EXERCISE 10.1 PAGE NO: 114

Choose the correct answer from the given four options:

1. To divide a line segment AB in the ratio 5:7, first a ray AX is drawn so that BAX is an acute angle and then at equal distances points are marked on the ray AX such that the minimum number of these points is

(A) 8 (B) 10 (C) 11 (D) 12

Solution:

(D) 12

According to the question,

A line segment AB in the ratio 5:7

So, A:B = 5:7

Now,

Draw a ray AX making an acute angle ∠BAX,

Mark A+B points at equal distance.

So, we have A=5 and B=7

Hence, minimum number of these points = A+B = 5+7 =12

2. To divide a line segment AB in the ratio 4:7, a ray AX is drawn first such that BAX is an acute angle and then points A_1, A_2, A_3,.... are located at equal distances on the ray AX and the point B is joined to

(A) A_{12} (B) A_{11} (C) A_{10} (D) A_9

Solution:

(B) A_{11}

According to the question,

A line segment AB in the ratio 4:7

So, A:B = 4:7

Now,

Draw a ray AX making an acute angle BAX

Minimum number of points located at equal distances on the ray,

AX = A+B = 4+7= 11

A_1, A_2, A_3, ... are located at equal distances on the ray AX.

Point B is joined to the last point is A_{11}.

3. To divide a line segment AB in the ratio 5 : 6, draw a ray AX such that ∠BAX is an acute angle, then draw a ray BY parallel to AX and the points A_1, A_2, A_3, ... and B_1, B_2, B_3, ... are located at equal distances on ray AX and BY, respectively. Then the points joined are

(A) A_5 and B_6 (B) A_6 and B_5 (C) A_4 and B_5 (D) A_5 and B_4

Solution:

(A) A_5 and B_6

According to the question,

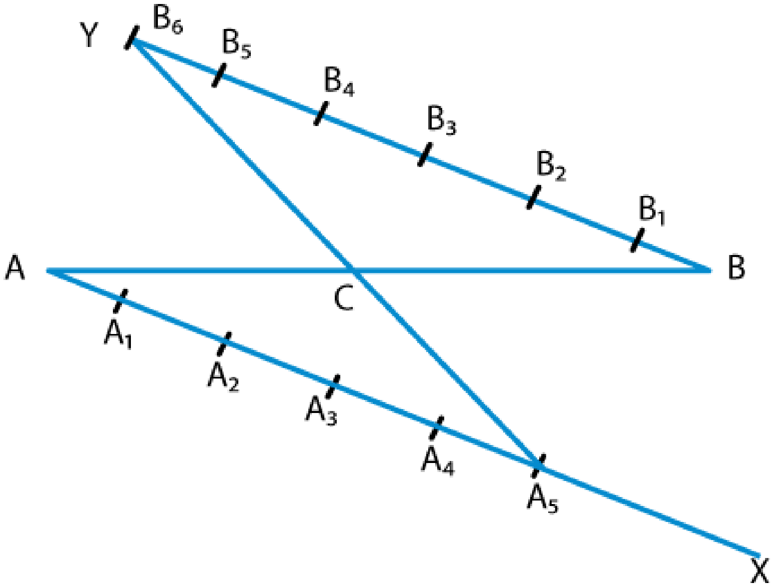
A line segment AB in the ratio 5:7

So, A:B = 5:7

Steps of construction:

1. Draw a ray AX, an acute angle BAX.

2. Draw a ray BY ||AX, angle ABY = angle BAX.
3. Now, locate the points A_1,A_2,A_3,A_4 and A_5 on AX and B_1,B_2,B_3,B_4,B_5 and B_6 (Because A:B = 5:7)
4. Join A_5B_6.
A_5B_6 intersect AB at a point C.
AC:BC= 5:6



EXERCISE 10.2 PAGE NO: 115

Write True or False and give reasons for your answer in each of the following:

1. By geometrical construction, it is possible to divide a line segment in the ratio √3:(1/√3)

Solution:

True

Justification:

According to the question,

Ratio= √3 : (1/√3)

On simplifying we get,

√3/ (1/√3) = (√3 x √3)/1 = 3:1

Required ratio = 3:1

Hence,

Geometrical construction is possible to divide a line segment in the ratio 3:1.

2. To construct a triangle similar to a given △ABC with its sides 7/3 of the corresponding sides of △ABC, draw a ray BX making acute angle with BC and X lies on the opposite side of A with respect to BC. The points B1, B2, ..., B7 are located at equal distances on BX, B3 is joined to C and then a line segment B6C′ is drawn parallel to B3C where C′ lies on BC produced. Finally, line segment A′C′ is drawn parallel to AC.

Solution:

False

Justification:

Let us try to construct the figure as given in the question.

Steps of construction,

1. Draw a line segment BC.
2. With B and C as centres, draw two arcs of suitable radius intersecting each other at A.
3. Join BA and CA and we get the required triangle ΔABC.
4. Draw a ray BX from B downwards to make an acute angle ∠CBX.
5. Now, mark seven points B_1, B_2, B_3 ...B_7 on BX, such that $BB_1 = B_1B_2 = B_2B_3 = B_3B_4 = B_4B_5 = B_5B_6 = B_6B_7$.
6. Join B_3C and draw a line B_7C'|| B_3C from B_7 such that it intersects the extended line segment BC at C'.
7. Draw C'A' ||CA in such a way that it intersects the extended line segment BA at A'.

Then, ΔA'BC' is the required triangle whose sides are 7/3 of the corresponding sides of ΔABC.

According to the question,

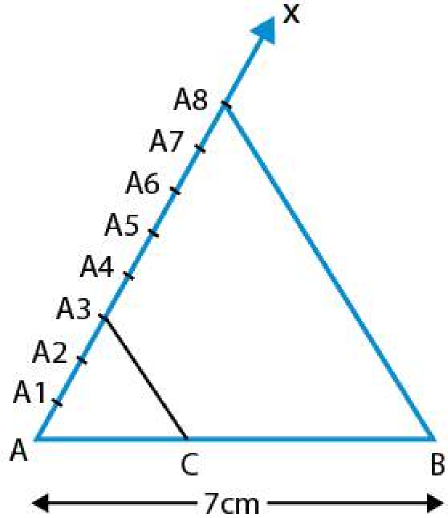
We have,

Segment B_6C' || B_3C. But it is clear in our construction that it is never possible that segment B_6C'||B_3C since the similar triangle A'BC' has its sides 7/3 of the corresponding sides of triangle ABC.

So, B_7C' is parallel to B_3C.

EXERCISE 10.3 PAGE NO: 116

1. Draw a line segment of length 7 cm. Find a point P on it which divides it in the ratio 3:5.
Solution:

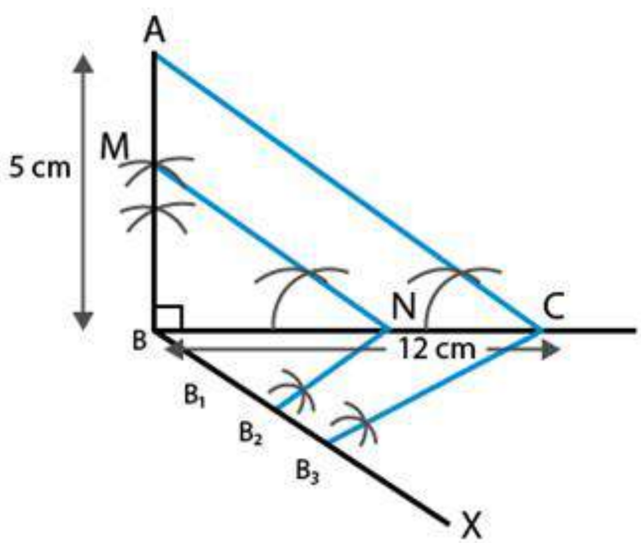


Steps of construction:

1. Draw a line segment, AB = 7 cm.
2. Draw a ray, AX, making an acute angle down ward with AB.
3. Mark the points A_1, A_2, A_3 ... A_8 on AX.
4. Mark the points such that $AA_1 = A_1A_2 = A_2A_3 = ..., A_7A_8$.
5. Join BA_8.
6. Draw a line parallel to BA_8 through the point A_3, to meet AB on P.

   Hence AP: PB = 3: 5

2. Draw a right triangle ABC in which BC = 12 cm, AB = 5 cm and ∠B = 90°. Construct a triangle similar to it and of scale factor 2/3. Is the new triangle also a right triangle?
Solution:



Steps of construction:

1. Draw a line segment AB = 5 cm. Construct a right angle SAB at point A.
2. Draw an arc of radius 12 cm with B as its centre to intersect SA at C.
3. Join BC to obtain ABC.
4. Draw a ray AX making an acute angle with AB, opposite to vertex C.
5. Locate 3 points, A_1, A_2, A_3 on line segment AX such that $AA_1 = A_1A_2 = A_2A_3$.
6. Join A_3B.
7. Draw a line through A_2 parallel to A_3B intersecting AB at B'.
8. Through B', draw a line parallel to BC intersecting AC at C'.
9. Triangle AB'C' is the required triangle.

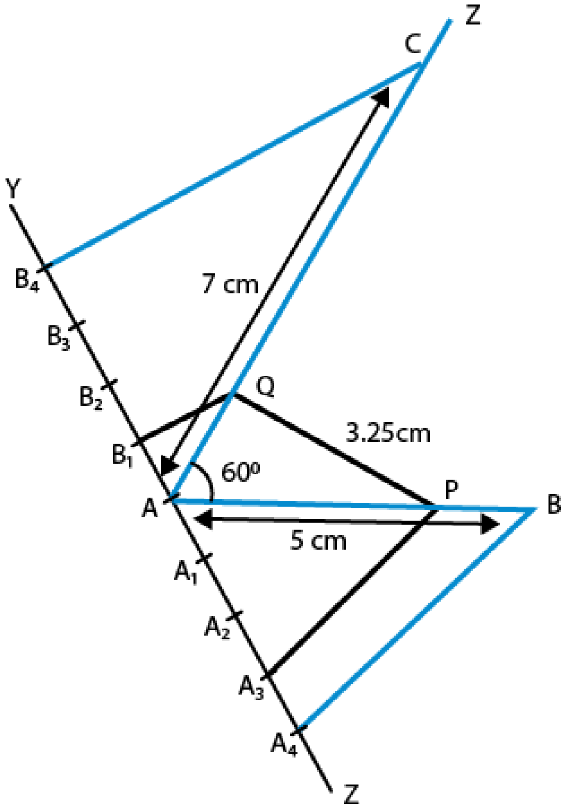
EXERCISE 10.4 PAGE NO: 117

1. 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 = ¾ AB and AQ = ¼ AC. Join P and Q and measure the length PQ.

Solution:

Steps of construction:

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



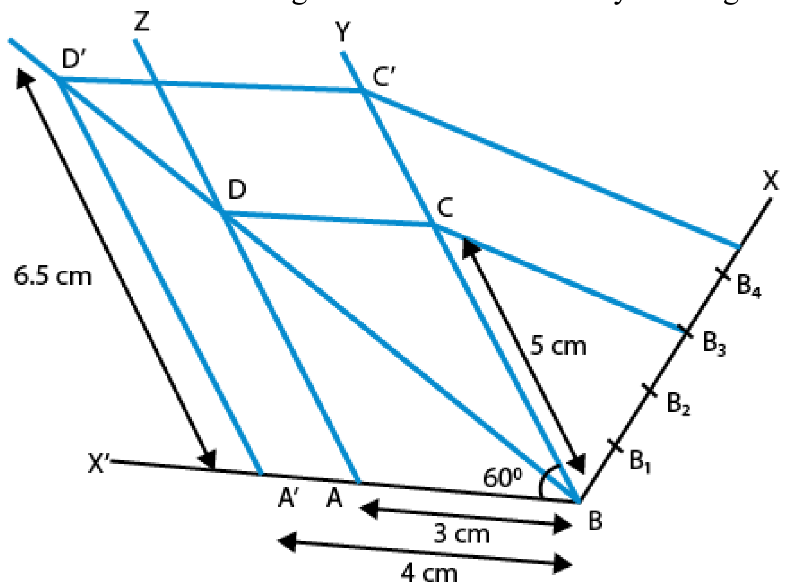
2. Draw ∠BAZ = 60°.
3. With centre A and radius 7 cm, draw an arc cutting the line AZ at C.
4. Draw a ray AX, making an acute ∠BAX.
5. Divide AX into four equal parts, namely $AA_1 = A_1A_2 = A_2A_3 = A_3A_4$.
6. Join A_4B.
7. Draw $A_3P \parallel A_4B$ meeting AB at P.
8. Hence, we obtain, P is the point on AB such that AP = ¾ AB.
9. Next, draw a ray AY, such that it makes an acute ∠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 = ¼ 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:

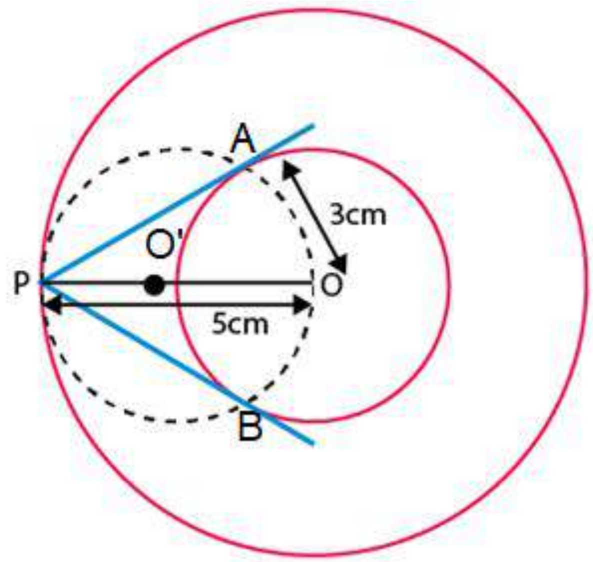
Steps of constructions:

1. Draw a line AB=3 cm.
2. Draw a ray BY making an acute ∠ABY=60°.
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 ∠ZAX'=60°.(BY||AZ, ∴ ∠YBX'=ZAX'=60°)
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 ∠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 B4C'||B3C intersecting the extended line segment BC at C'.
12. Draw C'D'|| CD intersecting the extended line segment BD at D'. Then, ΔD'BC' is the required triangle whose sides are 4/3 of the corresponding sides of ΔDBC.
13. Now draw a line segment D'A'|| 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 ∠A'BD'= 60° 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.