CBSE Test Paper 04

Chapter 11 Construction

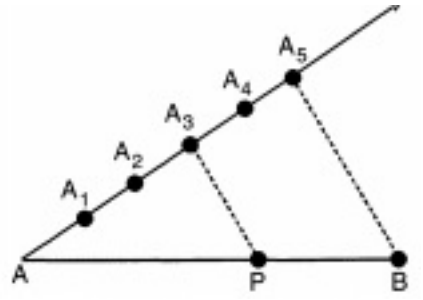
1. To divide a line segment AB in the ratio 3 : 7, draw a ray AX such that is $\angle BAX$ an acute angle, then draw a ray BY parallel to AX and the points A_1, A_2, A_3, ... and B_1, B_2, B_3,... are located at equal distances on ray AX and BY respectively. Then the points joined are: **(1)**
   a. A_4 andB_3
   b. A_3 andB_7
   c. A_5 and B_5
   d. A_7 and B_3
2. To divide a line segment AB in the ration 5: 6, draw a ray AX such that is$\angle BAX$ an acute angle, then draw a ray BY parallel to AX and the points A_1, A_2, A_3 ... and are $B_1, B_2, B_3 \ldots .$ located at equal distances on ray AX and BY, respectively. Then, the points joined are **(1)**
   a. $A_5\ and\ B_4$
   b. $A_6\ and\ B_5$
   c. $A_4\ and\ B_5$
   d. $A_5\ and\ B_6$
3. To draw a pair of tangents to a circle which are inclined to each other at an angle of 60°, it is required to draw tangents at end-points of those two radii of the circle, the angle between them should be **(1)**
   a. 120°
   b. 135°
   c. 90°
   d. 60°
4. To divide a line segment AB in the ration 2 : 5, first a ray AX is drawn, so that $\angle BAX$ is an acute angle and then at equal distances points are marked on the ray such that the minimum number of these points is : **(1)**
   a. 4
   b. 5
   c. 7

d. 2

5. To construct a triangle similar to given ΔABC with its sides $\frac{7}{5}$ of the corresponding side of ΔABC, draw a ray BX such that $\angle CBX$ is an acute angle and X is on the opposite side of A with respect to BC. Then, locate points X_1, X_2, X_3 ... at equal distances on BX. The points to be joined are: **(1)**
   a. X_7 and C
   b. X_2 and C
   c. X_5 and C
   d. X_{12} and C
6. To draw a pair of tangents to a circle which are inclined to each other at an angle of, 35^o it is required to draw tangents at the end points of those two radii of the circle, the angle between them should be: **(1)**
   a. 105^o
   b. 140^o
   c. 145^o
   d. 70^o
7. Point C bisects the line segment PQ in the ratio: **(1)**
   a. $1:1$
   b. $2:5$
   c. $1:4$
   d. $2:3$
8. To divide a line segment LM in the ratio 4 : 3, a ray LX is drawn first such that $\angle MLX$ is an acute angle and then points, $L_1\, L_2, L_3$, ... are located at equal distances on the ray LX and the points M is joined to: **(1)**
   a. L_2
   b. L_7
   c. L_4
   d. L_3
9. Triangle PQR is constructed similar to triangle ABC with scale factor $\frac{2}{3}$. Find triangle PQR. **(1)**
10. To divide a line segment AB in the ratio 2:5, first a ray AX is drawn, so that $\angle BAX$ is an acute angle and then at equal distances, how many points are located on the ray

AX? **(1)**

11. What is the ratio of division of the line segment AB by the point P from A? **(1)**



12. Draw a circle of radius 5 cm. Take a point P on it. Without using the centre of the circle, draw a tangent to the circle at point P. Also write steps of construction. **(2)**

13. Find the third side of a right angled triangle whose hypotenuse is length p cm , one side of length q cm and p - q = 1. **(2)**

14. Construct a quadrilateral similar to a given quadrilateral with sides $\frac{4}{7}$ of the corresponding sides of ABCD. **(2)**

15. Draw a pair of tangents to a circle of radius 6 cm which are inclined to each other at 60^{o}. Also write steps of construction. **(2)**

16. Draw a circle of radius 1.5 cm. Take a point P outside it. Without using the centre draw two tangents to the circle from the point P. **(2)**

17. Draw a triangle ABC with sides BC = 7 cm, $\angle$ B = 45^{o}, A = 105^{o}. Then construct a triangle whose sides are $\frac{4}{3}$ times the corresponding sides of the $\triangle$ ABC. **(3)**

18. Draw a circle of radius 5 cm. From a point 12 cm away from its centre, construct the pair of tangents to the circle and measure their lengths. **(3)**

19. Divide a line segment of length 9 cm internally in the ratio 4 : 3. Also, give justification of the construction. **(3)**

20. Draw a quadrilateral ABCD with AB = 3 cm, AD = 2.7 cm, DB = 3.6 cm, $\angle$B =110^{o} and BC = 4.2 cm. Construct a quadrilateral A'BC'D similar to the quadrilateral ABCD so that the diagonal D'B may be 4.8. **(3)**

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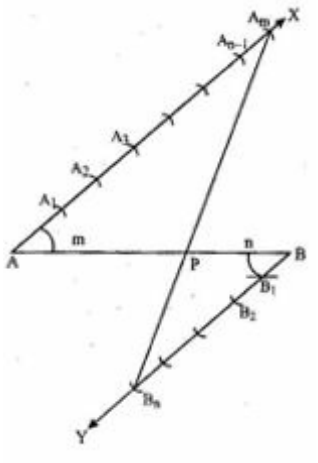
Chapter 11 Construction

Solution

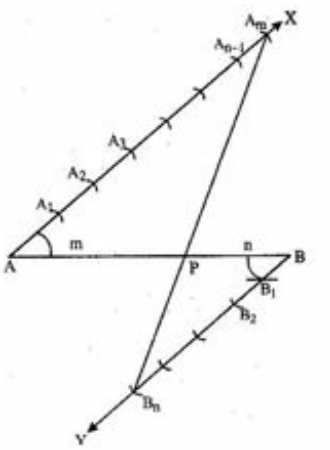
1. b. A_3 and B_7

   Explanation: If to divide the line segment AB in the ratio m : n, then we draw a ray AX such that $\angle$BAX is an acute angle, then draw a ray BY parallel to AX and the points A_1, A_2, A_3, ... A_{m-1}, A_m and B_1, B_2, ..., B_n are located at equal distances on ray AX and BY respectively. Then the points joined are Am and Bn. Therefore, according to the question, the points joined are A_3 and B_7.



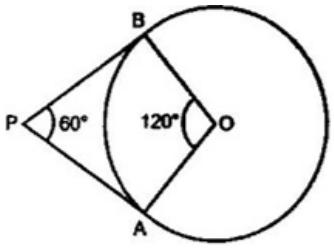
2. b. A_6 *and* B_5

   Explanation: According to the question, the points joined are A_6 to B_5. Because if we have to divide a line segment AB in the ratio m : n, then we draw rays AX and BY and mark the points A_1, A_2, . , A_m and B_1, B_2 ... B_n on rays AX and BY respectively. Then we join the point A_m to B_n.



3. a. 120^o

Explanation: As $AOBP$ is a quadrilateral the sum of four angles are 360^o
Tangents make 90^o with the radius of touching points so $\angle PAO$ and $\angle PBO$ are 90^o each.
so $\angle AOB = ((360 - (90 + 90 + 60))$
=$(360 - 240)$ = 120

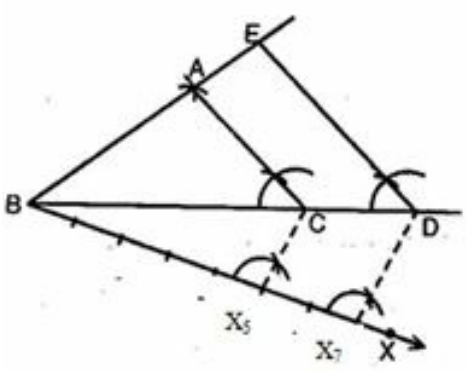


4. c. 7

Explanation: According to the question, the minimum number of those points which are to be marked should be (Numerator + Denominator) i.e., 2 + 5 = 7

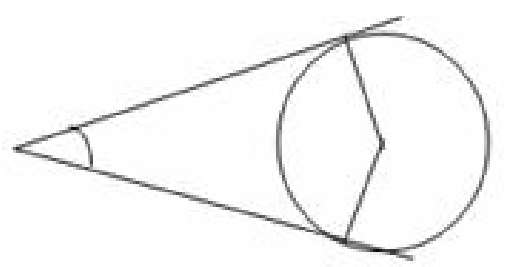
5. c. X_5 and C

Explanation: According to the question, the points to be joined are X_5 and C.



6. c. 145^o

Explanation: As it is a quadrilateral the sum of four angles 360^o. tangents make with 90^o a radius of touching points.



So, the angle at the centre $(360 - (90 + 90 + 35))$

$= (360 - 215)$

$= 145^o$

7. a. $1 : 1$

   Explanation: As we know that, if C bisects PQ then,

   $PC = CQ$

   or, $\frac{PC}{CQ} = \frac{1}{1}$

   or, $PC : CQ = 1 : 1$

8. b. L_7

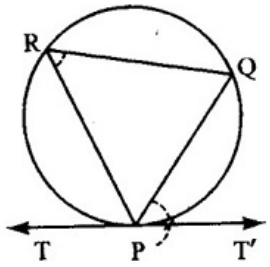
   Explanation: To divide a line segment AB in the ratio m: n, a ray AX is drawn, such that ∠BAX is an acute angle and the points A1, A2, A3, ..., Am, ... An are located at equal distances on the ray AX and then the point B is joined to An. Therefore, according to the question, the point M is joined to L7M.

9. If triangle PQR is constructed similar to triangle ABC with scale factor $\frac{2}{3}$.
   So, Triangle PQR is smaller to triangle ABC
   (∵ Reduced scale factor figures are smaller in size)

10. We know that , to divide a line segment AB in the ratio m : n, first draw a ray AX which makes an acute $\angle BAX$, then marks m + n points at equal distances.
    Here, $m = 2$ and $n = 5$
    Hence, number of points on the ray $AX = 2 + 5 = 7$

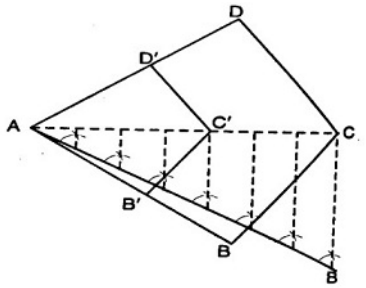
11. The ratio of division of the line segment AB by the point P from A is $AP : AB = 3 : 5.$

12. Steps of construction:
    i. Draw any chord PQ through the given point P on the circle.
    ii. Take a point R on the circle and join P and Q to a point R.
    iii. Construct and$\angle QPT' = \angle PRQ$ on the opposite side of the chord PQ.
    iv. Produce T'P to T to get TPT' as the required tangent.

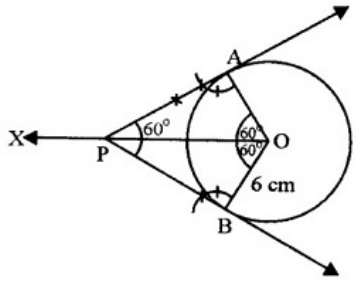


13. Given, the length of the hypotenuse of triangle = p cm & the length of one side be q cm
    Let, the length of third side be x cm
    By using the Pythagoras theorem it is,
    $(Hypotenuse)^2 = (Base)^2 + (Altitude)^2$
    $\Rightarrow p^2 = q^2 + x^2$
    $\Rightarrow x^2 = p^2 - q^2$
    $\Rightarrow x^2 = (p + q)(p - q)$
    $\Rightarrow x^2 = p + q$ [Given, $p - q = 1$]
    $\Rightarrow x = \sqrt{p + q}$
    Hence, the length of the third side is $\sqrt{p + q}$.

14. Steps of construction:
    i. Draw a quadrilateral ABCD with the given data.
    ii. Join AC and divide it into 7 equal parts.
    iii. Let C' be the point which divides AC in the ratio 4 : 3, i.e.
    $AC' = \frac{4}{7}AC$
    iv. From C', draw lines parallel to CB and CD meeting AB and AD at B' and D' respectively.
    AB'C'D' is the required quadrilateral

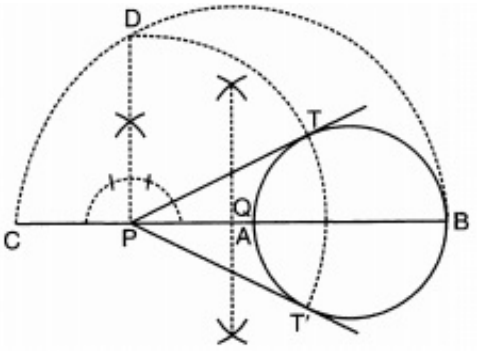


15. Steps of construction:
    i. Draw a circle with centre O and radius = 6 cm.
    ii. Take a ray OP.
    iii. Construct $\angle POA$ and $\angle POB$ = 60^0 such that $\angle AOB = 120^\circ$.
    iv. Construct $\angle OAP = \angle OBP = 90^\circ$ with radii OA and OB respectively such that their arms AP and BP intersect ray OP at P, then $\angle APB = 60^\circ$
    Such that tangents PA and PB are inclined at 60^0 with each other.



16. Steps of construction:
    i. Draw a circle of radius 1.5 cm. Take a point P outside it.
    ii. Through P draw a secant PAB to meet the circle at A and B.
    iii. Produce AP to C such that PC = PA. Bisect CB at Q.
    iv. With CB as diameter and centre as Q, draw a semicircle.
    v. Draw PD $\perp$ CB, to meet semi-circle at the point D.
    vi. Intersect P as centre and PD as radius draw an arc to interest the circle at T and T'. PT and PT' are the required tangents.
    vii. Join P to T and P to T'

    Hence

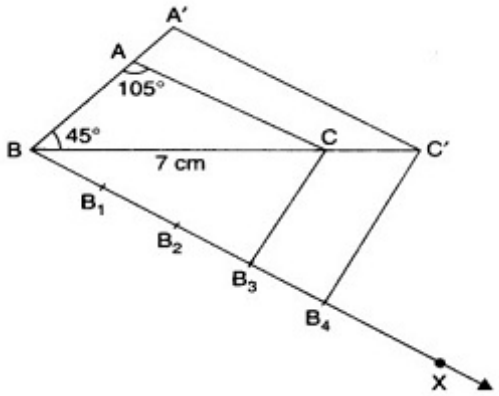


17. Required: To draw a triangle ABC with sides BC = 7 cm, $\angle$ B = 45° cm and $\angle$ A = 105° and then to construct a triangle whose sides are $\frac{4}{3}$ times the corresponding sides of triangle ABC.

    Steps of construction:

    i. Draw a $\triangle$ ABC with sides BC = 7 cm, $\angle$ B = 45° cm and $\angle$ A = 105º
    ii. Draw any ray BX making an acute angle with BC the Side opposite to the vertex A.
    iii. Locate 4 points B_1, B_2, B_3 and B_4 on BX
    iv. Join B_3 to C and draw a line through B_4 parallel to B_3C, intersecting the extended line segment BC to C'.
    v. Draw a line through C' parallel to CA intersecting the extended line segment BA at

A'.



Then, A'BC' is the required triangle.

Justification:

$\therefore$ C'A||CA [by construction]

$\therefore \triangle$ ABC $\sim \triangle$ A'BC' [AA similarity criterion]

$\therefore \frac{A'B}{AB} = \frac{A'C'}{AC} = \frac{BC'}{BC}$ [$\therefore$ Corresponding sides of two similar triangle are proportional]

$\therefore$ B_4C'||B_3C [By construction]

$\therefore \triangle$ $BB_4C' \sim \triangle$ BB_3C' [AA similarity criterion]

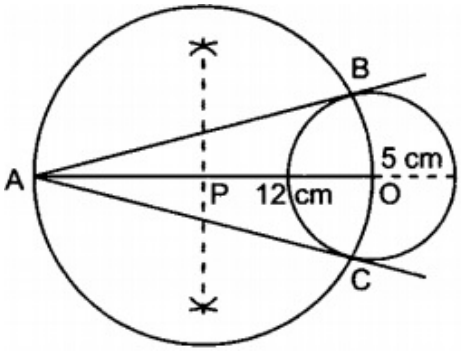
$\therefore \frac{BC'}{BC} = \frac{BB_4}{BB_3}$ [By basic proportionality theorem]

But $\frac{BB_4}{BB_3} = \frac{4}{3}$ [By construction]

$\therefore \frac{BC'}{BC} = \frac{4}{3}$

$\therefore \frac{A'B}{AB} = \frac{A'C'}{AC} = \frac{BC'}{BC} = \frac{4}{3}$

18. Steps of Construction:



i. With O as centre, draw a circle of radius 5 cm.

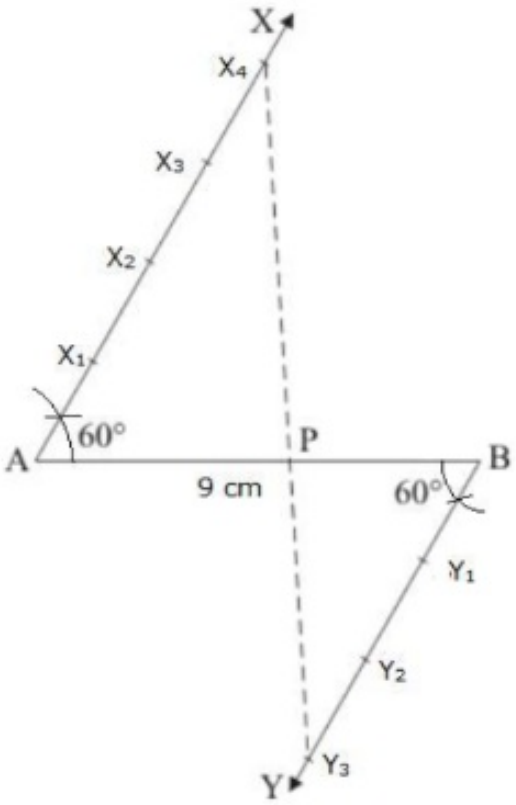
ii. Take a point A at a distance of 12 cm from O.

iii. Join OA and bisect it. Let P is the mid-point of OA.

iv. Taking P as centre and PO as radius, draw a circle intersecting the given circle at the points B and C.

v. Join AB and AC. AB and AC are the required tangents. Length of tangents = 11 cm

19. Steps of construction



i. Draw a line segment AB of 9cm.

ii. Through the points A and B, draw two parallel lines AX and BY on the opposite side of AB.

iii. Cut 4 equal parts on AX and 3 equal parts on BY such that.

$AX_1 = X_1X_2 = X_2X_3 = X_3X_4$ and $BY_1 = Y_1Y_2 = Y_2Y_3$

iv. Join X_4Y_3 which intersect AB at P

$\therefore \frac{AP}{PB} = \frac{4}{3}$

Justification

In $\triangle APX_4$ and $\triangle BPY_3$

$\angle APX_4 = \angle BPY_3$ (vertically opposite angles)

$\angle PAX_4 = \angle PBY_3$ (alternate interior angle)

then, $\triangle \mathrm{APX}_4 \sim \triangle \mathrm{BPY}_3$ (by AA similaritiy)

$\therefore \frac{PA}{PB} = \frac{AX_4}{BY_3} = \frac{4}{3}$

20. Steps of construction
    i. Draw AB = 3 cm
    ii. Make $\angle PBQ = 110^\circ$
    iii. From BP, cut BC = 4.2 cm and from BQ, cut BA = 3 cm.
    iv. Taking B and A as a centre, draw arcs of radii 3.6 cm and 2.7 cm respectively, let the arcs intersect in D. Join AD, DC. ABCD is the quadrilateral with the given data.
    v. Now produce BD and cut BD' = 4.8 cm.
    vi. Through D', draw lines parallel to DA and DC meeting BQ and BC' in A' and C' respectively.
    vii. Join D'A' and D'C'.
    ABC'S' is the required quadrilateral.