Long Answer Type Questions

[4 marks]

Que 1. Construct a triangle similar to a given triangle ABC with its sides equal to $\frac{5}{3}$ of the corresponding sides of the triangle ABC (i.e., of scale factor $\frac{5}{3}$).

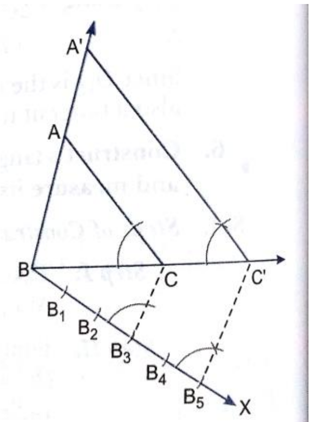

Fig. 9.10

Sol. Steps of construction:

Step I: Draw any ray BX making an acute angle with BC on the side opposite to the vertex A.

Step II: From B cut off 5 arcs

$B_1, B_2, B_3 B_4 \textit{ and } B_5 \textit{ on } BX \textit{ so that}$

$BB_1 = B_1B_2 = B_2B_3 = B_3B_4 = B_4B_5.$

Step III: Join B_3 to C and draw a line through B_5 parallel to B_3 C, intersecting the extended line segment BC at C'.

Step IV: Draw a line through C' parallel to CA intersecting the extended line segment BA at A' (see figure). Then, A' BC' is the required triangle.

Justification:

Note that $\Delta ABC \sim \Delta' BC'$. (Since AC || A' C')

Therefore, $\frac{AB}{A'B} = \frac{AC}{A'C'} = \frac{BC}{BC'}$

But, $\frac{BC}{BC'} = \frac{BB_3}{BB_5} = \frac{3}{5},$

Therefore, $\frac{A'B}{AB} = \frac{A'C'}{AC} = \frac{BC'}{BC} = \frac{5}{3}.$

Que 2. Draw a circle of radius 3 cm. Take two points P and Q on one of its extended diameter each at a distance of 7 cm from its centre. Draw tangents to the circle from these two points P and Q.

Sol.

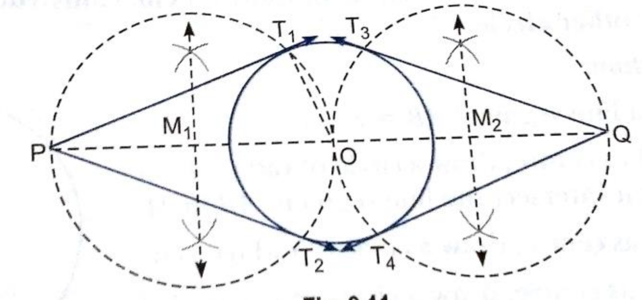

Fig. 9.11

Steps of Construction:
Step I: Taking a point O as centre, draw a circle of radius 3 cm.
Step II: Take two points P and Q on one of its extended diameter such that OP = OQ = 7 cm.
Step III: Bisect OP and OQ and let M_1 and M_2 be the mid-points of OP and OQ respectively.
Step IV: Draw a circle with M_1 as centre and M_1 P as radius to intersect the circle at T_1 and T_2.
Step V: Join PT_1 and PT_2.
Then, PT_1 and PT_2 are the required tangents. Similarly, the tangents QT_3 and QT_4 can be obtained.

Justification: On joining OT_1, we find $\angle PT_1O = 90°$, as it is an angle in the semicircle.

∴ $PT_1 \perp OT_1$.
Since OT_1 is a radius of the given circle, so PT_1 has to be a tangents to the circle.
Similarly, PT_2, QT_3 and QT_4 are also tangents to the circle.

Que 3. Let ABC be a right triangle in which AB = 6 cm, BC = 8 cm and $\angle B = 90°$. BD is the perpendicular from B on AC. The circle through B, C, D is drawn. Construct the tangents from A to this circle.

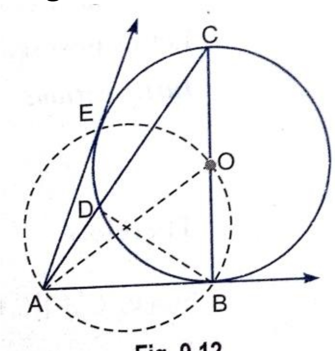

Fig. 9.12

Sol. Steps of Construction:
Step I: Draw ΔABC and perpendicular BD from B on AC.
Step II: Draw a circle with BC as diameter. This circle will pass through D.
Step III: Let O be the mid-point of BC. Join AO.
Step IV: Draw a circle with AO as diameter. This circle cuts the circle drawn in step II at B and

E.
Step V: Join AE. AE and AB are desired tangents drawn from A to the circle passing through B, C and D.

Que 4. Draw a right triangle in which the sides (other than hypotenuse) are of lengths 4 cm and 3 cm. Then construct another triangle whose sides are $\frac{5}{3}$ times the corresponding sides of the given triangle.

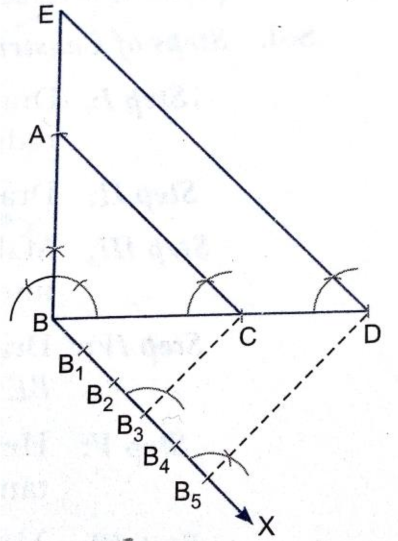

Fig. 9.13

Sol. Steps of Construction:
Step I: Construct a ΔABC in which BC = 4 cm, $\angle B = 90°$ and BA = 3 cm.
Step II: Below BC, make an acute $\angle CBX$.
Step III: Along BX, mark off five arcs: B_1, B_2, B_3, B_4 and B_5 such that $BB_1 = B_1 B_2 = B_2 B_3 = B_3 B_4 = B_4 B_5$.
Step IV: Join B_3 C.
Step V: From B_5, draw B_5 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 $\frac{5}{3}$ times the corresponding sides of ΔABC.

Justification:
Since, DE || CA

$\therefore \quad \Delta ABC \sim \Delta EBD \quad$ and $\quad \frac{EB}{AB} = \frac{BD}{BC} = \frac{DE}{CA} = \frac{5}{3}$

Hence, we have the new triangle similar to the given triangle whose sides are equal to $\frac{5}{3}$ times the corresponding sides of ΔABC.