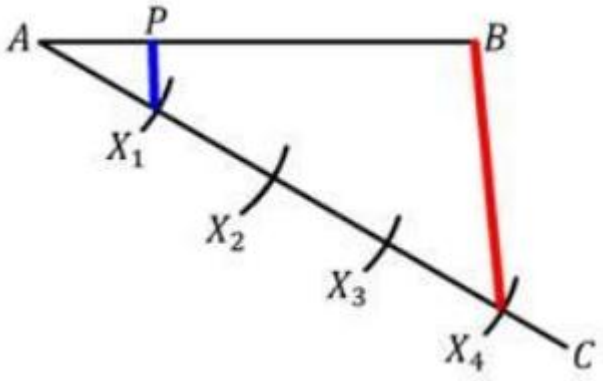
Revision Notes on Constructions

Division of a Line Segment

If we have to divide a line segment in particular ratio, then we can do it by measuring the length on the ruler and mark it on the line. But if we don't have anything to measure then we can do it by using steps of construction.

Method 1



AB is a line segment of 4 cm. Divide it in the ratio of 1:3 using a compass.

Steps of Construction

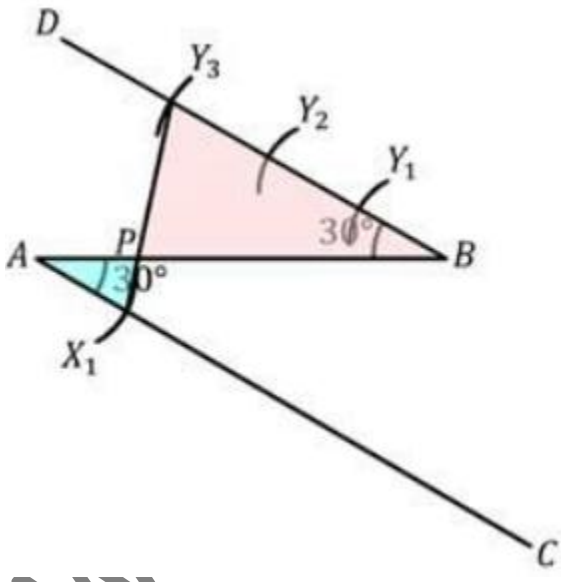
Step 1: Draw a line AC of any length by making an acute angle with the given line segment AB.

Step 2: Using any small length on the compass mark 4 points of equal size on AC, so that $AX_1 = AX_2 = AX_3 = AX_4$.We are marking 4 points as we have to divide the line in the ratio of 1:3, so 1 + 3 = 4.

Step 3: Now join BX_4.

Step 4: Draw a line from point X_1 to line AB parallel to BX_4, which intersects AB at point P.

Now AP: PB = 1:3.



Method 2(Alternative Method)

A line can also be divided by another method.

Steps of Construction

Step 1: Draw a line AC with the acute angle with the line segment AB.

Step 2: Draw another line DB parallel to AC so that ∠BAX = ∠ADB

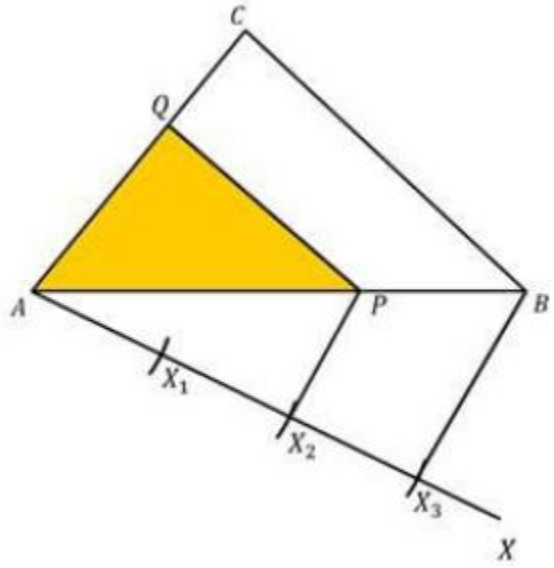
Step 3: Mark the points X_1(m = 1) on AC and Y_1, Y_2, Y_3 n = 3) on DB so that $AX_1 = BY_1 = Y_1Y_2 = Y_2Y_3$.

Step 4: Join X_1Y_3 so that it intersects line AB at P.

AP:PB = 1:3

Construction of a Triangle similar to a given Triangle as per given Scale

The scale factor is the ratio of the sides of the triangle given to the sides of the triangle to be made by the steps of construction.



Example:

Draw a triangle similar to ΔABC with its sides equal to 2/3 of the corresponding sides of the given triangle ABC. (Scale factor = 2/3).

Steps of Construction

Step 1: Draw a line AX by making an acute angle with the line segment AB.

Step 2: Mark three points of equal size using a compass on the line AX. Points will be depending upon the scale factor as we have to mark the number of points which is greater in the scale factor. In the ratio of 2/3(3 > 2).

Step 3: Join BX_3 and draw a line from X_2 parallel to BX_3 to intersect AB at P.

Step 4: Draw a line parallel to BC from point P to intersect AC at Q.

Now ΔAPQ ~ ΔABC.

Remark: Here we have made a similar triangle which is smaller than the given triangle because the scale factor was 2/3. But if we have scale factor like 5/3 then we will make a bigger triangle then the given triangle by taking 5 points on the line).

Construction of Tangents to a Circle

Tangent is a line which intersects the circle at one point only at the outer of the circle. It is always perpendicular to the radius of the circle.

Example:

Construct the pair of tangents to the circle of radius 3 cm from the point which is 7 cm away from its centre, and measure their lengths also.

Steps of Construction

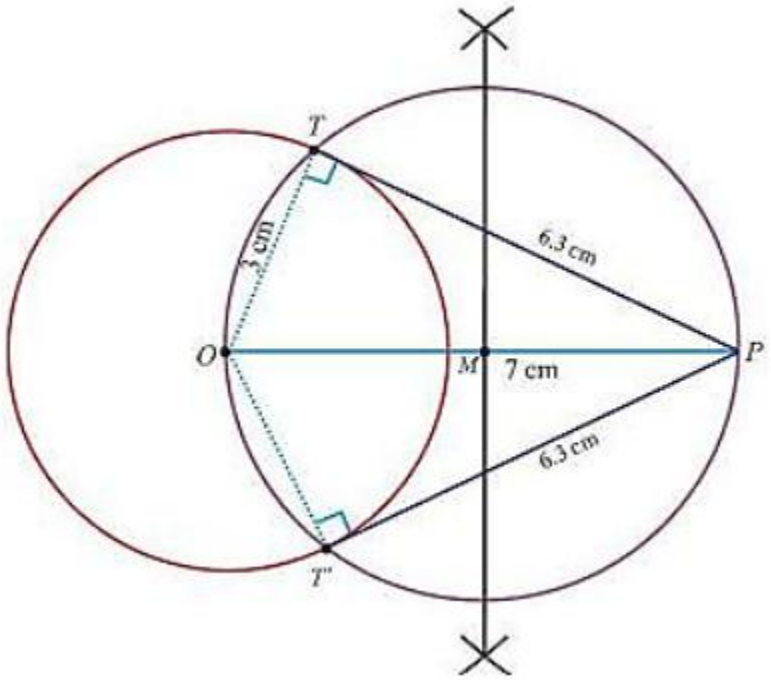
Step 1: Draw a circle of radius 3 cm by taking O as the centre.

Step 2: Mark a point P outside the circle at a distance of 7 cm from the centre O. Join OP.

Step 3: Bisect the line segment OP, so that the perpendicular bisector of OP intersects it at the point M.

Step 4: Now draw another circle by taking M as centre and MO as radius, which intersects the given circle at two points' i.e. T and T'.

Step 5: Now join PT and PT' which are the required tangents and measure the length of the tangents.



The length of the tangents is PT = PT' = 6.3 cm.