct an equilateral triangle of altitude 6 cm. [CBSE-15-6DWMW5A]

Answer. Steps of construction :

1. Draw any line l.
2. Take any point M on it and draw a line p perpendicular to l.

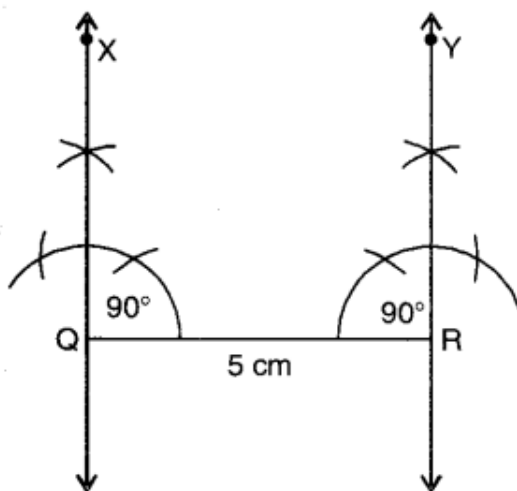
3. With M as centre, cut off $MC = 6$ cm
4. At C, with initial line CM construct angles of measures 30° on both sides and let these lines intersect line l in A and B. Thus, $\triangle ABC$ is the required triangle.



Q13. Draw a line segment $QR = 5$ cm. Construct perpendiculars at point Q and R to it. Name them as QX and RY respectively. Are they both parallel ? [CBSE-15-NS72LP7] [CBSE-14-ERFKZ8H]

Answer. Steps of construction :

1. Draw a line segment $QR = 5$ cm.
2. With Q as centre, construct an angle of 90° and let this line through Q is QX.
3. With R as centre, construct an angle of 90° and let this line through R is RY. Yes, the perpendicular lines QX and- RY are parallel.



LONG ANSWER TYPE QUESTIONS

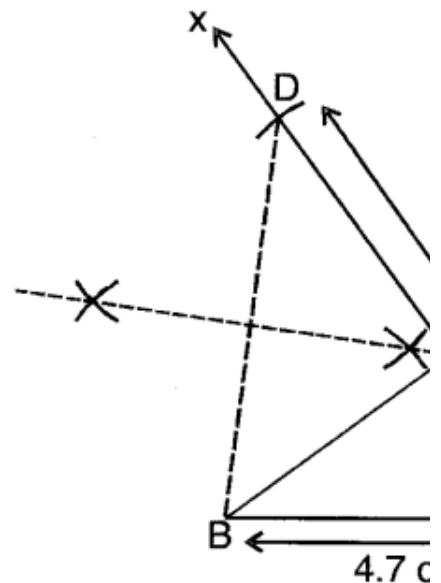
Q14. Construct a triangle ABC in which $BC = 4.7$ cm, $AB + AC = 8.2$ cm and $\angle C = 60^\circ$. [CBSE March 2012]

Answer. Given : In $\triangle ABC$, $BC = 4.7$ cm, $AB + AC = 8.2$ cm and $\angle C = 60^\circ$.

Required : To construct $\triangle ABC$.

Steps of construction :

1. Draw $BC = 4.7$ cm.
2. Draw $\angle BCX = 60^\circ$.
3. From ray CX , cut off $CD = 8.2$ cm.
4. Join BD .
5. Draw the perpendicular bisector of BD meeting CD at A .
6. Join AB to obtain the required triangle ABC .



Justification :

$\therefore$ A lies on the perpendicular bisector of BD , therefore $AB = AD$

Now, $CD = 8.2$ cm $\Rightarrow AC + AD = 8.2$ cm $\Rightarrow AC + AB = 8.2$ cm.

Q15. To construct a triangle, given its perimeter and its two base angles, e.g., construct a triangle with perimeter 10 cm and base angles 60° and 45° . [CBSE March 2012]

Answer.

Given : In $\triangle ABC$,

$$AB + BC + CA = 10 \text{ cm,}$$

$$\angle B = 60^\circ \text{ and } \angle C = 45^\circ.$$

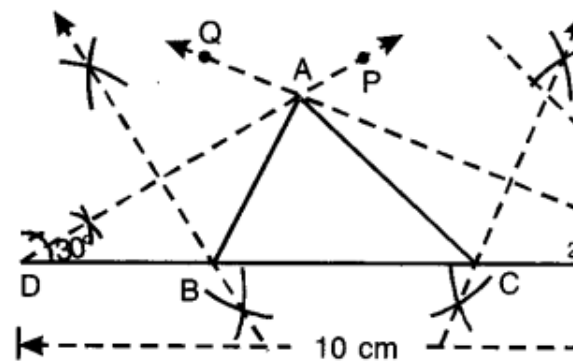
Required : To construct $\triangle ABC$.

Steps of construction :

1. Draw $DE = 10$ cm.
2. At D , construct $\angle EDP = \frac{1}{2}$ of $60^\circ = 30^\circ$ and at E , construct

$$\angle DEQ = \frac{1}{2} \text{ of } 45^\circ = 22\frac{1}{2}^\circ.$$

3. Let DP and EQ meet at A .
4. Draw perpendicular bisector of AD to meet DE at B .
5. Draw perpendicular bisector of AE to meet DE at C .
6. Join AB and AC . Then, ABC is the required triangle.



Q16. Construct $\triangle XYZ$, if its perimeter is 14 cm, one side of length 5 cm and $\angle X = 45^\circ$. [CBSE-14-ERFKZ8H]

Answer. Here, perimeter of $\triangle XYZ = 14$ cm and one side $XY = 5$ cm
 $\therefore YZ + XZ = 14 - 5 = 9$ cm and $\angle X = 45^\circ$.

Steps of construction :

1. Draw a line segment $XY = 5$ cm.
2. Construct an $\angle YXA = 45^\circ$ with the help of compass and ruler.
3. From ray XA , cut off $XB = 9$ cm.
4. Join BY .
5. Draw perpendicular bisector of BY and let it intersect XB in Z .
6. Join ZY . Thus, $\triangle XYZ$ is the required triangle.

