CONSTRUCTIONS

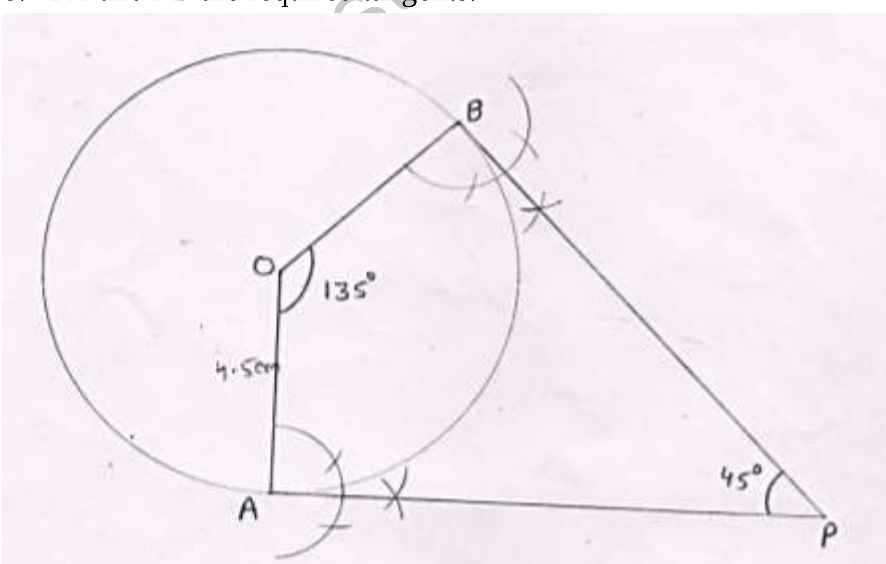
(With Solutions)

Level 3.

Q1- **Draw a pair of tangents to a circle of radius 4.5cm which are inclined to each other at an angle of 45^0**

STEPS OF CONSTRUCTION-

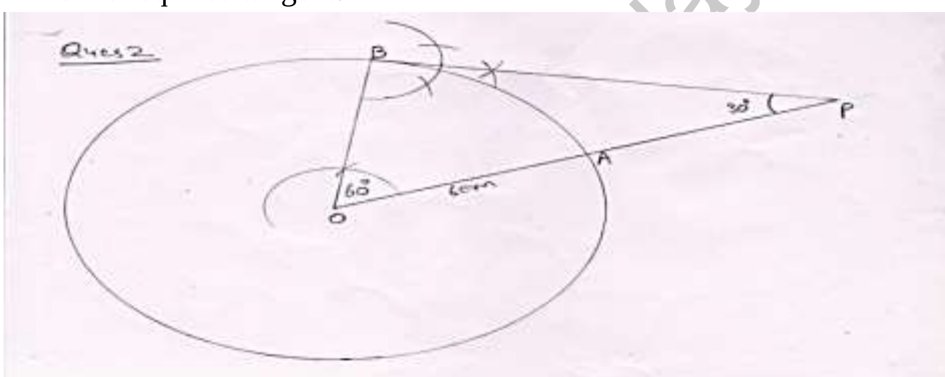
1. Draw a circle of radius 4.5cm with centre O.
2. We know
   $\angle O+\angle A+\angle B+\angle P=360^0$(Angle sum property of quad.)
   $\angle O+90^0+90^0+45^0=360^0$
   $\angle O+225^0=360^0$
   $\angle O=360^0-225^0$
   $\angle O=135^0$
3. Draw radius OA.
4. At O draw an angle of 135^0 which meets the circle at B.
5. At A and B draw angle of 90^0 with compass (because radius and tangent are perpendicular to each other at the point of contact).
6. Right angles at A and B meet at P
7. Verify $\angle APB=45^0$.
8. PA and PB are required tangents.



Q2- **Draw a circle of radius 6cm, draw a tangent to this circle making an angle of 30^0 with a line passing through the centre.**

STEPS OF CONSTRUCTION-

1. Draw a circle of radius 6cm with centre O.
2. From figure
   $\angle O+\angle B+\angle P=180^0$(Angle sum property of triangle)
   $\angle O+90^0+30^0=180^0$
   $\angle O+120^0=180^0$
   $\angle O=180^0-120^0$
   $\angle O=60^0$
3. At O draw angle of 60^0 with compass meeting circle at B
4. At B draw angle of 90^0 with compass (because radius and tangent are perpendicular to each other at the point of contact.)
5. Verify $\angle OPB=30^0$
6. BP is the required tangent.



Q3- **Two trees are to be planted at two positions A and B in the middle of park and third tree is at a position C in such a way that AC:BC=3:4. How it can be done?**

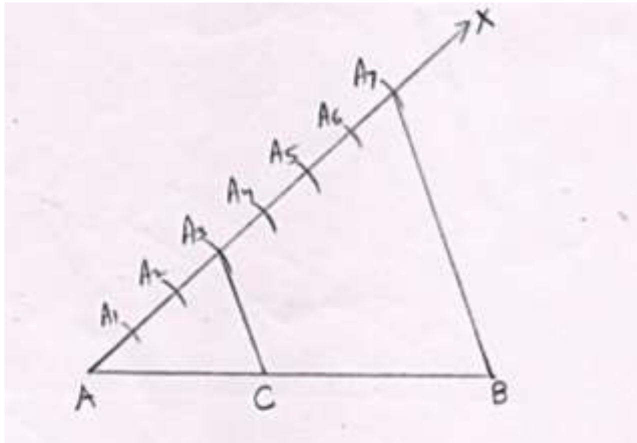
Steps of construction

1 First two trees are planted at A &B.Then a long line segment AX is drawn as shown in the figure

2 Now {3+4} i,e 7 equal parts AA_1,A_1A_2,A_2A_3,A_3A_4,A_4A_5,A_5A_6,&A_6A_7 are marked on AX join BA_7

3 Then Through the third point A_3,draw a line segmentA_3C

Intersecting AB at C as AC:CB = 3 : 4



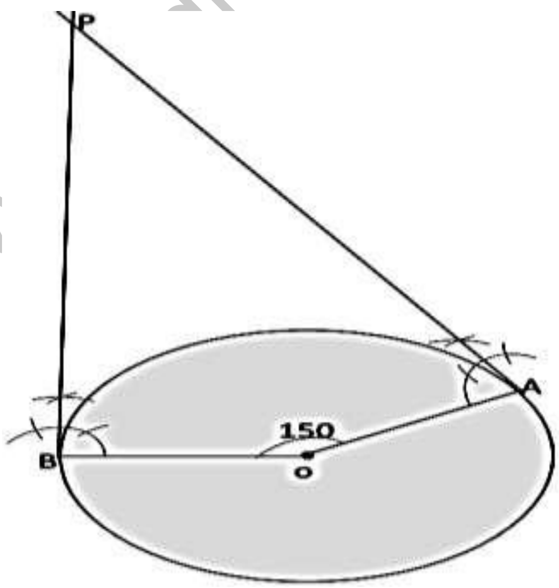
Q 4. Draw a circle of radius 4cm. and construct a pair of tangents to the circle which are inclined to each other at 30^0.

1. Sol. Steps of construction

1. Draw a circle with centre O and radius 4 cm.
2. Draw a radius OA draw an angle AOB = 150^0.

   [angle AOB = $360^0 - (30^0 + 90^0 + 90^0)$]
3. At A and B draw perpendiculars intersecting at P.

4. Now < APB = 30^0.



LEVEL 4.

Q1**. Draw a triangle ABC with side BC = 6 cm, AB = 5 cm and ∠ABC = 60°. Then construct a triangle whose sides are¾ of the corresponding sides of the triangle ABC.**

Sol. A ΔA'BC' whose sides are $\frac{3}{4}$ of the corresponding sides of ΔABC can be drawn as follows.

Step 1

Draw a ΔABC with side BC = 6 cm, AB = 5 cm and ∠ABC = 60°.

Step 2

Draw a ray BX making an acute angle with BC on the opposite side of vertex A.

Step 3

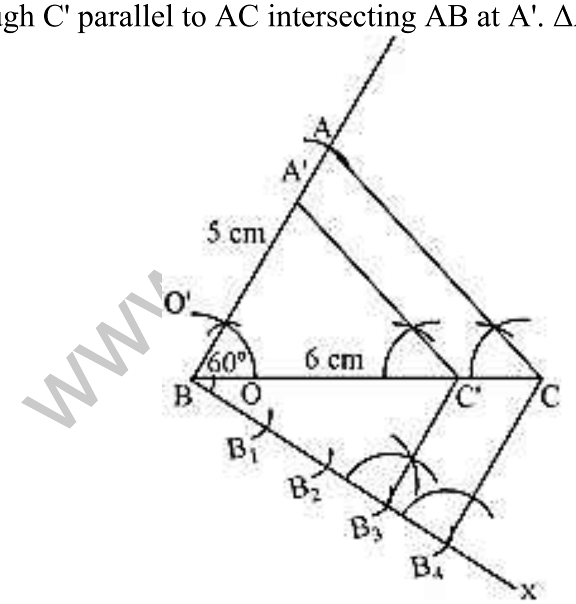
Locate 4 points (as 4 is greater in 3 and 4), B_1, B_2, B_3, B_4, on line segment BX.

Step 4

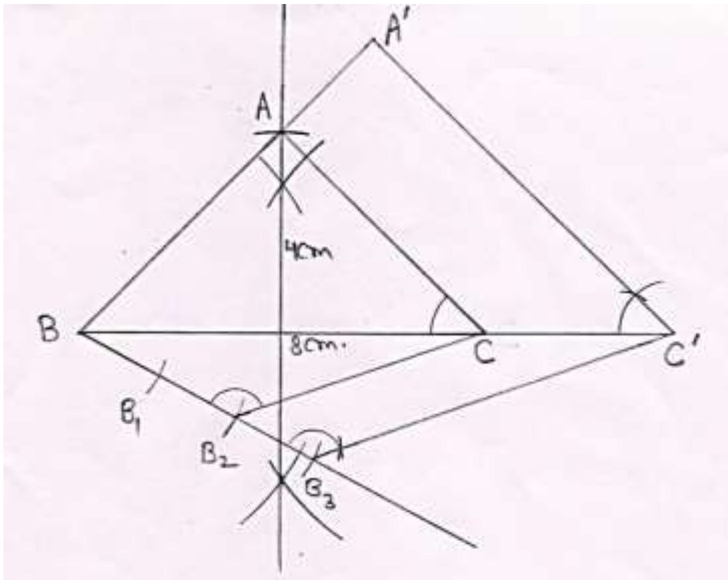
Join B_4C and draw a line through B_3, parallel to B_4C intersecting BC at C'.

Step 5

Draw a line through C' parallel to AC intersecting AB at A'. ΔA'BC' is the required triangle.



Q2- **Construct an isosceles triangle whose base is 8cm and altitude 4cm and then another triangle whose sides are $1\frac{1}{2}$ times the corresponding sides of the isosceles triangle.**

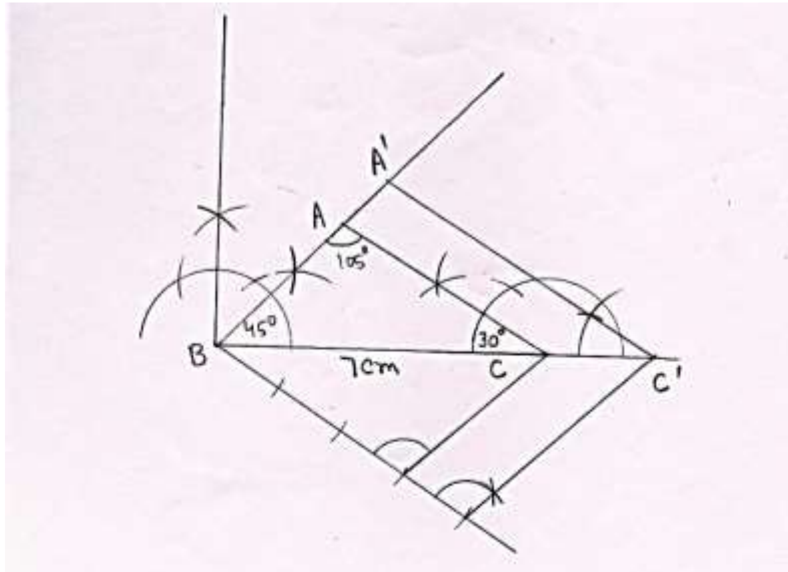


STEPS OF CONSTRUCTION-

1. Draw a line segment BC = 8 cm.
2. Draw perpendicular bisector of BC.
3. M is mid-point of BC.
4. Cut an arc MA = 4cm.
5. Join AB and AC.
6. ABC is isosceles triangle with altitude 4cm.
7. Draw ray BX such that CBX is an acute angle.
8. With convenient radius draw three arcs B_1,B_2,B_3 on BX such that $BB_1 = B_1B_2 = B_2B_3$.
9. Join B_2C.
10. Draw B_3C' parallel to B_2C.
11. Similarly draw C'A' parallel to CA.
12. A'BC' is the required triangle.

    Triangle A'BC' = $\frac{3}{2}$of triangle ABC.

Q3- Draw **a triangle ABC with side BC= 7cm, ∠B=45^0, ∠A=105^0. Then construct a triangle whose sides are $\frac{3}{4}$times the corresponding sides of triangle ABC.**



STEPS OF CONSTRUCTION-

1. Draw a line segment BC = 7cm.
2. At B draw angle of 45^0
3. $\angle A + \angle B + \angle C = 180^0$
4. $105^0 + 45^0 + \angle C = 180^0$
5. $150^0 + \angle C = 180^0$
6. $\angle C = 180^0 - 150^0$
7. $\angle C = 30^0$
8. At C Draw angle 30^0
9. Both angles meet at A at 105^0
10. ABC is the given triangle
11. Draw ray BX making acute angle with BC
12. With convenient radius draw four arcs B_1, B_2, B_3, B_4 such that $BB_1 = B_1B_2 = B_2B_3 = B_3B_4$
13. JoinB_3C
14. Draw B_4C_1 parallel to B_3C
15. Draw C_1A_1 parallel to CA
16. Therefore A_1BC_1 is required triangle
17. Triangle$A_1BC_1 = \frac{4}{3}\Delta ABC$

Q 4. **Draw a triangle ABC with side BC = 7 cm, ∠B = 45°, ∠A = 105°. Then, construct a triangle whose sides are 4/3 times the corresponding side of ΔABC.**

Sol. Step 1

Draw a ΔABC with side BC = 7 cm, ∠B = 45°, ∠C = 30°.

Step 2
Draw a ray BX making an acute angle with BC on the opposite side of vertex A.
Step 3
Locate 4 points (as 4 is greater in 4 and 3), B_1, B_2, B_3, B_4, on BX.
Step 4
Join B_3C. Draw a line through B_4 parallel to B_3C intersecting extended BC at C'.
Step 5
Through C', draw a line parallel to AC intersecting extended line segment at C'. ΔA'BC' is the required triangle.

The required triangle can be drawn as follows.