Constructions

Short Answer Type Questions-I (2 marks each)

Q. 1. Draw a line segment of length 8 cm and divide it internally in the ratio 4 : 5.
[CBSE Delhi, Term 2, Set 1, 2017]

Ans. Steps of construction:

(i) Draw a line segment $AB = 8$ cm.

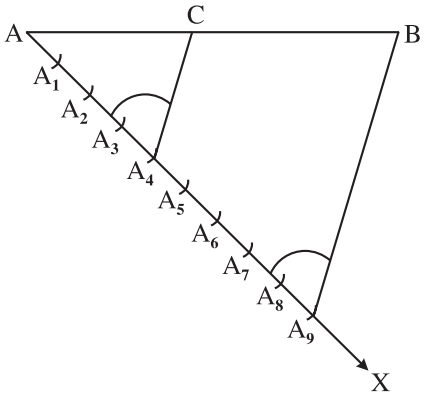
(ii) Draw any ray AX making an acute angle with AB.

(iii) Draw 9 *i.e.* (4 + 5) points on ray AX namely $A_1, A_2, A_3, A_4, A_5, A_6, A_7, A_8, A_9$ at equal distance.

(iv) Join BA_9.

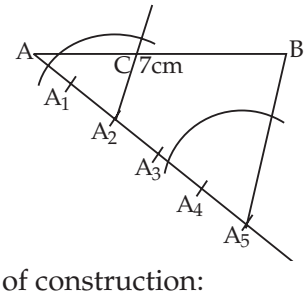
(v) Through point A_4, draw a line parallel to A_9B intersecting AB at the point C.

Then $AC : CB = 4 : 5$



Q. 2. Draw a line segment of length 7 cm and divide it internally in the ratio 2 : 3.
[CBSE Delhi, Term 2, Set 2, 2017]

Ans.



Steps of construction:

(i) Draw a line segment $AB = 7$ cm.

(ii) At A draw an acute angle with 5 equidistant marks A_1, A_2, A_3, A_4, A_5.

(iii) Join A_5B.

(iv) Draw $A_2C \parallel A_5B$ to get point C on AB.

Thus, $AC : CB = 2 : 3$

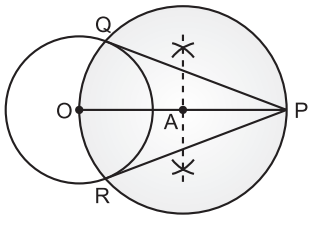
Long Answer Type Questions (4 marks each)

Q. 1. Draw a circle of radius 2 cm with centre O and take a point P outside the circle such that OP = 6.5 cm. From P, draw two tangents to the circle. **[CBSE OD, Set 1, 2020]**

Ans. Steps of construction :

(i) Draw a circle with centre O and radius 2 cm.

(ii) Take a point P outside the circle at a distance of 6.5 cm from O and join OP.



(iii) Draw perpendicular bisector of OP to get its mid-point A.

(iv) Taking A as centre and OA (or AP) as radius, draw a circle which intersect the circle of radius 2 cm at points Q and R.

(v) Join PQ and PR.

Thus, PQ and PR are the required tangents.

Q. 2. Construct a triangle with sides 5 cm, 6 cm and 7 cm and then construct another triangle whose sides are $\frac{3}{4}$ times the corresponding sides of the first triangle.
[CBSE OD, Set 1, 2020]

Ans. Steps of construction :

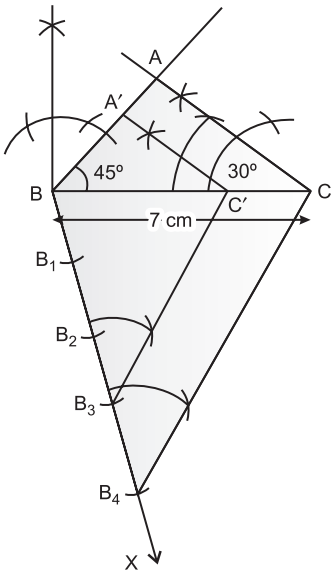
(i) Draw a line segment BC = 7 cm.

(ii) Taking B as centre, draw an arc of radius 5 cm.

(iii) Taking C as centre, draw another arc of radius 6 cm. Let the two arcs intersect each other at point A.

(iv) Join AB and AC. Thus, ΔABC is obtained.

(v) Draw a ray BX at an acute angle with side BC.



(vi) Locate 4 point B_1, B_2, B_3 and B_4 on BX such that $BB_1 = B_1B_2 = B_2B_3 = B_3B_4$.

(vii) Join B_4C and draw a line through B_3, parallel to B_4C, to intersect BC at C′.

(viii) Draw a line C′A′, parallel to CA, to intersect AB at A′.

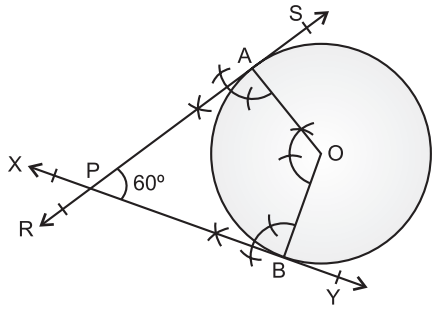
Thus, ΔA′BC′ is the required triangle whose sides are $\frac{3}{4}$ times the corresponding sides of ΔABC.

Q. 3. Draw two tangents to a circle or radius 4 cm, which are inclinded to each other at an angle of 60°. [CBSE OD, Set 2, 2020]

Ans. Steps of construction :

(i) Draw a circle with O as centre and radius = 4 cm.

(ii) Take a point A on the circumference of the circle and join OA.



(iii) Construct ∠AOB = 120° such that point B is on circumference of the circle.

(iv) Draw RS perpendicular to OA and XY perpendicular to OB.

Let XY and RS intersect each other at P.

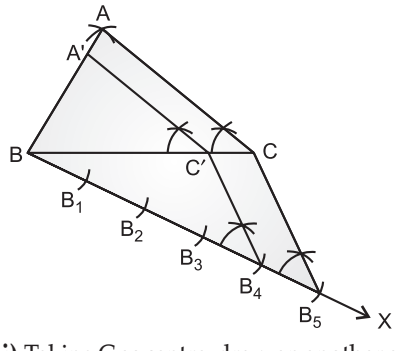
Hence, AP and BP are the tangents inclined at 60°.

Q. 4. Construct a triangle ABC with sides 3 cm, 4 cm and 5 cm. Now, construct another triangle whose sides are $\frac{4}{5}$ times the corresponding sides of ΔABC. [CBSE OD, Set 2, 2020]

Steps of construction :

(i) Draw a line segment BC = 5 cm.

(ii) Taking B as centre, draw an arc of radius 3 cm.



(iii) Taking C as centre, draw an another arc of radius 4 cm. Let the two arcs intersect each other at point A.

(iv) Join AB and AC. Thus, ΔABC is obtained.

(v) Draw a ray BX at an acute angle with side BC.

(vi) Locate 5 points B_1, B_2, B_3, B_4 and B_5 on BX such that $BB_1 = B_1B_2 = B_2B_3 = B_3B_4 = B_4B_5$.

(vii) Join B_5C and draw a line through B_4, parallel to B_5C, to intersect BC at C′.

(viii) Draw a line C′A′, parallel to CA, to intersect BA that A′.

Thus, ΔA′BC′ is the required triangle whose sides are $\frac{4}{5}$ times the cooresponding sides of ΔABC.

Q. 5. Construct a ΔABC with AB = 6 cm, BC = 5 cm and $\angle B = 60°$. Now construct another triangle whose sides are $\frac{2}{3}$ times the corresponding sides of ΔABC.

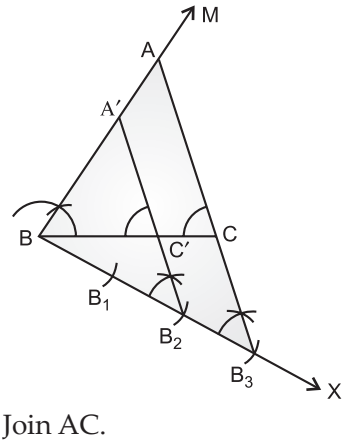
[CBSE OD, Set 3, 2020]

Ans. Steps of construction :

(i) Draw a line segment BC = 5 cm.

(ii) At point B, construct $\angle MBC = 60°$.

(iii) Taking B as centre, draw an arc of radius 6 cm, which intersect ray BM at point A.



(iv) Join AC.

Thus, ΔABC is obtained.

(v) Draw a ray BX at an acute angle with side BC.

(vi) Locate 3 points B_1, B_2 and B_3 on BX such that $BB_1 = B_1B_2 = B_2B_3$.

(vii) Join B_3C and draw a line throuhg B_2, parallel to B_3C, to intersect BC at C′.

Draw a line C′A′, parallel to CA, to intersect BA at A′.

Thus, $\Delta A'BC'$ is the required triangle, whose sides are $\frac{2}{3}$ times the corresponding sides of ΔABC.

Q. 6. Draw a line segment AB of length 7 cm. Taking A as centre, draw a circle of radius 3 cm and taking B as centre, draw another circle of radius 2 cm. Construct tangents to each circle from the centre of the other circle.

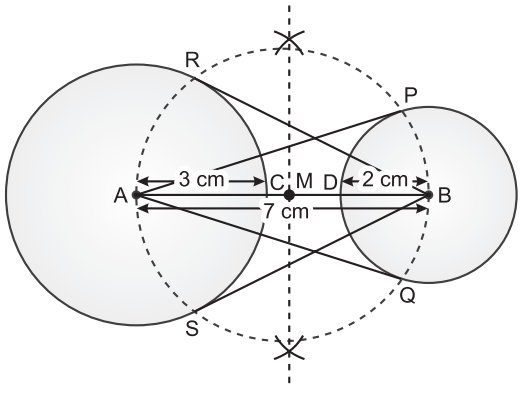
[CBSE Delhi, Set 1, 2020]

Ans. Steps of construction :

(i) Draw AB = 7 cm.

(ii) With centres A and B and radii $r_1 = 3$ cm and $r_2 = 2$ cm respectively, draw two circles.

(iii) Draw perpendicular bisector of AB. Let M is the mid-point of AB.



(iv) With M as centre and radius MA or MB, draw a circle cutting the pervious circles at P, Q, R and S.

(v) Join AP, AQ, BR and BS.

Then, AP, AQ, BR and BS are the required tangents.

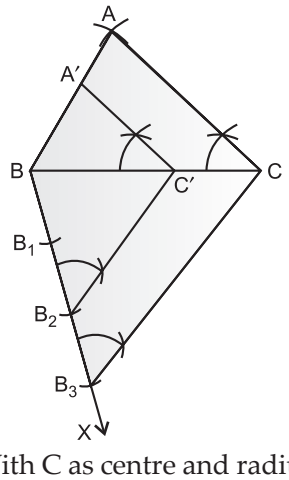
Q. 7. Construct a triangle with sides 4 cm, 5 cm and 6 cm. Then construct another triangle whose sides are $\frac{2}{3}$ times the corresponding sides of the first triangle.

[CBSE Delhi, Set 2, 2020]

Ans. Steps of construction :

(i) Draw BC = 6 cm

(ii) With B as centre and radius 4 cm, draw an arc.



(iii) With C as centre and radius 5 cm, draw another arc intersecting the previous arc at A.

(iv) Join AB and AC to get ΔABC.

(v) Draw a ray BX making an acute angle with BC.

(vi) With any convenient radius draw 3 arcs on BX *i.e.*, B_1, B_2 and B_3 such that

$BB_1 = B_1B_2 = B_2B_3$.

(vii) Join B_3C.

(viii) Draw $B_2C' \parallel B_3C$ making $\angle BB_3C = \angle BB_2C'$ meeting BC at C'.

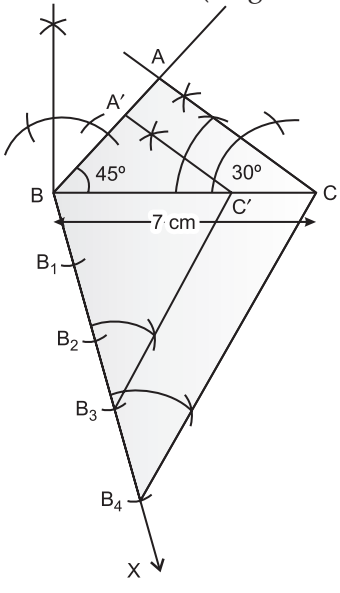
(ix) Draw $C'A' \parallel CA$ making $\angle ACB = \angle A'C'B$ metting AB at A'.

Then $\Delta A'BC'$ is the required triangle.

Q. 8. Draw a ΔABC with BC = 7 cm, $\angle B = 45°$ and $\angle A = 105°$. Then construct another triangle whose sides are $\frac{3}{4}$ times the corresponding sides of ΔABC. **[CBSE Delhi, Set 3, 2020]**

Ans. In ΔABC,

$\angle A + \angle B + \angle C = 180°$ (Angles sum property)



$\Rightarrow \quad 105° + 45° + \angle C = 180°$

$\Rightarrow \quad 150° + \angle C = 180°$

$\Rightarrow \quad \angle C = 30°$

Steps of construction :

(i) Draw BC = 7 cm

(ii) At point B, construct $\angle B = 45°$.

(iii) At point C, construct $\angle C = 30°$. Thus ΔABC is obtained.

(iv) Draw a ray BX making an acute angle with BC

(v) With any convenient radius draw 4 arcs on BX *i.e.*, B_1, B_2, B_3 and B_4 such that $BB_1 = B_1B_2 = B_2B_3 = B_3B_4$.

(vi) Join B_4C.

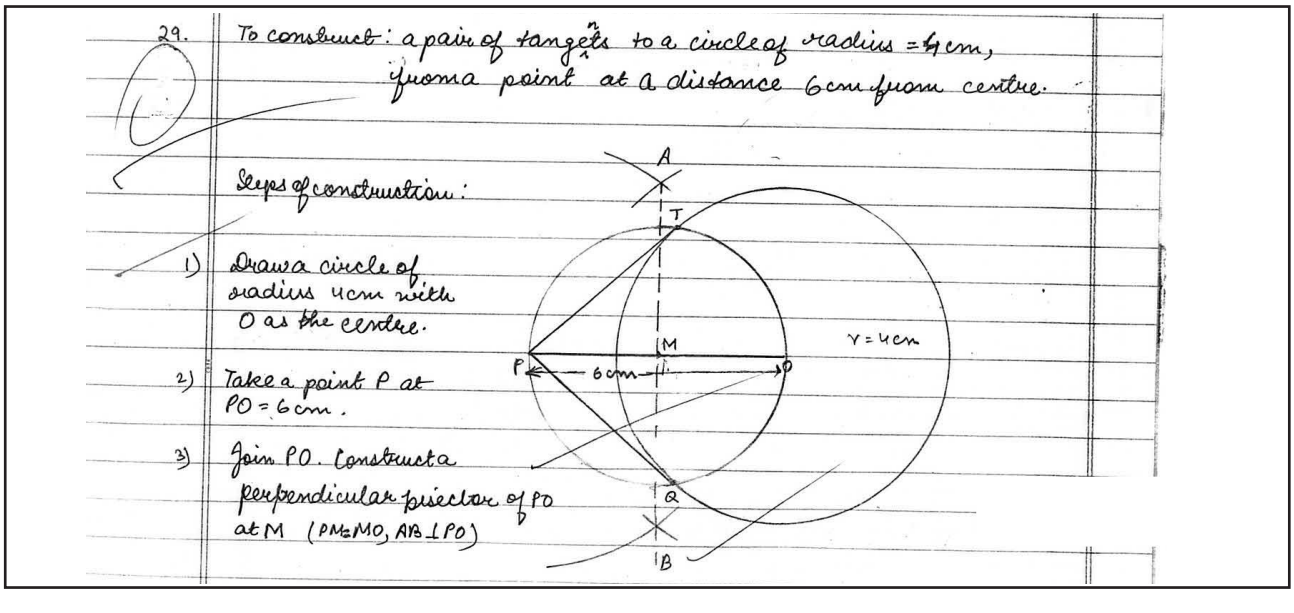
(vii) Draw $B_3C' \parallel B_4C$ making $\angle BB_4C = \angle BB_3C'$ meeting BC at C'.

(viii) Draw $C'A' \parallel CA$ making $\angle ACB = \angle A'C'B$ meeting BA at A'.

Then, $\Delta A'BC'$ is the required triangle.

Q. 9. Draw a circle of radius 4 cm. Construct a pair of tangents from a point at distance of 6 cm from the centre of circle. **[CBSE, 2019]**

Topper's Answers



4) With M as centre and PM (= MO) as radius, draw a circle touching the circle with centre O at T and Q

5) Join PT and PQ

∴ PT and PQ are required tangents.

Q. 10. Construct an equilateral ΔABC with each side 5 cm. Then construct another triangle whose sides are $\frac{2}{3}$ times the corresponding sides of ΔABC.

[CBSE OD, Set 1, 2019]

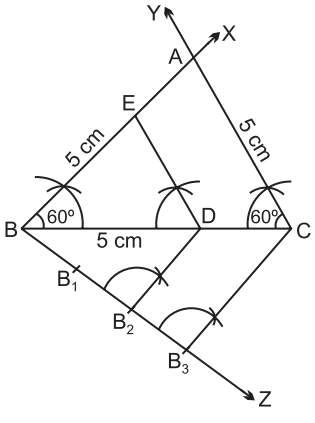
Ans. Steps for construction are as follows:

(i) Draw a line sgement $BC = 5$ cm

(ii) At B and C construct $\angle CBX = 60°$ and $\angle BCY = 60°$

(iii) The point of intersection of rays BX and CY gives the point A.

Thus an equilateral ΔABC is obtained.



(iv) Below BC, make an acute angle $\angle CBZ$

(v) Along BZ, mark off 3 points B_1, B_2, B_3 such that BB_1, B_1B_2, B_2B_3 are equal.

(vi) Join B_3C.

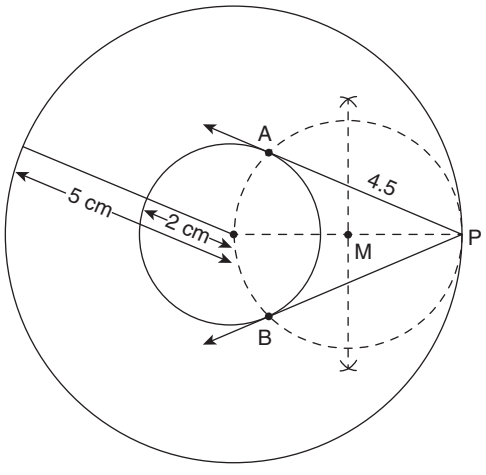
(vii) From B_2, draw $B_2D \parallel B_3C$, meeting BC at D.

(viii) From D, draw $DE \parallel CA$, metting AB at E.

Then ΔEBD is the required triangle, each of whose sides is $\frac{2}{3}$ of the corresponding side of ΔABC.

Q. 11. Draw two concentric circles of radii 2 cm and 5 cm. Take a point *P* on the outer circle and construct a pair of tangents *PA* and *PB* to the smaller circle. Measure *PA*.

[CBSE OD, Set 1, 2019]



Ans. Steps for construction are as follows:

(i) Draw two concentric circles with centre as O and radius 2 cm and 5 cm respectively.

(ii) Now, take a point P on outer circle and join OP.

(iii) Draw the perpendicular bisector of OP, which bisects OP at point M.

(iv) Taking M as centre and OM as radius, draw a circle which intersect the smaller circle at point A and point B.

(v) Join PA and PB.

Hence, PA and PB are the required tengents with PA = 4.5 cm.

Q. 12. Construct a ΔABC in which $CA = 6$ cm, $AB = 5$ cm and $\angle BAC = 45°$. Then construct a triangle whose sides are $\frac{3}{5}$ of the corresponding sides of ΔABC.

[CBSE Delhi, Set 1, 2019]

Ans. Steps of construction are as follows:

(i) Draw $AB = 5$ cm

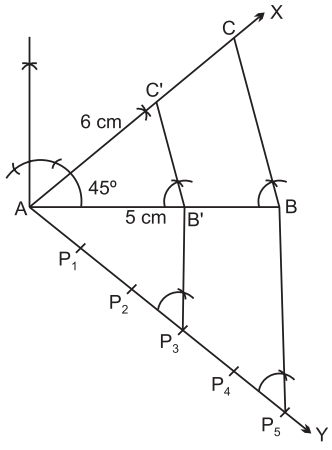
(ii) At the point A, draw $\angle BAX = 45°$

(iii) From AX, cut off $AC = 6$ cm

(iv) Join BC.

Thus, ΔABC is formed with given data.

(v) Draw a ray AY making any acute angle with AB as shown in the figure.



(vi) Draw 5 arcs P_1, P_2, P_3, P_4, and P_5 with equal intervals.

(vii) Join BP_5.

(viii) Draw $P_3B' \parallel P_5B$ meeting AB at B'.

(ix) From B′, draw $B'C' \parallel BC$ meeting AC at C'.

$\therefore \quad \Delta AB'C' \sim \Delta ABC$

Hence, $\Delta AB'C'$ is the required triangle.

Q. 13. Construct a triangle ABC with side BC = 6 cm, $\angle B$ = 45°, $\angle A$ = 105°. Then construct another triangle whose sides are $\frac{3}{4}$ times the corresponding sides of the ΔABC. [CBSE Delhi, Set 2, 2019]

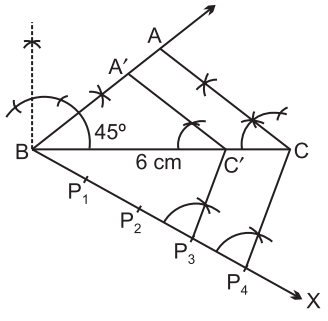
Ans. $\because \angle A = 105°$ and $\angle B = 45°$ (given)

and $\angle A + \angle B + \angle C = 180°$

$\Rightarrow \quad 105° + 45° + \angle C = 180°$

$\angle C = 180° - 150°$

$\angle C = 30°$



Steps of construction:

(i) Draw a ΔABC in which BC = 6 cm $\angle B$ = 45° and $\angle C$ = 30°

(ii) Draw a ray BX and mark 4 arcs P_1, P_2, P_3, P_4 of equal radius on it.

(iii) Join P_4C.

(iv) From P_3, draw $P_3C' \parallel P_4C$ which meets BC at C'.

(v) From C' draw $C'A \parallel CA$, which meets AB at A'

Thus, $\Delta A'BC' \sim \Delta ABC$

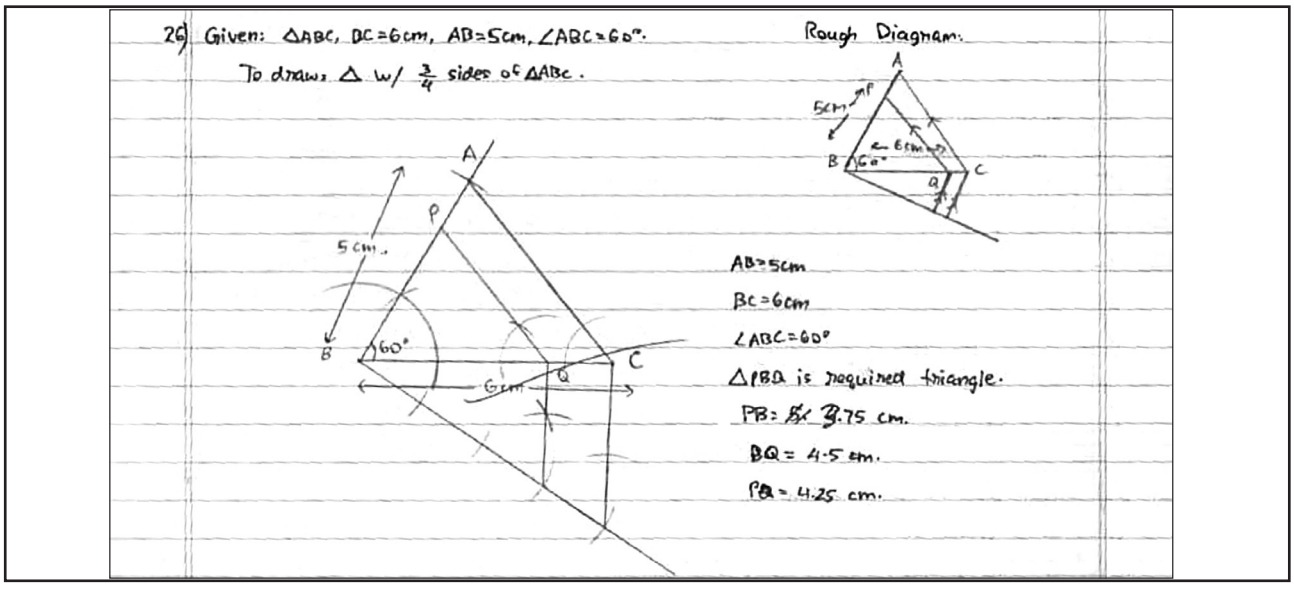
and $\Delta A'BC'$ is the required triangle.

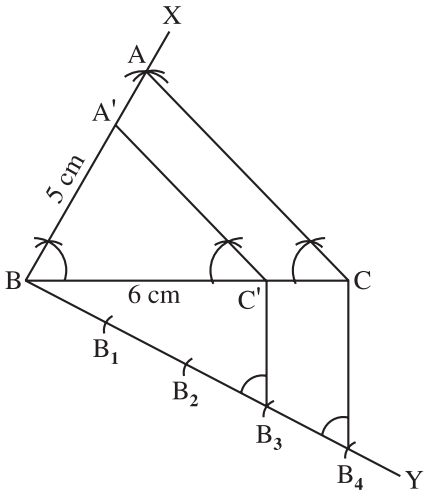
Q. 14. Draw a triangle ABC with BC = 6 cm, AB = 5 cm and $\angle ABC$ = 60°. Then construct a triangle whose sides are $\frac{3}{4}$ of the corresponding sides of the ΔABC. [CBSE, 2018]

[CBSE Delhi, Term 2, Set 2, 2016]

Ans.

Topper's Answers





Steps of construction:

(i) Draw a line segment $BC = 6$ cm.

(ii) Construct $\angle XBC = 60°$.

(iii) With B as centre and radius equal to 5 cm, draw an arc intersecting XB at A.

(iv) Join AC. Thus, ΔABC is obtained.

(v) Draw an acute angle $\angle CBY$ below of B.

(vi) Mark 4-equal arcs on BY as B_1, B_2, B_3 and B_4.

(vii) Join B_4 to C.

(viii) From B_3, draw a line parallel to B_4C intersecting BC at C'.

(ix) Draw another line parallel to CA from C', intersecting AB at A'.

(x) Thus, $\Delta A'BC'$ is required triangle which is similar to ΔABC such that $BC' = \frac{3}{4} BC$.

Q. 15. Construct a triangle ABC with side BC = 7 cm, $\angle B = 45°$, $\angle A = 105°$. Then construct another triangle whose sides are $\frac{3}{4}$ times the corresponding sides of the ΔABC. [CBSE OD, Term 2, Set 1, 2017]

Ans. Refer Delhi 2020 Set - 3, Q - 39

Q. 16. Construct an isosceles triangle with base 8 cm and altitude 4 cm. Construct another triangle whose sides are $\frac{2}{3}$ times the corresponding sides of the isosceles triangle. [CBSE Delhi, Term 2, Set 1, 2017]

Ans. Steps of construction:

(i) Draw a line segment $BC = 8$ cm.

(ii) Construct XY, the perpendicular bisector of line segment BC, meeting BC at M.

(iii) Cut $MA = 4$ cm on XM.

(iv) Join BA & CA.

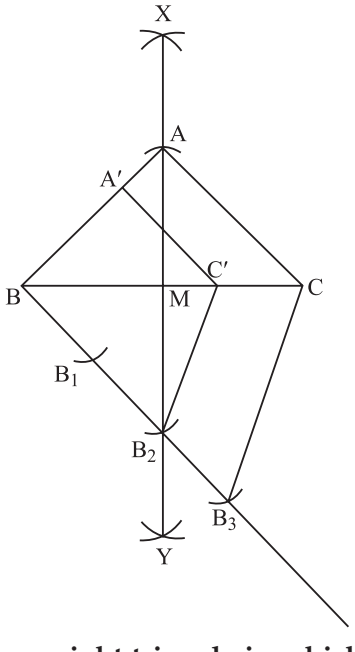
Thus, ΔABC is obtained.

(iv) At B, draw an acute angle in downward direction. Draw 3 arcs B_1, B_2 and B_3 on it.

(v) Join B_3C and at B_2, draw line parallel to B_3C, cutting BC at C'.

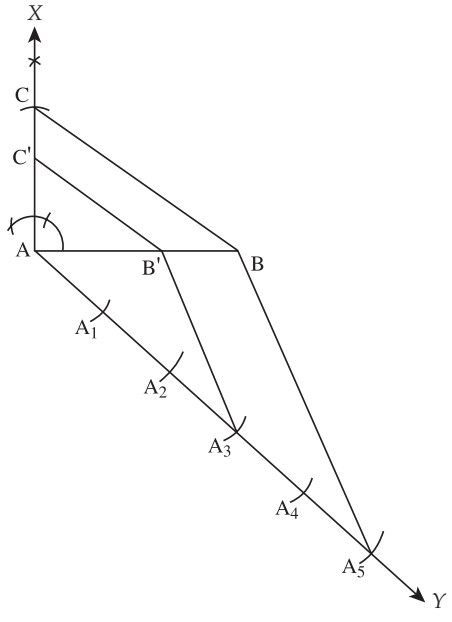
(vi) At C', draw $A'C'$ parallel to AC, cutting AB at A'.

Thus, $\Delta A'C'B$ is required triangle.



Q. 17. Draw a right triangle in which the sides (other than the hypotenuse) are of lengths 4 cm and 3 cm. Now construct another triangle whose sides are $\frac{3}{5}$ times the corresponding sides of the given triangle. [CBSE Delhi, Term 2, Set 2, 2017]

Ans.



Steps of construction:

(i) Draw a line segment $AB = 4$ cm.

(ii) Construct $\angle BAX = 90°$

(iii) Taking A as centre and radius 3 cm, draw an arc intersecting AX at C.

(iv) Join BC. Thus, right triangle ABC is obtained.

(v) Below of AB, draw an acute angle BAY with 5 equidistant arcs A_1, A_2, A_3, A_4, A_5 on AY.

(vi) Join A_5B.

(vii) Draw $A_3B' \parallel A_5B$ intersecting AB at B'.

(viii) Draw $B'C' \parallel BC$, intersecting AC at C'.

Thus, $AB'C'$ is required triangle.

Q. 18. Draw a circle of radius 4 cm. Draw two tangents to the circle inclined at an angle of 60° to each other.

[CBSE OD, Term 2, Set 1, 2016]

Ans. Refer 2020, O.D., Set - 2, Q - 39

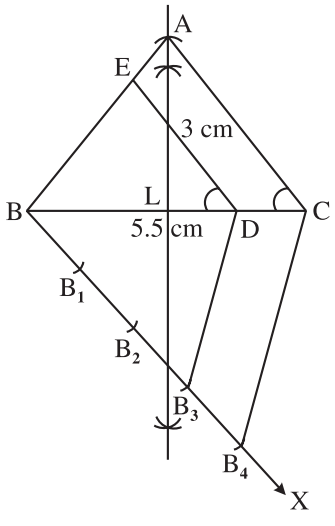
Q. 19. Draw an isosceles ΔABC in which $BC = 5.5$ cm and altitude $AL = 3$ cm. Then construct another triangle whose sides are $\frac{3}{4}$ of the corresponding sides of ΔABC.

[CBSE OD, Term 2, Set 2, 2016]

Ans. Steps of construction:

(i) Draw a line segment $BC = 5.5$ cm.

(ii) Draw a perpendicular bisector of BC intersecting BC at L such that $AL = 3$ cm.



(iii) Join AB and AC.

Thus, ΔABC is obtained.

(iv) Below BC, make an acute angle $\angle CBX$.

(v) Along BX, mark off four points B_1, B_2, B_3, B_4 such that $BB_1 = B_1B_2 = B_2B_3 = B_3B_4$.

(vi) Join B_4C.

(vii) From B_3, draw $B_3D \parallel B_4C$, meeting BC at D.

(viii) From D, draw $DE \parallel CA$, meeting AB at E.

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

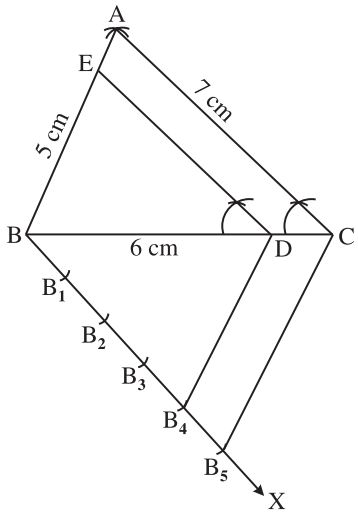
Q. 20. Draw a triangle with sides 5 cm, 6 cm, and 7 cm. Then draw another triangle whose sides are $\frac{4}{5}$ of the corresponding sides of first triangle.

[CBSE OD, Term 2, Set 3, 2016]

Ans. Steps of construction:

(i) Draw a line segment $BC = 6$ cm.

(ii) With B as centre and radius equal to 5 cm, draw an arc.



(iii) With C as centre and radius equal to 7 cm, draw an arc.

(iv) Mark the point where the two arcs intersect as A. Join AB and AC.

Thus, ΔABC is obtained.

(v) Below BC, make an acute $\angle CBX$.

(vi) Along BX, mark off five points B_1, B_2, B_3, B_4, B_5 such that $BB_1 = B_1B_2 = B_2B_3 = B_3B_4 = B_4B_5$.

(vii) Join B_5C.

(viii) From B_4, draw $B_4D \parallel B_5C$, meeting BC at D.

(ix) From D, draw $DE \parallel CA$, meeting AB at E.

Then, ΔEBD is the required triangle each of whose sides is $\frac{4}{5}$ of the corresponding side of ΔABC.

Q. 21. Draw two concentric circles of radii 3 cm and 5 cm. Construct a tangent to smaller circle from a point on the larger circle. Also measure its length.

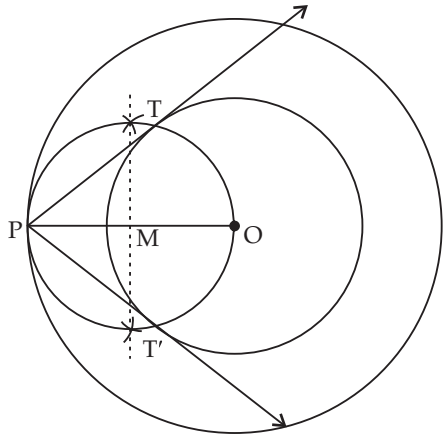
[CBSE Delhi, Term 2, Set 1, 2016]

Ans. Steps of construction:

(i) Draw two concentric circles of radii 3 cm and 5 cm.

(ii) Mark a point P on larger circle such that $OP = 5$ cm

(iii) Join OP and bisect it at M.



(iv) Draw a circle with M as centre and radius equal to MP to intersect the given circle at the points T and T'.

(v) Join PT and PT'.

Then, PT and PT' are the required tangents.

Q. 22. Draw a triangle ABC with $BC = 7$ cm, $\angle B = 45°$ and $\angle A = 105°$. Then construct a triangle whose sides are $\frac{4}{5}$ times the corresponding sides of ΔABC.

[CBSE Delhi, Term 2, Set 3, 2016]

Ans. $\angle B = 45°$ and $\angle A = 105°$

$\because$ Sum of angles of triangle is 180°

$\therefore \quad \angle A + \angle B + \angle C = 180°$

$\Rightarrow \quad 105° + 45° + \angle C = 180°$

$\Rightarrow \quad \angle C = 180° - (105° + 45°)$

$\Rightarrow \quad \angle C = 30°$

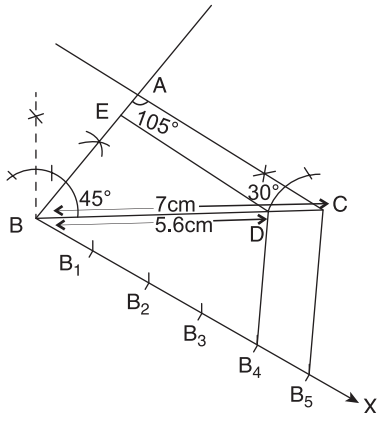
Steps of construction:

(i) Draw a line segment $BC = 7$ cm

(ii) Construct $\angle B = 45°$ and $\angle C = 30°$

(iii) Mark A as the intersecting point of rays through B and C.

Thus, ΔABC is obtained.



(iv) Draw an acute angle CBX below of BC and mark off 5 points B_1, B_2, B_3, B_4, B_5, such that $BB_1 = B_1B_2 = B_2B_3 = B_3B_4 = B_4B_5$.

(v) Join B_5C.

(vi) Draw $B_4D \parallel B_5C$, intersecting BC at D.

(vii) Draw DE || CA, intersecting BA at E.

Then, ΔBDE is the required triangle similar to ΔABC such that each side of ΔBDE is $\frac{4}{5}$ times the corresponding side of ΔABC.

Q. 23. Construct a ΔABC in which $AB = 6$ cm, $\angle A = 30°$ and $\angle B = 60°$. Construct another $\Delta AB'C'$ similar to ΔABC with base $AB' = 8$ cm. [CBSE OD, Term 2, Set 1, 2015]

Ans. Steps of construction:

(i) Draw a line segment $AB = 6$ cm.

(ii) Construct $\angle ABP = 60°$ and $\angle QAB = 30°$

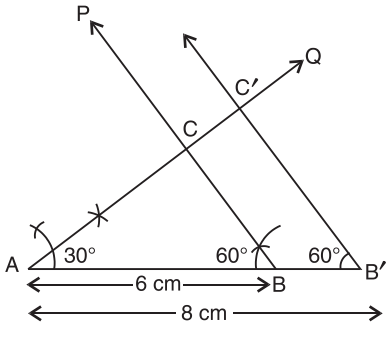
(iii) Mark the intersecting points of rays AQ and BP as C.

Thus, ΔABC is the required triangle.

(iv) Extend AB to B', such that $AB' = 8$ cm.

(v) Draw $B'C' \parallel BC$ intersecting AQ at C'.

Then, $\Delta AB'C'$ is the required triangle similar to ΔABC.



Q. 24. Construct a right triangle ABC with AB = 6 cm, $BC = 8$ cm and $\angle B = 90°$. Draw BD, the perpendicular from B on AC. Draw the circle through B, C and D and construct the tangents from A to this circle. [CBSE OD, Set 2, 2015]

Ans. Steps of construction:

(i) Draw a line segment $AB = 6$ cm.

(ii) Make a right angle at point B and mark $BC = 8$ cm on it.

(iii) Join AC. Thus, right triangle ABC is obtained.

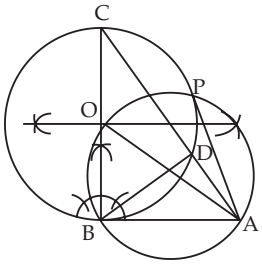
(iv) Draw a perpendicular BD to AC.

(v) Draw perpendicular bisector of BC to get its mid-point O.

(vi) Taking BC as diameter, draw a circle which passes through points B, C and D.

(vii) Join A to O and taking AO as diameter, draw second circle.

The point of intersection of two circles are B and P.



(viii) Join AB and AP, which are the required tangents.

Q. 25. Construct a triangle ABC in which $AB = 5$ cm, $BC = 6$ cm and $\angle ABC = 60°$. Now construct another triangle whose sides are $\frac{5}{7}$ times the corresponding sides of ΔABC. [CBSE OD, Set 3, 2015]

Ans. Steps of construction:

(i) Draw a line segment $AB = 5$ cm.

(ii) Construct $\angle ABX = 60°$.

(iii) From B, draw an arc of radius 6 cm, cutting BX at C.

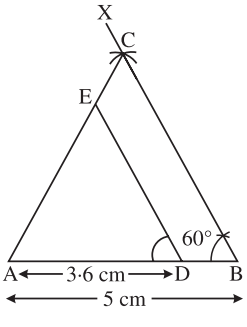
(iv) Join AC.

Thus, ΔABC is obtained

(v) Draw D on AB such that $AD = \frac{5}{7}AB$

$$= \left(\frac{5}{7} \times 5\right) \text{cm} = 3.6 \text{ cm}$$

(vi) Draw $DE \parallel BC$ cutting AC at E. Then ΔADE is the required triangle similar to ΔABC such that each side of ΔADE is $\frac{5}{7}$ times the corresponding side of ΔABC.



Q. 26. Construct a triangle ABC with BC = 7 cm, $\angle B = 60°$ and AB = 6 cm. Construct another triangle whose sides are $\frac{3}{4}$ times the corresponding side of ΔABC.
[CBSE Delhi, Term 2, Set 1, 2015]

Ans. Steps of construction:

(i) Draw a line segment AB = 6 cm.

(ii) Construct $\angle ABX = 60°$.

(iii) With B as centre, draw an arc of radius 7 cm cutting BX at C.

(iv) Join AC.

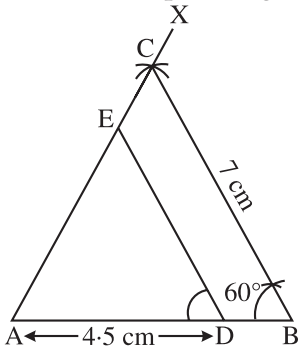
Thus ΔABC is obtained.

(v) Take a point D on AB such that

$$AD = \frac{3}{4} AB = \left(\frac{3}{4} \times 6\right) \text{cm} = \frac{9}{2} \text{cm} = 4.5 \text{ cm}$$

(vi) Draw $DE \parallel BC$, meeting AC at E.

Then, ΔADE is the required triangle similar to ΔABC such that each side of ΔADE is $\frac{3}{4}$ times the corresponding side of ΔABC.



Q. 27. Draw a line segment AB of length 7 cm. Taking A as centre, draw a circle of radius 3 cm and taking B as centre, draw another circle of radius 2 cm. Construct tangents to each circle from the centre of the other cirlce. [CBSE Delhi, Term 2, Set 3, 2015]

Ans. Refer 2020 Delhi, Set - 1, Q - 37