Exercise - 13A

1. Draw a line segment AB of length 7 cm. Using ruler and compasses, find a point P on AB such that $\frac{AP}{AB}=\frac{3}{5}$.

Sol:

Steps of Construction:

Step 1: Draw a line segment $AB = 7\ cm$

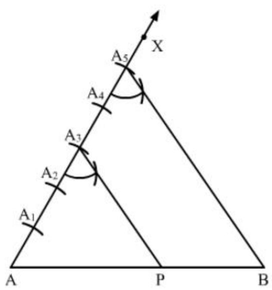
Step 2: Draw a ray *AX*, making an acute angle $\angle BAX$.

Step 3: Along *AX*, mark 5 points (greater of 3 and 5) A_1, A_2, A_3, A_4 and A_5 such that

$AA_1 = A_1A_2 = A_2A_3 = A_3A_4 = A_4A_5$

Step 4: Join A_5B.

Step 5: From A_3, draw A_3P parallel to A_5B (draw an angle equal to $\angle AA_5B$), meeting *AB* in P.



Here, P is the point on AB such that $\frac{AP}{PB}=\frac{3}{2}$ or $\frac{AP}{AB}=\frac{3}{5}$.

2. Draw a line segment of length 7.6 cm and divide it in the ratio 5:8. Measure the two parts.

Sol:

Steps of Construction:

Step 1: Draw a line segment $AB = 7.6 cm$

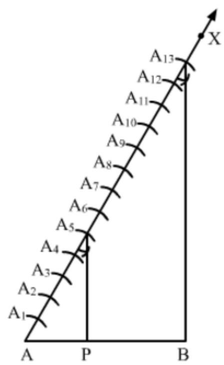
Step 2: Draw a ray *AX*, making an acute angle $\angle BAX$.

Step 3: Along *AX*, mark $(5+8=)13$points $A_1, A_2, A_3, A_4, A_5, A_6, A_7, A_8, A_9, A_{10}, A_{11}, A_{12}$ and A_{13} such that

$AA_1 = A_1A_2 = A_2A_3 = A_3A_4 = A_4A_5 = A_6A_7 = A_8A_9 = A_9A_{10} = A_{10}A_{11} = A_{11}A_{12} - A_{12}A_{13}$.

Step 4: Join $A_{13}B$.

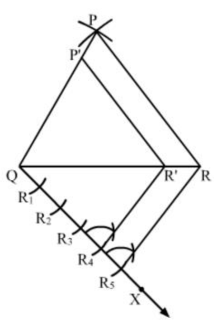
Step 5: From A_5, draw A_5P parallel to $A_{13}B$ (draw an angle equal to $\angle AA_{13}B$), meeting *AB* in *P*.



Here, P is the point on AB which divides it in the ratio $5:8$.
$\therefore$ Length of $AP = 2.9\ cm$ (Approx)
Length of $BP = 4.7\ cm$ (Approx)

3. Construct a ΔPQR, in which PQ = 6 cm, QR = 7 cm and PR =- 8 cm. Then, construct another triangle whose sides are $\frac{4}{5}$ times the corresponding sides of ΔPQR

Sol:
Steps of Construction
Step 1: Draw a line segment $QR = 7\,cm.$
Step 2: With Q as center and radius 6 cm, draw an arc.
Step 3: With R as center and radius 8cm, draw an arc cutting the previous arc at P
Step 4: Join PQ and $PR.$ Thus, ΔPQR is the required triangle.
Step 5: Below QR, draw an acute angle $\angle RQX$.
Step 6: Along OX, mark five points R_1, R_2, R_3, R_4 and R_5 such that
$QR_1 = R_1R_2 = R_2R_3 = R_3R_4 = R_4R_5$.
Step 7: Join RR_5.
Step 8: From R_4, draw $R_4R' \parallel RR_5$ meeting QR at R'.
Step 9: From R', draw $P'R' \parallel PR$ meeting PQ in P'.



Here, $\Delta P'QR'$ is the required triangle, each of whose sides are $\frac{4}{5}$ times the corresponding sides of ΔPQR.

4. Construct a triangle with sides 5 cm, 6 cm, and 7 cm and then another triangle whose sides are $\frac{7}{5}$ of the corresponding sides of the first triangle.

Sol:

Steps of Construction :

Step 1: Draw a line segment $BC = 4cm$.

Step 2: With B as center, draw an angle of $90°$.

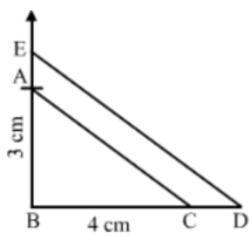
Step 3: With B as center and radius equal to 3 cm, cut an arc at the right angle and name it A.

Step 4: Join *AB* and *AC*.

Thus, Δ ABC is obtained.

Step 5: Extend *BC* to *D*, such that $BD = \frac{7}{5}BC = 75(4)cm = 5.6cm$.

Step 6: Draw $DE \parallel CA$, cutting AB produced to E.



Thus, ΔEBD is the required triangle, each of whose sides is $\frac{7}{5}$ the corresponding sides of ΔABC.

5. Construct a ΔABC with BC = 7 cm, $\angle B = 60°$ and AB = 6 cm. Construct another triangle whose sides are $\frac{3}{4}$ times the corresponding sides of ΔABC

Sol:

Steps of Construction

Step 1: Draw a line segment $BC = 7cm$.

Step 2: At *B*, draw $\angle XBC = 60°$.

Step 3: With B as center and radius 6 cm, draw an arc cutting the ray *BX* at *A*.

Step 4: Join *AC*. Thus, ΔABC is the required triangle.

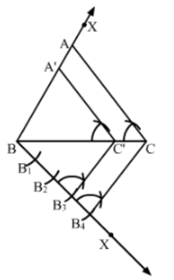
Step 5: Below *BC*, draw an acute angle $\angle YBC$.

Step 6: Along *BY*, mark four points B_1, B_2, B_3 and B_4 such that $BB_1 = B_1B_2 = B_2B_3 = B_3B_4$.

Step 7: Join CB_4.

Step 8: From B_3, draw $B_3C' \parallel CB_4$ meeting BC at C''.

Step 9: From C’, Draw $A'C' \parallel AC$ meeting AB in A’.



Here. $\Delta A'BC'$ is the required triangle whose sides are $\frac{3}{4}$ times the corresponding sides of ΔABC.

6. Construct a ΔABC in which AB = 6 cm, $\angle A = 30°$ and $\angle AB = 60°$. Construct another $\Delta AB'C'$ similar to ΔABC with base AB’ = 8 cm.

Sol:

Steps of Construction

Step 1: Draw a line segment $AB = 6cm.$

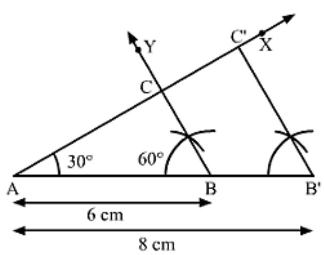
Step 2: At A, draw $\angle XAB = 30°.$

Step 3: At B, draw $\angle YBA = 60°.$ Suppose AX and BY intersect at C.

Thus, ΔABC is the required triangle.

Step 4: Produce AB to B’ such that $AB' = 8cm.$

Step 5: From B’, draw $B'C' \parallel BC$ meeting AX at C’.



Here. AB’C’ is the required triangle similar to $\Delta ABC.$

7. Construct a ΔABC in which BC = 8 cm, $\angle B = 45°$ and $\angle C = 60°$. Construct another triangle similar to ΔABC **such that its sides are** $\frac{3}{5}$ of the corresponding sides of ΔABC.

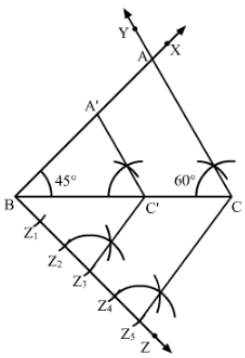
Sol:

Steps of Construction

Step 1: Draw a line segment $BC = 8cm.$

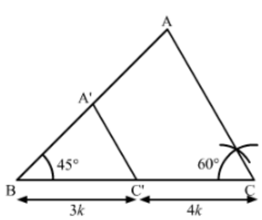
Step 2: At B, draw $\angle XBC = 45°.$

Step 3: At C, draw $\angle YCB = 60°.$ Suppose BX and CY intersect at A.
Thus, ΔABC is the required triangle
Step 4: Below BC, draw an acute angle $\angle ZBC$.
Step 5: Along BZ, mark five points Z_1, Z_2, Z_3, Z_4 *and* Z_5 such that
$BZ_1 = Z_1Z_2 = Z_2Z_3 = Z_3Z_4 = Z_4Z_5.$
Step 6: Join CZ_5.
Step 7: From Z_3, draw $Z_3C' \parallel CZ_5$ meeting BC at C'.
Step 8: From C', draw $A'C' \parallel AC$ meeting AB in A'.



Here, $\Delta A'BC'$ is the required triangle whose sides are $\frac{3}{5}$ of the corresponding sides of ΔABC.

8. To construct a triangle similar to ΔABC in which BC = 4.5 cm, $\angle B = 45°$ and $\angle C = 60°$, using a scale factor of $\frac{3}{7}$, BC will be divided in the ratio
(a) 3 : 4 (b) 4 : 7 (c) 3 : 10 (d) 3 : 7
Answer: (a) 3 : 4
Sol:
To construct a triangle similar to ΔABC in which $BC = 4.5cm, \angle B = 45°$ *and* $\angle C = 60°$, using a scale factor of $\frac{3}{7}$, BC will be divided in the ratio $3:4$.



Here, $\Delta ABC \sim \Delta A'BC'$
$BC' : C'C = 3:4$
or $BC' : BC = 3:7$
Hence, the correct answer is option A.

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

Sol:

Steps of Construction

Step 1: Draw a line segment $BC = 8cm.$

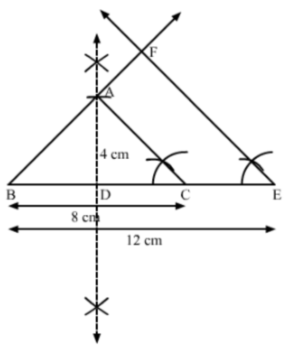
Step 2: Draw the perpendicular bisector XY of BC, cutting BC at D.

Step 3: With D as center and radius 4 cm, draw an arc cutting XY at A.

Step 4: Join AB and AC. Thus, an isosceles ΔABC whose base is 8 cm and altitude 4 cm is obtained.

Step 5: Extend BC to E such that $BE = \frac{3}{2}BC = \frac{3}{2} \times 8cm = 12cm.$

Step 6: Draw $EF \parallel CA$, cutting BA produced in F.



Here, ΔBEF is the required triangle similar to ΔABC such that each side of ΔBEF is $1\frac{1}{2}$ (or $\frac{3}{2}$) times the corresponding side of ΔABC.

10. 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.

Sol:

Steps of Construction

Step 1: Draw a line segment $BC = 3cm.$

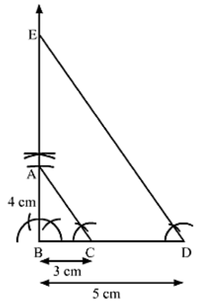
Step 2: At B, draw $\angle XBC = 90°$.

Step 3: With B as center and radius 4 cm, draw an arc cutting BX at A.

Step 4: Join AC. Thus, a right ΔABC is obtained.

Step 5: Extend BC to D such that $BD = \frac{5}{3}BC = \frac{5}{3} \times 3cm = 5cm.$

Step 6: Draw $DE \parallel CA$, cutting BX in E.



Here. ΔBDE is the required triangle similar to ΔABC such that each side of ΔBDE is $\frac{5}{3}$ times the corresponding side of ΔABC.

Exercise – 13B

1. Draw a circle of radius 3 cm. Form a point P, 7 cm away from the centre of the circle, draw two tangents to the circle. Also, measure the lengths of the tangents.

Sol:

Steps of Construction

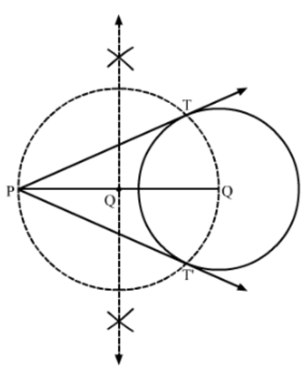
Step 1: Draw a circle with O as center and radius 3 cm.

Step 2: Mark a point *P* outside the circle such that $OP = 7\,cm.$

Step 3: Join *OP*. Draw the perpendicular bisector *XY* of *OP*. cutting *OP* at *Q*.

Step 4: Draw a circle with *Q* as center and radius *PQ* (or *OQ*), to intersect the given circle at the points *T* and *T*'.

Step 5: Join *PT* and *PT*'.



Here, *PT* and *PT'* are the required tangents.

$PT = PT' = 6.3\,cm$ (Approx)

2. Draw two tangents to a circle of radius 3.5 cm form a point P at a distance of 6.2 cm form its centre.

Sol:

Steps of Construction

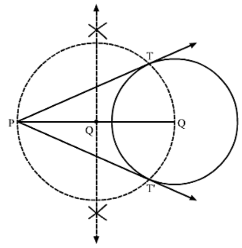
Step 1: Draw a circle with O as center and radius 3.5 cm.

Step 2: Mark a point *P* outside the circle such that $OP = 6.2 cm.$

Step 3: Join *OP*. Draw the perpendicular bisector *XY* of *OP*, cutting *OP* at *Q*.

Step 4: Draw a circle with Q as center and radius PQ (or 0Q), to intersect the given circle at the points T and T'.

Step 5: Join PT and PT'.



Here, PT and PT' are the required tangents.

3. Draw a circle of radius 3.5 cm. Take two points A and B on one of its extended diameter, each at a distance of 5 cm from its center. Draw tangents to the circle from each of these points A and B.

Sol:

Steps of Construction

Step 1: Draw a circle with center O and radius 3.5 cm.

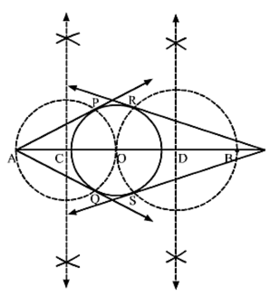
Step 2: Extends its diameter on both sides and mark two points A and B on it such that $OA = OB = 5\ cm.$

Step 3: Draw the perpendicular bisectors of *OA* and *OB*. Let *C* and *D* be the mid-points of *OA* and *OB*, respectively.

Step 4: Draw a circle with *C* as center and radius *OC* (or *AC*), to intersect the circle with center *O*, at the points *P* and *Q*.

Step 5: Draw another circle with *D* as center and radius *OD* (or *BD*), to intersect the circle with center *O* at the points *R* and *S*.

Step 6: Join *AP* and *AQ*, Also, join *BR* and *BS*.



Here, *AP* and *AQ* are the tangents to the circle from *A*, Also, *BR* and *BS* are the tangents to the circle from *B*.

4. Draw a circle with center O and radius 4 cm. Draw any diameter AB of this circle. Construct tangents to the circle at each of the two end points of the diameter AB.

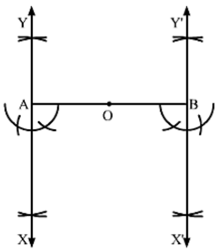
Sol:

Step 1: Draw a circle with center *O* and radius 4 cm.

Step 2: Draw any diameter *AOB* of the circle.

Step 3: At *A*, draw $\angle OAX = 90°$. Produce $XA = Y$.

Step 4: At *B*, draw $\angle OBX' = 90°$. Produce $X'B$ to Y'.



Here, XAY *and* $X'BY'$ are the tangents to the circle at the end points of the diameter *AB*.

5. Draw a circle with the help of a bangle. Take any point P outside the circle. Construct the pair of tangents form the point P to the circle

Sol:

Steps of Construction

Step 1: Draw a circle with the help of a bangle.

Step 2: Mark a point *P* outside the circle.

Step 3: Through *P*. draw a secant *PAB* to intersect the circle at *A* and *B*.

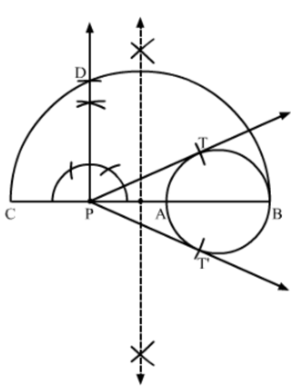
Step 4: Produce *AP* to *C* such that *PA* = *PC*.

Step 5: Draw a semicircle with *CB* as diameter.

Step 6: Draw $PD \perp BC,$ intersecting the semicircle at *D*.

Step 7: With *P* as center and *PD* as radius, draw arcs to intersect the circle at T and T'.

Step 8: Join *PT* and *PT'S.*



Here, *PT* and *PT*' are the required pair of tangents.

6. Draw a line segment AB of length 8 cm. Taking A as centre , draw a circle of radius 4 cm and taking B as centre , draw another circle of radius 3 cm. Construct tangents to each circle form the centre of the other circle.

Sol:

Steps of Construction

Step 1: Draw a line segment *AB* = *8* cm.

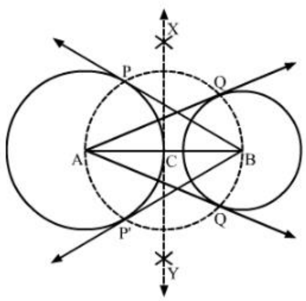
Step 2: With A as center and radius 4 cm, draw a circle.

Step 3: With B as center and radius 3 cm, draw another circle.

Step 4: Draw the perpendicular bisector *XY* of *AB*, cuffing *AB* at *C*.

Step 5: With *C* as center and radius *AC* (or *BC*), draw a circle intersecting the circle with center A at P and P': and the circle with center B at Q and Q'.

Step 6: Join BP and BP' Also, join *AQ* and *AQ'*.



Here. AQ and AQ' are the tangents from A to the circle with center B. Also, BP and BP' are the tangents from B to the circle with center A.

7. Draw a circle of radius 4.2. Draw a pair of tangents to this circle inclined to each other at an angle of $45°$

Sol:

Steps of Construction:

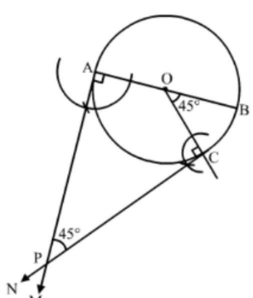
Step 1: Draw a circle with center *O* and radius = 4.2 cm.

Step 2: Draw any diameter *AOB* of this circle.

Step 3: Construct $\angle BOC = 45°$. such that the radius *OC* meets the circle at *C*.

Step4: Draw $AM \perp AB$ and $CN \perp OC$.

AM and CN intersect at P.



Thus, *PA* and *PC* are the required tangents to the given circle inclined at an angle of $45°$.

8. Write the steps of construction for drawing a pair of tangents to a circle of radius 3 cm , which are inclined to each other at an angle of $60°$.

Sol:

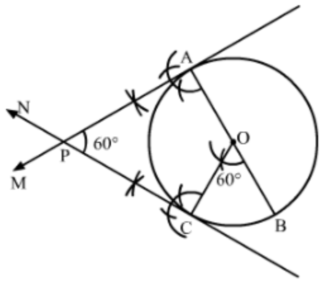
Steps of Construction

Step 1: Draw a circle with center O and radius 3c m.

Step 2: Draw any diameter AOB of the circle.

Step 3: Construct $\angle BOC = 60°$ such that radius OC cuts the circle at C.

Step 4: Draw $AM \perp AB$ and $CN \perp OC$. Suppose AM and CN intersect each other at P.



Here, AP and CP are the pair of tangents to the circle inclined to each other at an angle of 60°.

9. Draw a circle of radius 32 cm. Draw a tangent to the circle making an angle $30°$ with a line passing through the centre.

Sol:

Steps Of construction:

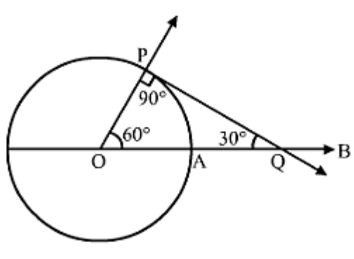
Step 1: Draw a circle with center O and radius 3 cm.

Step 2: Draw radius OA and produce it to B.

Step 3: Make $\angle AOP = 60°$

Step 4: Draw $PQ \perp OP$, meeting OB at Q.

Step 5: Then, PQ is the desired tangent, such that $\angle OQP = 30°$



10. Construct a tangent to a circle of radius 4 cm form a point on the concentric circle of radius 6 cm and measure its length. Also, verify the measurement by actual calculation.

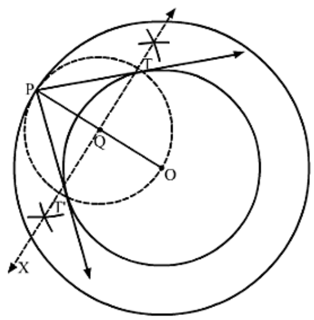
Sol:

Steps of Construction

Step 1: Mark a point O on the paper

Step 2: With O as center and radii 4cm and 6cm, draw two concentric circles.

Step 3: Mark a point P on the outer circle.
Step 4: Join OP.
Step 5: Draw the perpendicular bisector *XY* of OP, cutting *OP* at *Q*.
Step 6: Draw a circle with *Q* as center and radius *OQ* (or *PQ*), to intersect the inner circle in points T and T'.
Step 7: Join PT and PT'.



Here, PT and PT' are the required tangents.
PT = PT' 4.5 cm (Approx)
Verification by actual calculation
Join OT to form a right ΔOTP (Radius is perpendicular to the tangent at the point of contact)
In right ΔOTP,

$OP^2 = OT^2 + PT^2$ (Pythagoras Theorem)

$\Rightarrow PT = \sqrt{OP^2 - OT^2}$

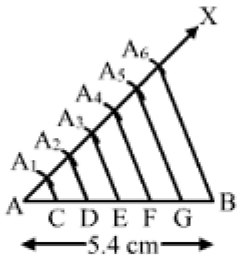
$\Rightarrow PT = \sqrt{6^2 - 4^2} = \sqrt{36-16} = \sqrt{20} \approx 4.5\ cm$

$(OP = 6\ cm\ and\ OT = 4\ cm)$

Exercise - Formative Assessment

11. Draw a line segment AB of length 5.4 cm. Divide it into six equal parts. Write the steps of construction.

Sol:
Steps of Construction:
Step 1: Draw a line segment $AB = 5.4 cm.$
Step 2: Draw a ray AX, making an acute angle, $\angle BAX$.
Step 3: Jong *AX*, mark 6 points A_1, A_2, A_3, A_4, A_5 such that,
$AA_1 = A_1A_2 = A_2A_3 = A_3A_4 = A_4A_5 = A_5A_6.$
Step 4: Join $A_6B.$
Step 5: Draw $A_1C\ A_2D,\ A_3D,\ A_4F\ and\ A_5A_6.$



Thus, AB is divided into six equal parts.

12. Draw a line segment AB of length 6.5 cm and divided it in the ratio 4 : 7. Measure each of the two parts.

Sol:

Steps of Construction:

Step 1: Draw a line segment $AB = 6.5 cm.$

Step 2: Draw a ray *AX*, making an acute angle $\angle BAX$.

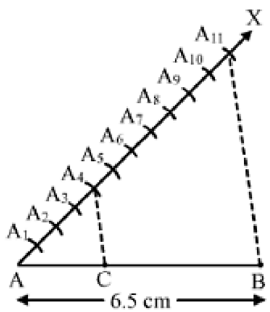
Step 3: Jong *AX*, mark $(4+7) = 11$ points $A_1, A_2, A_3, A_4, A_5, A_6, A_7, A_8, A_9, A_{10}, A_{11}$ such that

$AA_1 = A_1A_2 = A_2A_3 = A_3A_4 = A_4A_5 = A_5A_6 = A_6A_7 = A_7A_8 = A_8A_9 = A_9A_{10} = A_{10}A_{11}$

Step 4: Join $A_{11}B.$

Step 5: From A_4, draw $A_4C \parallel A_{11}B,$ meeting AB at C.

Thus, C is the point on AB, which divides it in the ratio 4 : 7.



Thus, $AC : CB = 4 : 7$

From the figure,

$AC = 2.36 cm$

$CB = 4.14 cm$

13. Construct a ΔABC in which B= 6.5 cm, AB = 4.5 cm and $\angle ABC = 60°$

Sol:

Steps of Construction:

Step 1: Draw a line segment $BC = 6.5\ cm.$

Step 2: With B as center, draw an angle of 60°.

Step 3: With B as center and radius equal to 4.5 cm, draw an arc, cutting the angle at A

Step 4: Join AB and AC.

Thus, ΔABC is obtained.

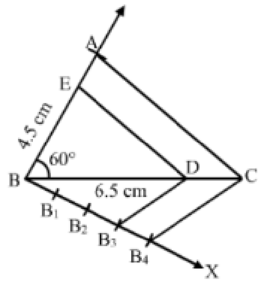
Step 5: Below *BC*, draw an acute $\angle CBX$.

Step 6: Along *BX*, mark off four points B_1, B_2, B_3, B_4. such that $BB_1 = B_1B_2 = B_2B_3 = B_3B_4$.

Step 7: Join B_4C.

Step 8: From B_3. draw $B_3D \parallel B_4C$, meeting *BC* at *D*.

Step 9: From *D*, draw $DE \parallel CA$, meeting AB at E.



Thus, ΔEBD is the required triangle, each of whose sides is $\frac{3}{4}$ the corresponding sides of ΔABC.

14. Construct a ΔABC in which BC = 5cm, $\angle C = 60°$ and altitude from A equal to 3 cm. Construct a ΔADE similar to ΔABC such that each side of ΔADE is $\frac{3}{2}$ times the corresponding side of ΔABC. Write the steps of construction.

Sol:

Steps of Construction:

Step 1: Draw a line *l*.

Step 2: Draw an angle of 90° at *M* on *l*

Step 3: Cut an arc of radius 3 cm on the perpendicular. Mark the point as *A*

Step 4: With A as center, make an angle of 30° and let it cut *l* at *C*. We get $\angle ACB = 60°$.

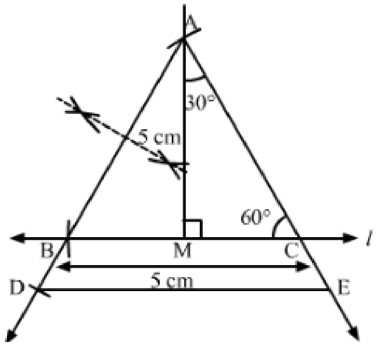
Step 5: Cut an arc of 5 cm from *C* on *l* and mark the point as B.

Step 6: Join AB.

Thus, ΔABC is obtained

Step 7: Extend AB to D, such that *BD* = *BC*.

Step 8: Draw $DE \parallel BC$, cutting AC produced to E.



Then, ΔADE is the required triangle, each of whose sides is of the corresponding sides of ΔABC.

15. Construct an isosceles triangle whose base is 9 cm and altitude 5cm. Construct another triangle whose sides are $\frac{3}{4}$ of the corresponding sides of the first isosceles triangle.

Sol:

Steps of Construction:

Step 1: Draw a line segment $BC = 9\,cm$

Step 2: With B as center, draw an arc each above and below BC.

Step 3: With C as center, draw an arc each above and below BC.

Step 4: Join their points of intersection to obtain the perpendicular bisector of BC. Let it intersect BC at D

Step 5: From D, cut an arc of radius 5 cm and mark the point as A

Step 6: Join AB and AC

Thus ΔABC is obtained

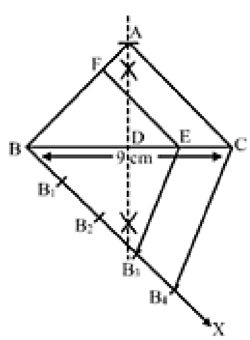
Step 5: Below BC. make an acute $\angle CBX$.

Step 6: Along BX, mark off four points B_1, B_2, B_3, B_4 such that $BB_1 = B_1B_2 = B_2B_3 = B_3B_4$

Step 7: Join B_4C.

Step 8: From B_3. draw $B_2E \parallel B_4C$ meeting BC at E.

Step 9: From E. draw $EF \parallel CA$ meeting AB al F.



Thus, ΔFBE is the required triangle, each of whose sides is $\frac{3}{4}$ the corresponding sides of the first triangle.

16. Draw a ΔABC, right-angled at B such that AB = 3 cm and BC = 4cm. Now, Construct a triangle similar to ΔABC, each whose sides is $\frac{7}{5}$ times the corresponding side of ΔABC.

Sol:

Steps of Construction

Sept 1: Draw a line segment $BC = 4cm$

Sept 2: With B as center draw an angle of $90°$

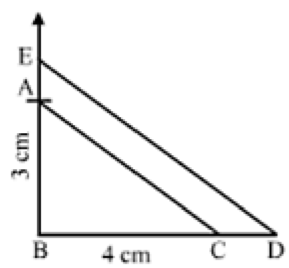
Step 3: With B as center and radius equal to 3cm cat an arc at the night angle and name it A

Step 4: Join AB and AC

Thus, ΔABC is obtained

Step 5: Extend BC to D, such that $BD = \frac{7}{5}BC = \frac{7}{5}(4)cm = 5.6cm$

Step 6: Draw $DE \| CA$ cutting AB produced to E



Thus, ΔEBD is the required triangle, each of whose sides is $\frac{7}{5}$ the corresponding sides of ΔABC.

17. Draw a circle of radius 4.8 cm. Take a point P on it. Without using the centre of the circle, construct a tangent at the point P. Write the steps of construction.

Sol:

Steps of Construction:

Step 1: Draw a circle of radius 4.8 cm.

Step 2: Mark a point P on it.

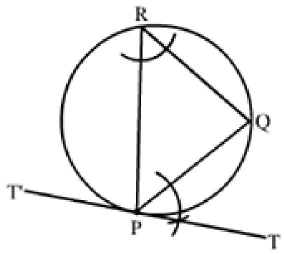
Step 3: Draw any chord PQ.

Step 4: Take a point R on the major arc QP

Step 5: Join PR and RQ.

Step6: Draw $\angle QPT = \angle PRQ$

Step 7: Produce *TP* to *T*', as shown in the figure.



TPT is the required tangent.

18. Draw a circle of radius 3.5 cm. Draw a pair of tangents to this circle which are inclined to each other at an angle of $60°$. Write the steps of construction.

Sol:

Steps of Construction:

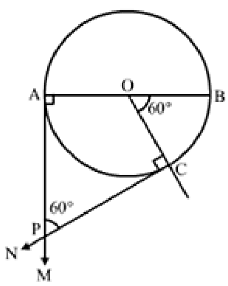
Step 1: Draw a circle with center O and radius = 3.5cm

Step 2: Draw any diameter AOB of this circle

Step 3: Construct $\angle BOC = 60°$, such that the radius OC meets the circle at C.

Step 4: Draw $MA \perp AB$ *and* $NC \perp OC$.

Let AM and CN intersect at P.



Then, PA and PC are the required tangents to the given circle that are inclined at an angle of $60°$

19. Draw a circle of radius 4 cm. Draw tangent to the circle making an angle of $60°$ with a line passing through the centre.

Sol:

Steps of construction

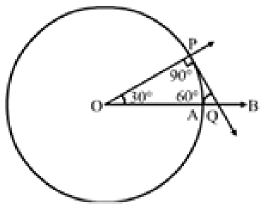
Step 1: Draw a circle with center O and radius 4cm

Step 2: Draw radius OA and produce it to B.

Step 3: Make $\angle AOP = 30°$

Step 4: Draw $PQ \perp OP$, meeting OB at Q.

Step 5: Then, PQ is the desired tangent, such that $\angle OQP = 60°$



20. Draw two concentric circles of radii 4 cm and 6 cm. Construct a tangent to the smaller circle from a point on the larger circle. Measure the length of this tangent.

Sol:

Step of Construction:

Step 1: Draw a circle with *O* as center and radius 6 cm

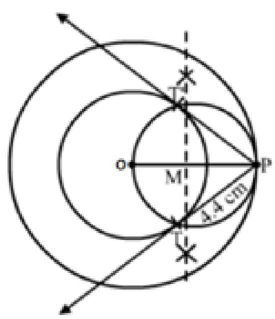
Step 2: Draw another circle with *O* as center and radius 4 cm

Step2: Mark a point P on the circle with radius 6 cm

Step 3: Join *OP* and bisect it at *M*.

Step 4: Draw a circle with *M* as center and radius equal to *MP* to intersect the given circle with radius 4 cm at points T and T'.

Step5: Join PT and PT'.



Thus, PT or PT' the required tangents and measure 4.4 cm each.