HOTS (Higher Order Thinking Skills)

Que 1. Draw a circle with the help of a bangle. Take a point outside the circle. Construct the pair of tangents from this point to the circle.

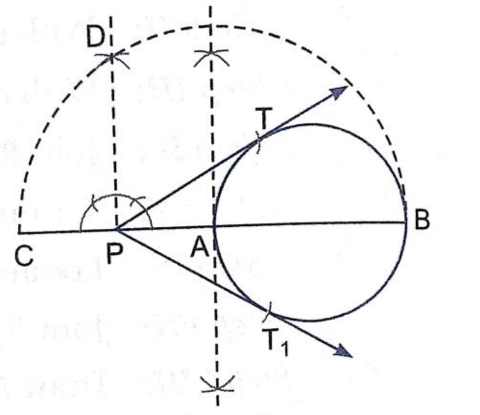

Fig. 9.17

Sol. Steps of Construction:
Step I: Draw a circle with the help of a bangle.
Step II: Let P be the external point from where the tangents are to be drawn to the given circle. Through P, draw a secant PAB to intersect the circle at A and B (say).
Step III: Produce AP to a point C, such that AP = PC, i.e., P is the mid-point of AC.
Step IV: Draw a semicircle with BC as diameter.
Step V: Draw PD ⊥ CB, intersecting the semicircle at D.
Step VI: With P as centre and PD as radius, draw arcs to intersect the given circle at T and T.
Step VII: Join PT and PT_1. Then, PT and PT_1 are the required tangents.

Que 2. Draw a ΔABC with side BC = 7 cm, $\angle B = 45°, \angle A = 105°$. Then construct a triangle whose sides are $\frac{4}{3}$ times the corresponding sides of ΔABC.

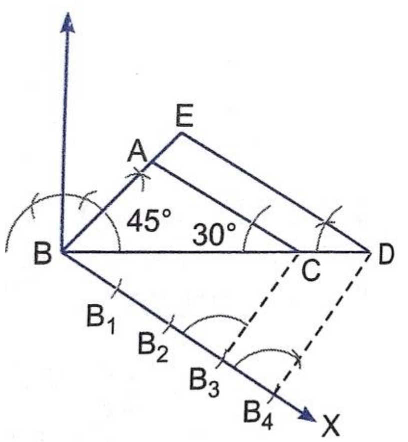

Fig. 9.18

Sol. Step of Construction:
Step I: Construct a ΔABC in which BC = 7 cm,

$$\angle B = 45°, \angle C = 180° - (\angle A + \angle B)$$

$= 180° - (105° + 45°) = 180° - 150° = 30°.$

Step II: Below BC, makes an acute angle $\angle CBX$.

Step III: Along BX, mark off four arcs: B_1, B_2, B_3, and B_4 such that $BB_1 = B_1 B_2 = B_2 B_3 = B_3 B_4$.

Step IV: Join B_3 C.

Step V: From B_4, draw $B_4 D \| B_3 C$, meeting BC produced at D.

Step VI: From D, draw ED||AC, meeting BA produced at E. Then EBD is the required triangle whose sides are $\frac{4}{3}$ times the corresponding sides of ΔABC.

Justification:

Since, DE||CA. ∴ $\Delta ABC \sim \Delta EDB \text{ and } \frac{EB}{AB} = \frac{BD}{BC} = \frac{DE}{CA} = \frac{4}{3}$

Hence, We have the new triangle similar to the given triangle.

Whose sides are equal to $\frac{4}{3}$ times the corresponding sides of ΔABC.

Que 3. Draw a pair of tangents to a circle of radius 5 cm which are inclined to each other at an angle of 60°.

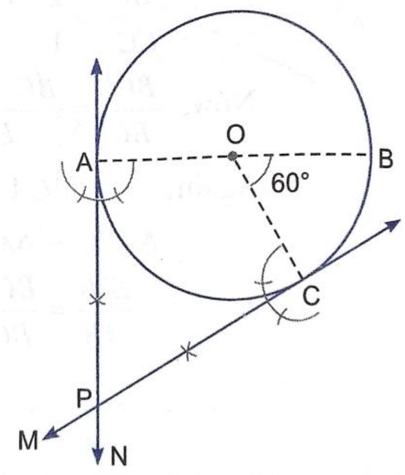

Fig. 9.19

Sol. Steps of Construction:

Step I: Draw a circle with centre O and radius 5 cm.

Step II: Draw any diameter AOB.

Step III: Draw a radius OC such that $\angle BOC = 60°$.

Step IV: At C, we draw CM ⊥ OC and at A, we draw AN ⊥ OA.

Step V: Let the two perpendicular intersect each other at P. Then, PA and PC are required tangents.

Justification:

Since OA is the radius, so PA has to be a tangent to the circle. Similarly, PC is also tangent to the circle.

$$\angle APC = 360° - (\angle OAP + \angle OCP + \angle AOC)$$
$$= 360° - (90° + 90° + 120°) = 360° - 300° = 60°$$

Hence, tangents PA and PC are inclined to each other at an angle of 60 °.