

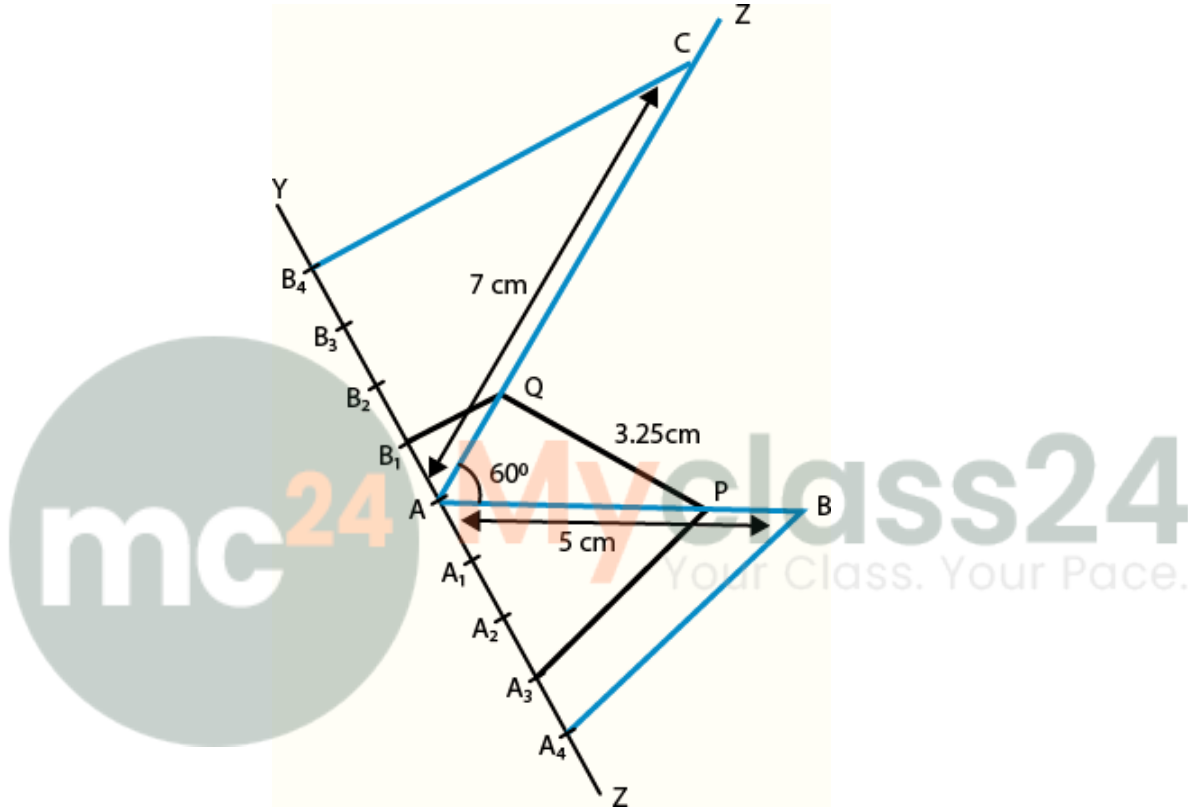
EXERCISE 10.4

Two line segments AB and AC include an angle of 60° where $AB = 5$ cm and $AC = 7$ cm. Locate points P and Q on AB and AC, respectively such that $AP = \frac{3}{4} AB$ and $AQ = \frac{1}{4} AC$. Join P and Q and measure the length PQ.

Solution:

Steps of construction:

1. Draw a line segment $AB = 5$ cm.



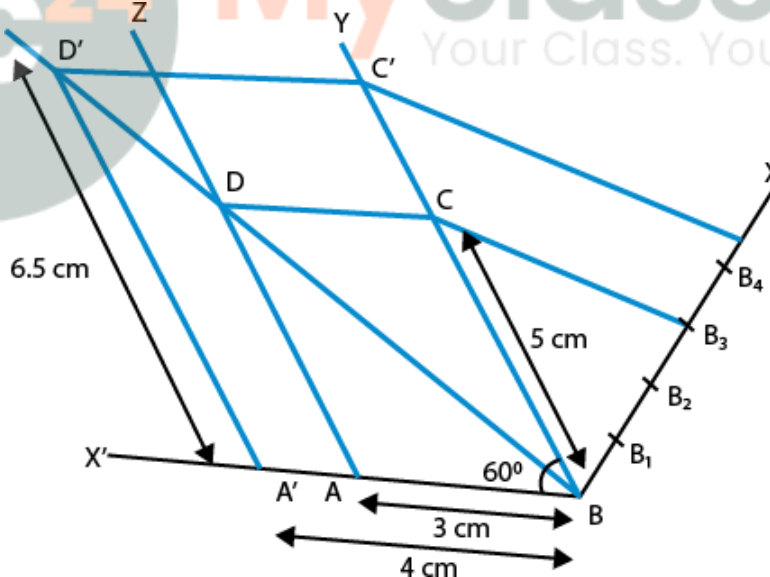
2. Draw $\angle BAZ = 60^\circ$.
3. With centre A and radius 7 cm, draw an arc cutting the line AZ at C.
4. Draw a ray AX, making an acute $\angle BAX$.
5. Divide AX into four equal parts, namely $AA_1 = A_1A_2 = A_2A_3 = A_3A_4$.
6. Join A_4B .
7. Draw $A_3P \parallel A_4B$ meeting AB at P.
8. Hence, we obtain, P is the point on AB such that $AP = \frac{3}{4} AB$.
9. Next, draw a ray AY, such that it makes an acute $\angle CAY$.
10. Divide AY into four parts, namely $AB_1 = B_1B_2 = B_2B_3 = B_3B_4$.
11. Join B_4C .
12. Draw $B_1Q \parallel B_4C$ meeting AC at Q. We get, Q is the point on AC such that $AQ = \frac{1}{4} AC$.
13. Join PQ and measure it.
14. $PQ = 3.25$ cm.

2. Draw a parallelogram ABCD in which BC = 5 cm, AB = 3 cm and angle ABC = 60°, divide it into triangles BCD and ABD by the diagonal BD. Construct the triangle BD'C' similar to triangle BDC with scale factor 4/3. Draw the line segment D'A' parallel to DA where A' lies on extended side BA. Is A'BC'D' a parallelogram?

Solution:

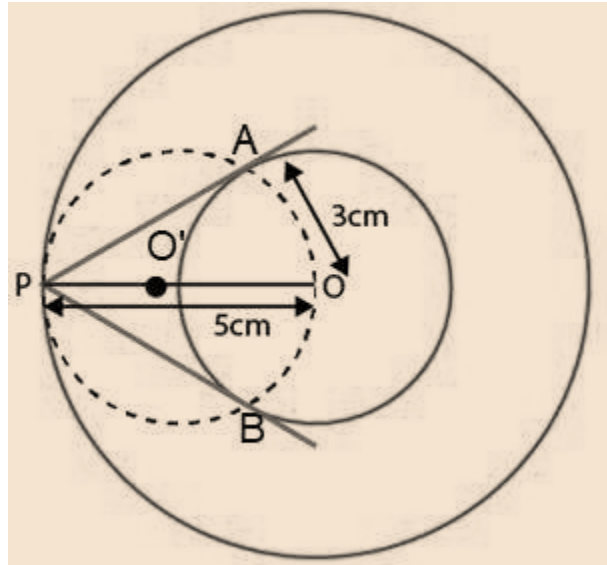
Steps of constructions:

1. Draw a line AB=3 cm.
2. Draw a ray BY making an acute $\angle ABY=60^\circ$.
3. With centre B and radius 5 cm, draw an arc cutting the point C on BY.
4. Draw a ray AZ making an acute $\angle ZAX'=60^\circ$. ($BY\parallel AZ, \therefore \angle YBX'=ZAX'=60^\circ$)
5. With centre A and radius 5 cm, draw an arc cutting the point D on AZ.
6. Join CD
7. Thus we obtain a parallelogram ABCD.
8. Join BD, the diagonal of parallelogram ABCD.
9. Draw a ray BX downwards making an acute $\angle CBX$.
10. Locate 4 points B_1, B_2, B_3, B_4 on BX, such that $BB_1=B_1B_2=B_2B_3=B_3B_4$.
11. Join B_4C and from B_3C draw a line $B_4C'\parallel B_3C$ intersecting the extended line segment BC at C' .
12. Draw $C'D'\parallel CD$ intersecting the extended line segment BD at D' . Then, $\triangle D'BC'$ is the required triangle whose sides are 4/3 of the corresponding sides of $\triangle DBC$.
13. Now draw a line segment $D'A'\parallel DA$, where A' lies on the extended side BA.
14. Finally, we observe that $A'BC'D'$ is a parallelogram in which $A'D'=6.5$ cm $A'B=4$ cm and $\angle A'BD'=60^\circ$ divide it into triangles $BC'D'$ and $A'BD'$ by the diagonal BD' .



3. Draw two concentric circles of radii 3 cm and 5 cm. Taking a point on outer circle construct the pair of tangents to the other. Measure the length of a tangent and verify it by actual calculation.

Solution:



Steps of constructions:

1. Draw a circle with center O and radius 3 cm.
2. Draw another circle with center O and radius 5 cm.
3. Take a point P on the circumference of larger circle and join OP.
4. Draw another circle with diameter OP such that it intersects the smallest circle at A and B.
5. Join A to P and B to P.

Hence AP and BP are the required tangents.

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