CBSE Test Paper 02

CH-11 Constructions

1. The construction of a $\triangle ABC$, given that BC = 3 cm, $\angle C = 60^0$ is possible when difference of AB and AC is equal to _____.
   a. 3.1 cm
   b. 2.8 cm
   c. 3 cm
   d. 3.2 cm
2. A quadrilateral can be drawn if the measures of its _____.
   a. four angles and one side are given
   b. four sides are given
   c. three sides and a diagonal are given
   d. four sides and one diagonal are given
3. Instruments used to draw a pair of parallel lines are_____.
   a. protractor and scale
   b. compass and scale
   c. set square and scale
   d. none of these
4. With the help of a ruler and a compass, it is not possible to construct an angle of _____.
   a. 30^0
   b. 45^0

c. 70^0

d. $7\frac{1}{2}^\circ$

5. What is the supplementary angle of 108^0 ?

   a. 72^0

   b. 70.5^0

   c. 72.5^0

   d. 71^0

6. Plot the points A (5, 5) and B (-5, 5) in cartesian plane. Join AB, OA, and OB. Name the type of triangle so obtained.

7. Construct a triangle ABC where base BC = 4.5 cm. $\angle$B = 45^o and AB - AC = 2.5 cm.

8. Construct a triangle with base of length 5 cm, the sum of the other two sides 7 cm and one base angle of 60^o.

9. Construct an equilateral triangle whose altitude is 4 cm.

10. Construct a triangle PQR in which QR = 6 cm., $\angle$Q = 60^o and PR - PQ = 2 cm.

11. Construct an equilateral triangle of each sides 5.6cm

12. 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).

13. Draw a perpendicular bisector of a line segment.

14. Construct a triangle ABC in which BC = 5 cm, $\angle B = 60^\circ$ and AC + AB = 7.5 cm.

15. Construct a $\triangle$ABC, in which BC = 7 cm, AB + AC = 13 cm and $\angle$B = 60° and justify it.

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Solution

1. (b) 2.8 cm
   Explanation: To construct a triangle whose base, base angle and difference of other two sides are given, the difference of other two sides should be less than its base.

   As in this case AB - AC < BC, So we can construct this triangle.

2. (d) four sides and one diagonal are given
   Explanation: At first we will have to draw the diagonal and then by taking end points of diagonals as the Centre we can draw the arcs corresponding to the length of the four sides given. Therefore, the measures of four sides and one diagonal is necessary for the construction of a quadrilateral.
3. (c) set square and scale
   Explanation: A ruler and a set square can be used to draw parallel lines as described below:

   STEP 1: Position an edge of the set square against the ruler and draw a line along one of the other edges.

   STEP 2: Slide the set square into new position while keeping the ruler fixed at the same position.

   STEP 3: Draw the line along the same edge as in Step 1.

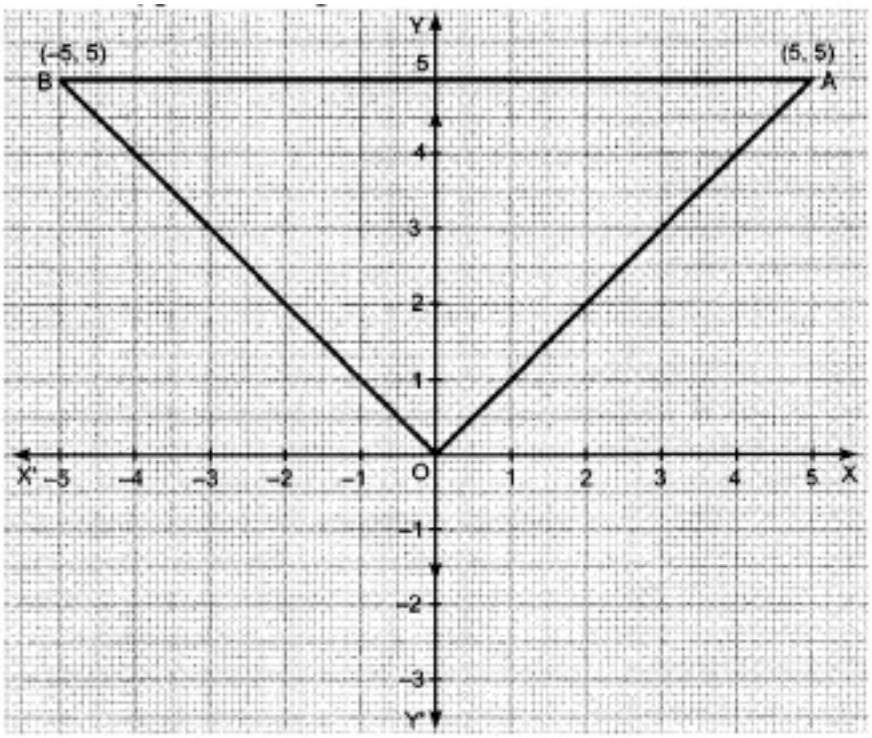
   The two lines thus drawn are parallel to each other.

4. (c) 70^0
   Explanation: With the help of a ruler and a compass, we cannot construct an angle which is not a multiple of and as is not a multiple of ,So, we cannot construct it.
5. (a) 72^0
   Explanation: Supplementary angles are those angles whose sum are 180^0 .

   So, $108^0 + x^0 = 180^0$

$\implies x^0 = 180^0 - 108^0 = 72^0$

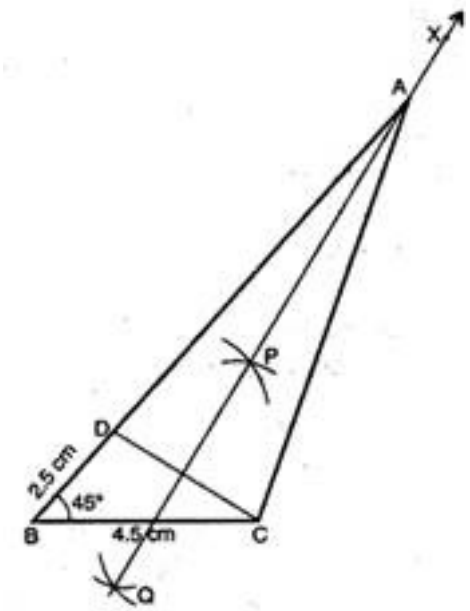
Thus the supplementary of 108^0 is 72^0.

6. 

O is origin, When we Join AB, OA, and OB then the triangle so obtained is an isosceles triangle.

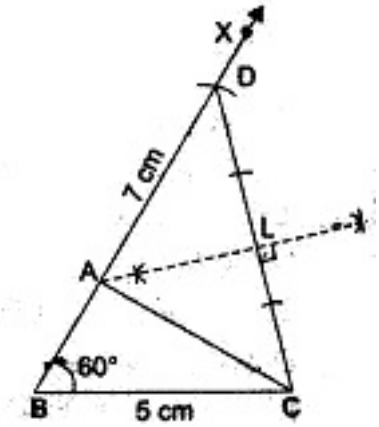
7. Given: In triangle ABC, BC = 4.5 cm, $\angle$B = 45^o and AB – AC = 2.5 cm.
Required: To construct the triangle ABC.
Steps of construction :

   i. Draw the base BC = 4.5 cm.
   ii. At the point B, construct an angle XBC = 45^o
   iii. Cut the line segment BD equal to AB – AC = 2.5 cm. on the ray BX.
   iv. Join DC.
   v. Draw the perpendicular bisector, say PQ of DC.
   vi. Let it intersect BX at a point A.
   vii. Join AC.



ABC is the required triangle.

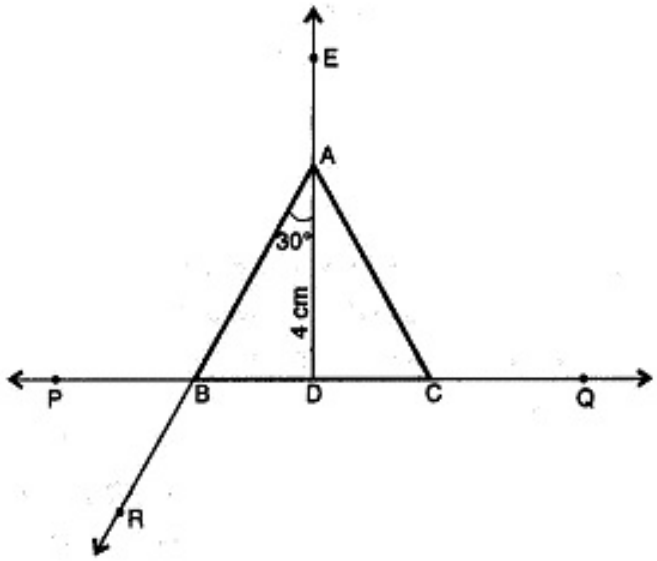
8. Given : In $\triangle$ABC, base BC = 5 cm., AB + AC = 7 cm and $\angle$ABC = 60^o
   Required : To construct the $\triangle$ABC.
   Steps of construction :



ABC is the required triangle.

i. Draw BC = 5 cm.
ii. At B construct $\angle$CBX = 60^o
iii. On BX, cut off BD = 7 cm.
iv. Join CD
v. Draw the perpendicular bisector of CD, which intersects BD at some point name it A.
vi. Join AC.

9. Given: In an equilateral triangle ABC, altitude AD = 4 cm.
   Required: To construct the triangle ABC.
   Steps of construction:

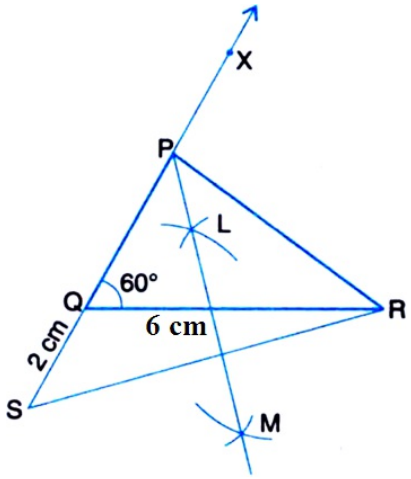


   ABC is the required triangle.

   i. Draw a line PQ.
   ii. Take a point D on it.
   iii. Draw a ray DE ⊥ PQ.
   iv. Cut off DA = 4 cm on DE
   v. Construct ∠DAR = ($\frac{1}{2} \times 60^o$) = 30^o . Let the ray AR intersect PQ at B.
   vi. Cut off line segment DC = BD.
   vii. Join AC.

10. Given : In △PQR, QR = 6 cm., ∠Q = 60^o and PR - PQ = 2 cm.
    Required: To construct △PQR.
    Steps of construction :

    i. Draw the base QR = 6 cm.
    ii. At the point, Q construct an ∠XQR = 60^o
    iii. Cutline segment QS = PR – PQ = 2 cm on the line QX extended on opposite side of line segment QR.
    iv. Join SR.



v. Draw the perpendicular bisector LM of SR.

vi. Let LM intersect QX at P.

vii. Join PR.

PQR is the required triangle.

Justification:

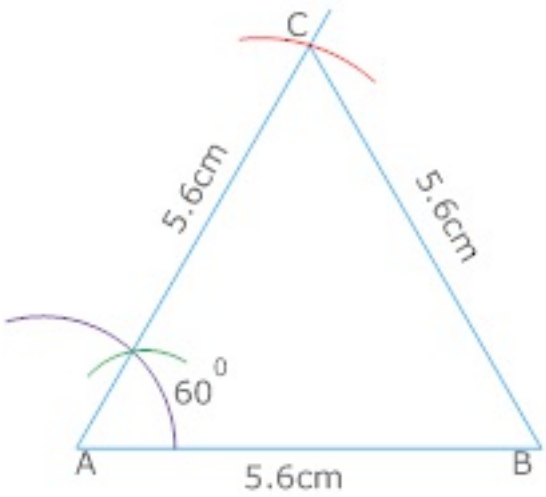
P lies on perpendicular bisector of OR.

$\therefore$ PO = PR

$\Rightarrow$ PQ + QO = PR

$\Rightarrow$ QO = PR – PQ = 2 cm

11. Steps of construction:



i. Draw AB = 5.6cm

ii. Draw $\angle XAB = 60^\circ$

iii. Taking A as centre draw an arc of radius 5.6 cm which intersect AX at point C

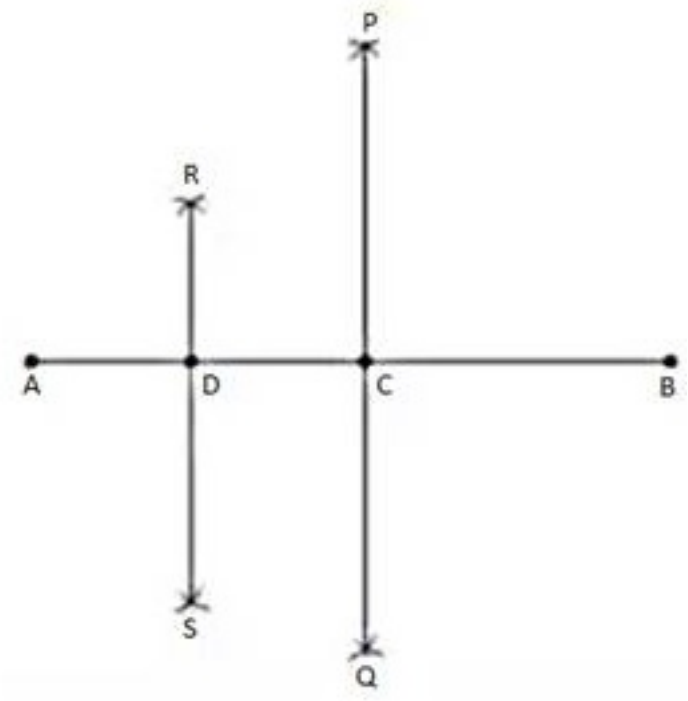
iv. Join BC

v. ΔABC is required equilateral triangle.

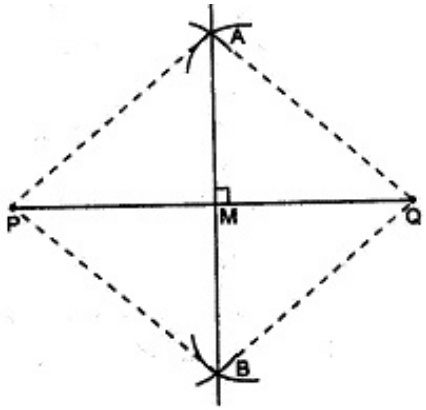
12. Steps of construction:-

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

i. Draw a line segment AB.
ii. With centre A and radius more than $\frac{1}{2}$ AB, draw arcs, one on each side of AB.
iii. With centre B and same radius, draw arcs cutting previous arcs at P and Q respectively.
iv. Join PQ which intersect AB at C.
v. With centre A and radius more than $\frac{1}{2}$ AC, draw arcs, one on each side of AC.
vi. With centre C and same radius, draw arcs cutting previous arcs at R and S respectively.
vii. Join RS which intersect AC at D.



13. Given: Any line segment PQ.
Required: To draw a perpendicular bisector of line segment PQ.



Steps of construction :

Justification: Join P and Q to both A and B to form PA, PB, QA and QB.

In triangles APB and AQB

PA = AQ . . . [arcs of equal radii]

PB = QB . . .[arcs of equal radii]

AB = AB . . .[Common]

$\therefore$ $\triangle$APB $\cong$ $\triangle$AQB . . .[By SSS congruence rule]

So, $\angle$PAM = $\angle$QAM . . .[c.p.c.t.]

In triangles AMP and AMQ,

PA = QA . . .[as before]

AM = AM . . .[Common]

$\angle$PAM = $\angle$QAM . . .[As proved above]

$\therefore$ $\triangle$AMP $\cong$ $\triangle$AMQ . . .[SAS congruence rule]

So, PM = QM

and $\angle$AMP = $\angle$AMQ . . . [c.p.c.t.]

As $\angle$AMP + $\angle$AMQ = 180^o . . .[Linear pair axiom]

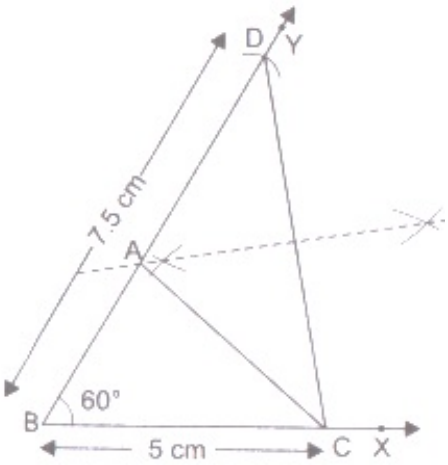
$\angle$AMP = $\angle$AMQ = 90^o

$\therefore$ AM i.e. AMB is the perpendicular bisector of PQ.

i. With P as centre and any suitable radius draw arcs, one on each side of PQ.
ii. With Q as centre and same radius draw two more arcs, one on each side of PQ cutting the previous arcs at A and B.
iii. Join AB to meet PQ at M, then AB bisects PQ at M and is perpendicular to PQ. Thus, AB is the required perpendicular bisector of PQ.

14. Given: In ΔABC , BC = 5 cm, AC + AB = 7.5 cm and $\angle B = 60^\circ$

Required: To construct

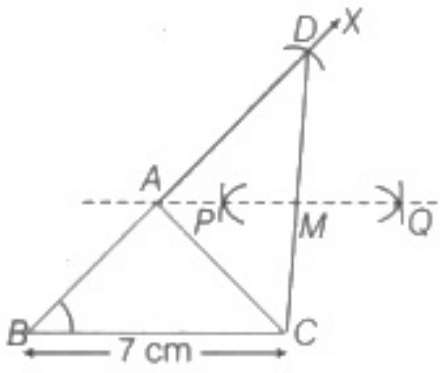


Steps of construction:

1. Draw a ray BX and cut off a line segment BC = 5 cm from it.
2. At B, construct
3. With B as centre and radius = 7.5 cm, draw an arc at meet BY at D.
4. Join CD.
5. Draw the perpendicular bisector of CD, intersecting BD at A.
6. Join AC. Then, ABC is the required triangle.

15. It is given that, BC = 7 cm, AB + AC = 13 cm and $\angle B = 60^o$.

Steps for Construction :-



Justification:

We can justify the construction of the given triangle in the following way:

We have drawn the base BC, as given in the question.

Since PQ is the perpendicular bisector of CD and A lies on it.

$\therefore$ AD = AC [$\because$ $\triangle$AMD $\cong$ $\triangle$AMC, by SAS rule]

Now, AB = BD - AD = BD - AC

$\Rightarrow$ AB + AC = BD

Thus, construction is justified.

i. First, let's start by drawing the base, BC = 7 cm. Now, draw a ray BX such that $\angle$XBC = $\angle$B = 60°, as given.
ii. Here, it is given that sum of two sides = AB + AC = 13 cm
So, we will cut the line segment BD (= 13 cm) from the ray BX.
iii. Join D and C to form line segment DC.
iv. Draw perpendicular bisector of DC, say PQ, which intersects BD at A.
v. Now join AC. Thus, we will get a $\triangle$ABC which is the required triangle.