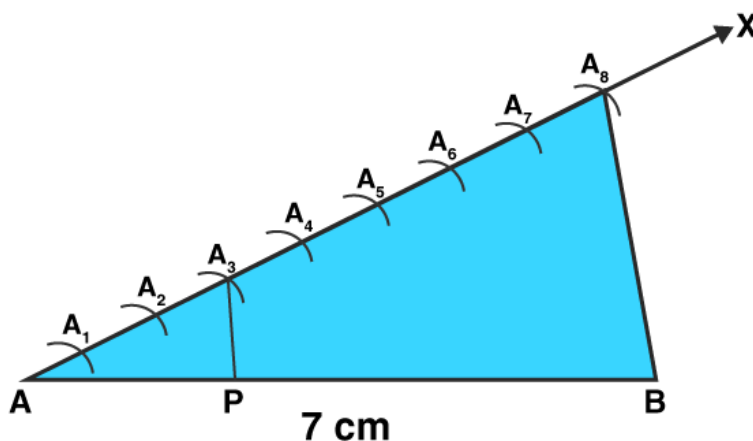Question 1: Draw a line segment AB of length 7 cm. Using ruler and compasses, find a point P on AB such that AP/AB = 3/5.

Solution:

Steps of Construction:

1. Draw a line segment AB = 7cm.

2. Draw a line from A making an acute angle with line segment AB.

3. Taking A as center draw an arc cutting at A_1 on the line.
And with the same radius consider A_1 as a center and draw another arc cutting line at A_2.
Repeat the same procedure and divide the line AX from A into 8 equal parts:
AA_1, A_1A_2, A_2A_3, A_3A_4, A_4A_5, A_5A_6, A_6A_7 and A_7A_8

4. Join A_8 and B by drawing a line.

5. Draw a parallel line to A_8B from A_3 which divides line segment AB at point P.

6. P is the required point such that AP/AB = 3/5.
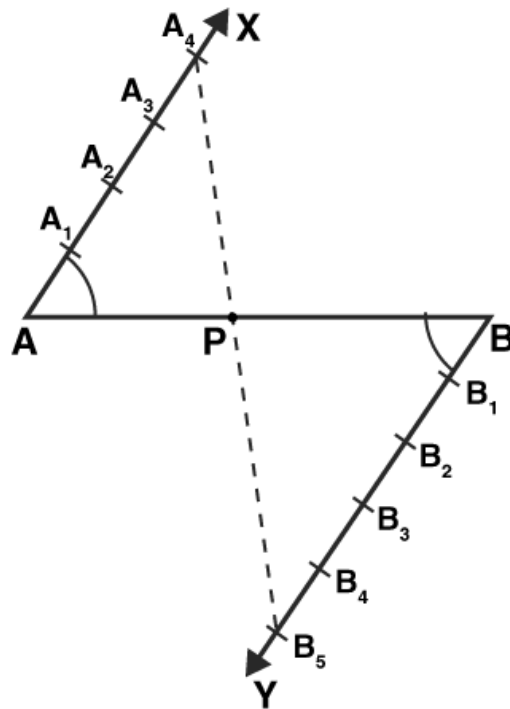
Question 2:
(i) Draw a line segment of length 8 cm and divide it internally in the ratio 4:5.

Solution:

Steps of construction:

1. Draw a line segment AB = 8 cm.

2. Draw a ray AX making an acute angle at A with AB.

3. Draw another ray BY parallel to AX making an acute angle. Make sure angle must be same as considered in step 2.

4.Taking A as center draw an arc cutting at A_1 on the line.
Taking same radius consider A_1 as a center and draw another arc cutting line at A_2.
Repeat the same procedure and divide the line AX into 4 points A1, A2, A3, A4.
In such a way, AA1=A1A2=A2A3=A3A4

5. Similar to step 4,
Taking B as center draw an arc cutting at B1 on the line.
Taking same radius (set in step 4) consider B1 as a center and draw another arc cutting line at B2.
Repeat the same procedure and divide the line BYinto 5 points in such a way that BB1 = B1B2= B2B3= B3B4 = B4B5

6. Join A4B5

7.Line A4B5 intersect AB at a point P.

Therefore, P is the point dividing the line segment AB internally in the ratio of 4 : 5.

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

Solution:

Steps of construction:
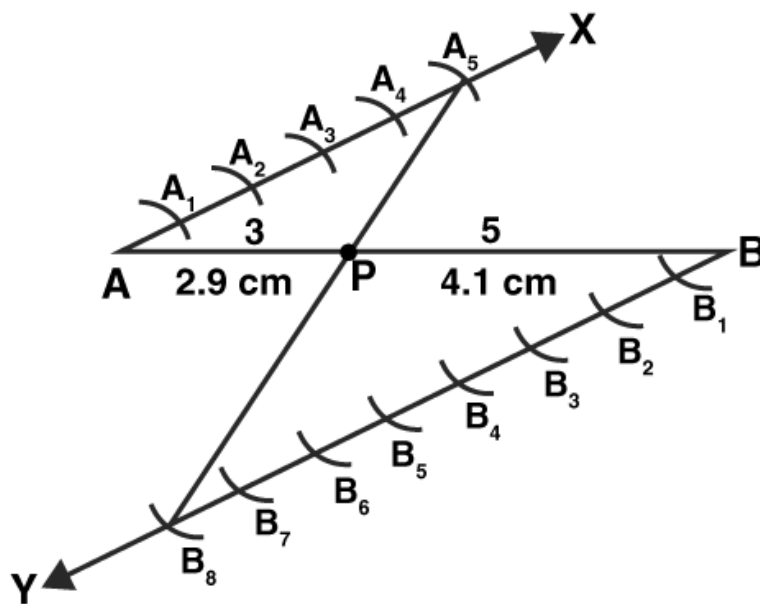
1. Draw a line segment AB = 7.6 cm.

2. Draw a ray AX making an acute angle at A with AB.

3. Draw another ray BY parallel to AX making an acute angle. Make sure angle must be same as considered in step 2.

4. Taking A as center draw an arc cutting at A1 on the line.
Taking same radius consider A1 as a center and draw another arc cutting line at A2.
Repeat the same procedure and divide the line AX into 5 points A1, A2, A3, A4 and A5
In such a way, AA1 = A1A2 = A2A3 = A3A4 = A4A5

5. Similar to step 4,
Taking B as center draw an arc cutting at B1 on the line.
Taking same radius (set in step 4) consider B1 as a center and draw another arc cutting line at B2.

Repeat the same procedure and divide the line BY into 8 points in such a way that BB1 = B1B2 = B2B3 = B3B4 = B4B5 = B5B6 = B6B7 = B7B8

6. Join A5B8

7. Line A5B8 intersect AB at a point P in the ratio 5:8

8. Measurement: PB = 4.7 cm and AP = 2.9 cm

Question 3: Construct a ΔPQR, in which PQ = 6 cm, QR = 7 cm and PR = 8 cm. Then, construct another triangle whose sides are 4/5 times the corresponding sides of ΔPQR.
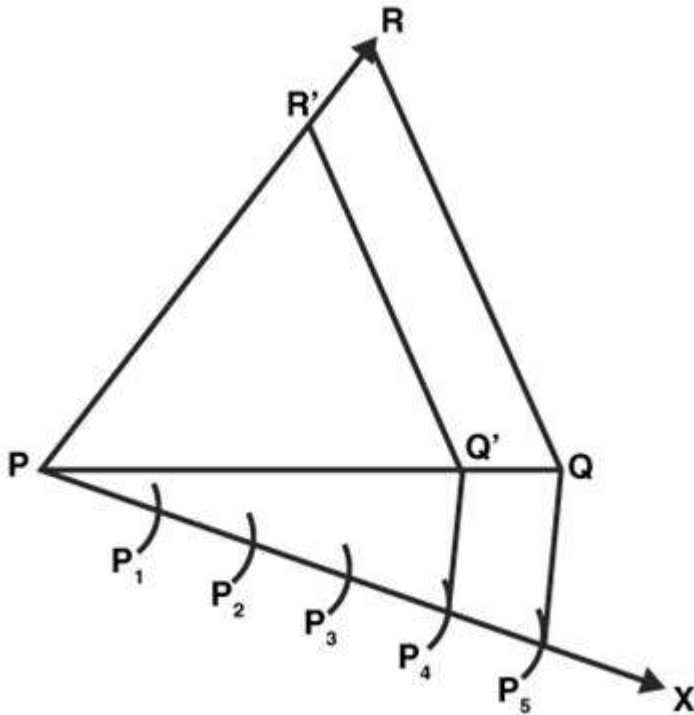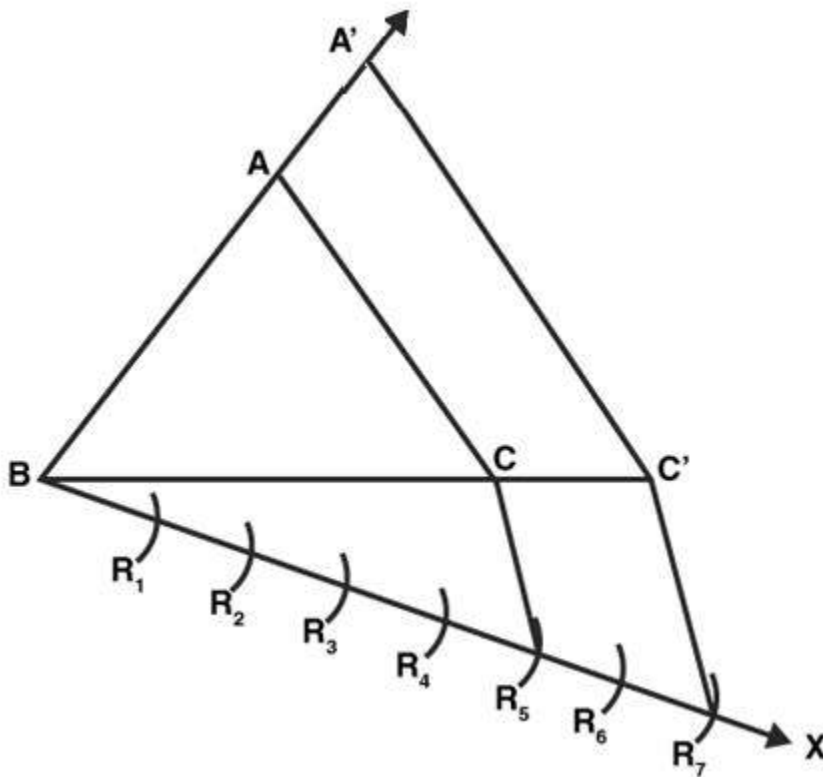
Solution:

Steps of construction:

1. Draw a line segment PQ = 6 cm.
   2. Draw an arc, using P as a center and radius = 8 cm
   3. Draw another arc, using Q as a center and radius = 7 cm
   4. Now, join PR and QR to get ΔPQR
   5. Draw a ray PX by making an acute angle, angle QPX
   6. Divide PX into 4 equal parts

P_1, P_2, P_3, P_4, P_5 such that $PP_1 = P_1P_2 = P_2P_3 = P_3P_4 = P_4P_5$

7. Join P5Q
8. Draw a line P4Q' which is parallel to P5Q
9. Similar to step 8, draw a line Q'R' which is parallel to QR

Therefore, △PQ'R' is the required triangle.

Question 4: Construct a triangle with sides 5 cm, 6 cm and 7 cm and then another triangle whose sides are 7/5 of the corresponding sides of first triangle.

Solution:
Steps of construction:

1. Draw a line segment BC = 5 cm.

2. Draw an arc, using B as a center and radius = 6 cm
3. Draw another arc, using C as a center and radius = 7 cm
4. Now, join AC and AB to get △ABC
5. Draw a ray BX by making an acute angle, angle CBX
6.

Along BX, mark off 7 points $R_1, R_2, R_3, R_4, R_5, R_6, R_7$
such that $BR_1 = R_1R_2 = R_2R_3 = R_3R_4 = ... = R_6R_7$

7. Join R5C
8. Draw a line R7C' which is parallel to R5C
9. Similar to step 8, draw a line C'A' which is parallel to CA

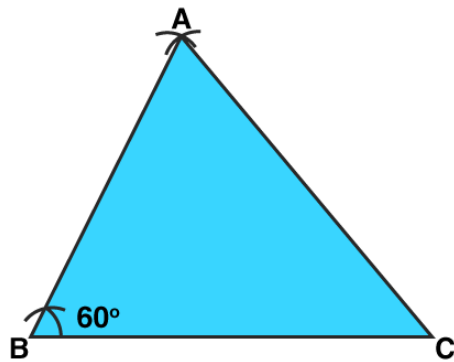Therefore,△A'BC' is the required triangle.

Question 5: Construct a ΔABC, with BC = 7 cm, ∠B = 60° and AB = 6 cm. Construct another triangle whose sides are times the corresponding sides of ΔABC.

Solution:
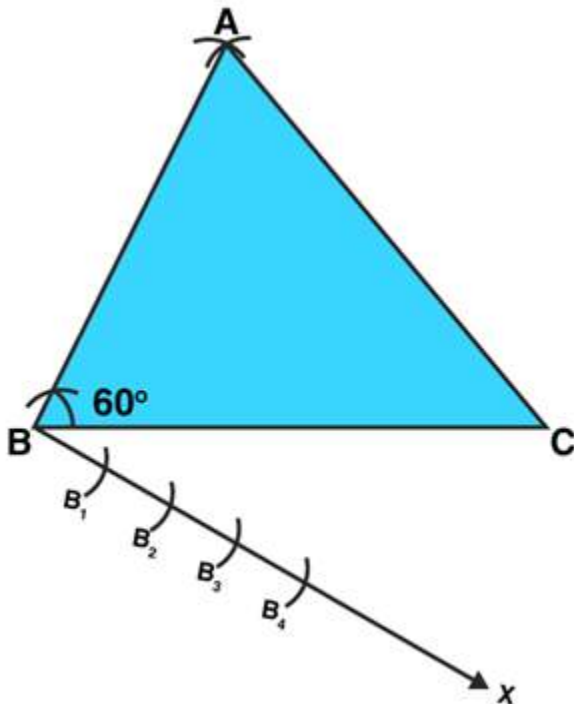
Steps of Construction:

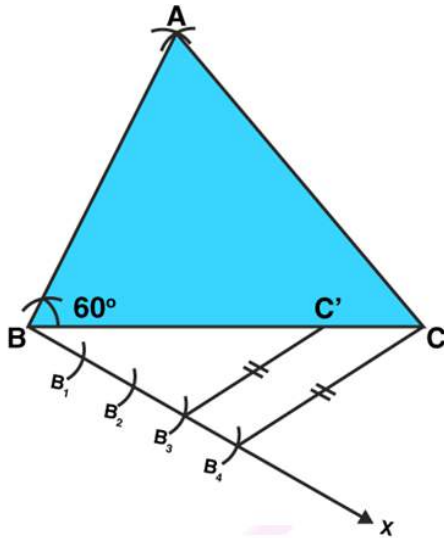1. Draw a triangle ABC with BC = 7 cm, ∠B = 60^0 and AB = 6 cm.

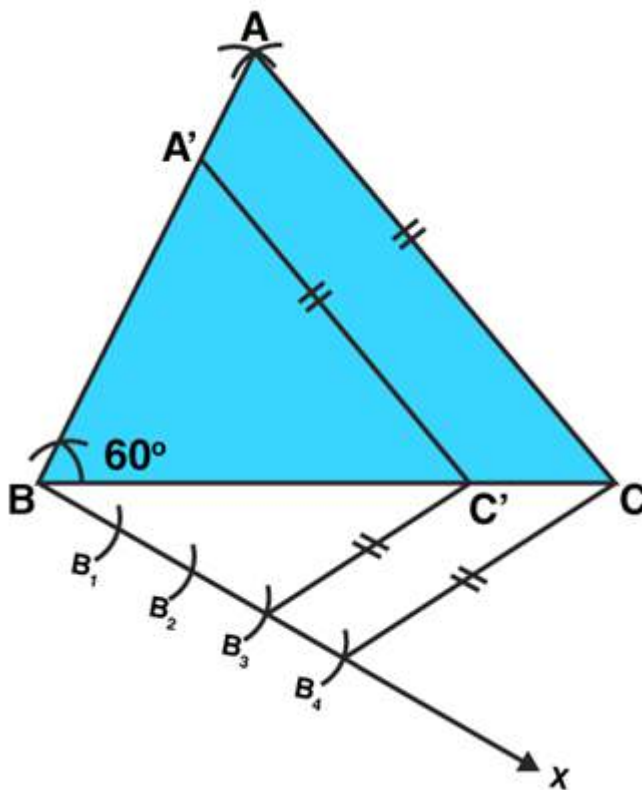2. Draw a ray BX making an acute angle with the line BC.

3. Divide BX into 4 equal arcs starting from B till B4. As shown in the below image.

4. Join B4C. Also draw a line from B3 parallel to B4C passing BC at C'.

5.Draw another line from C' parallel to CA passing AB at A'.

Thus, ΔA'BC' is required triangle.

Question 6: Construct a ΔABC in which AB = 6 cm, ∠A = 30° and ∠B = 60°. Construct another ΔAB'C' similar to ΔABC with base AB' = 8 cm.

Solution:
Construct a ΔABC in which AB = 6 cm, ∠A = 30° and ∠B = 60°. Construct another ΔAB'C' similar to ΔABC with base AB' = 8 cm.

1. Draw a line segment AB = 6cm and extend it to B' such that AB' = 8 cm.
2. Make an angle of 30° from A and angle of 60° from B. The point where these extended rays meet is C.
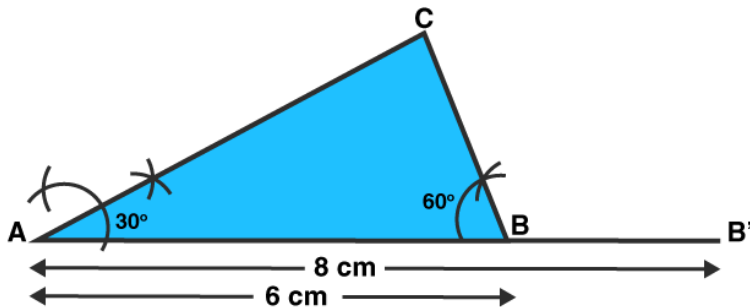
3. Draw an angle of 60° from B' (Similar triangles)

4. Extend line AC along C such that ray passing through point B' Cut AX at C'.
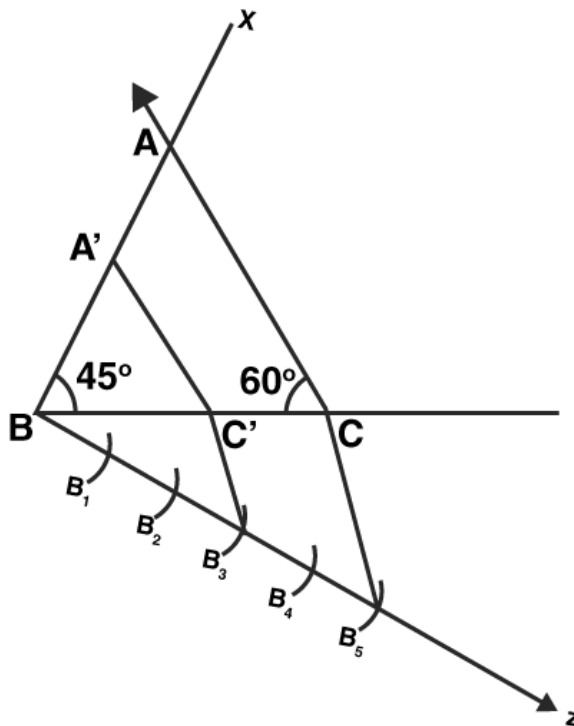5. AB'C' is the required triangle.
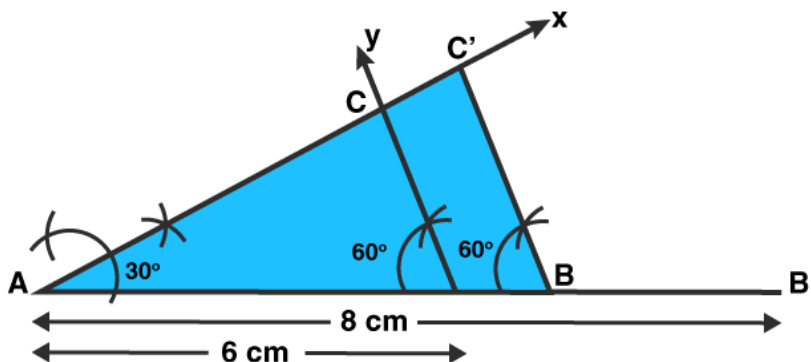
Question 7: Construct a ΔABC in which BC = 8 cm, ∠B = 45^0 and ∠C = 60°. Construct another triangle similar to ΔABC such that its sides are 3/5 of the corresponding sides of ΔABC.

Solution:

Steps of Construction:
1. Draw a line segment BC = 8 cm.
2. Construct a triangle ABC based on given instructions.
3. Draw an arc below BC, by making an acute angle, angle CBZ
4. Divide BZ into 5 equal parts.
such that $BB_1 = B_1B_2 = B_2B_3 = B_3B_4 = B_4B_5$
5. Join B5C
6. Draw a line B3C' which is parallel to B5C and join C'A' which is parallel to CA.

Therefore, ΔA'BC' is the required triangle.

Question 8: To construct a triangle similar to ΔABC in which BC = 4.5 cm, ∠B = 45° and ∠C = 60°, using a scale factor of 3/7, BC will be divided in the ratio.
(a) 3 : 4 (b) 4 : 7   (c) 3 : 10 (d) 3 : 7
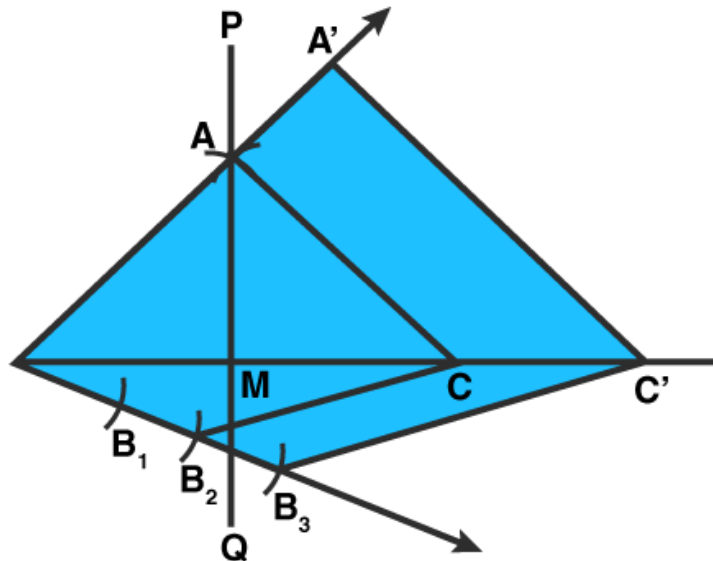
Solution:
BC will be divided in the ratio 3 : 4. Option (a) is correct.

Question 9: Construct an isosceles triangle whose base is 8 cm and altitude 4 cm and then another triangle whose sides are 1_1/2 (or 3/2) times the corresponding sides of the isosceles triangle.

Solution:
Steps of Construction:
1. Draw a line segment BC = 8 cm.
2. Draw a perpendicular bisector PQ of BC dividing BC at point M.
3. From QP cut off a distance MA = 4cm
4. Join AC and AB
5. Draw an arc below BC, by making an acute angle, angle CBX
6.
   Along BX, mark off 3 points
   B_1, B_2, B_3 such that $BB_1 = B_1B_2 = B_2B_3$.

7. Join B2C
8. Join B3C'which is parallel to B2C and Join A'C' which is parallel to AC

Thus, △A'BC' is required triangle.

Question 10: Draw a right triangle in which sides (other than hypotenuse) are of lengths 4 cm and 3 cm. Then, construct another triangle whose sides are 5/3 times the corresponding sides of the given triangle.

Solution:
Steps to construction:
1. Draw a line segment BC = 4 cm.

2. Construct, angle B = 90 degrees

3. Cut BA at the radius of 3 cm from BQ
4. Join AC (we have right triangle ABC)

5. Draw a ray BX and make an acute below BC, i.e. angle CBX

6.
Along BX, mark off 5 points B_1, B_2, B_3, B_4, B_5
such that $BB_1 = B_1B_2 = \ldots = R_4R_5$

7. Join B3C
8. Join B5C' which is parallel to B3C and C'A' which is parallel to AC.