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Chapter-11 Constructions

Very Short Question

Q. 1. To divide a line segment AB in the ratio $2 : 5$, first a ray AX is drawn, so that $\angle BAX$ is an acute angle and then at equal distances, how many points are located on the ray AX ?

[CBSE 2011]

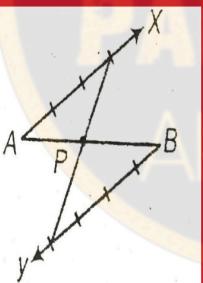
Sol. We know that, to divide a line segment AB in the ratio $m : n$, first draw a ray AX which makes an acute $\angle BAX$, then marked $m + n$ points at equal distance.

Here, $m = 2$, $n = 5$

Hence, minimum number of point on the ray AX
 $= 2 + 5 = 7$

Q. 5. In figure, find the ratio in which P divides AB (internally). [CBSE 2011]

Sol. 3 : 4



Q. 4. Given a triangle with side $AB = 8\text{ cm}$. To get a line segment $AB' = \frac{3}{4}$ of AB , find the ratio in which line segment AB is divided.

[CBSE 2011]

Sol. 3 : 1

Q. 1. To draw a pair of tangents to a circle which are inclined to each other at an angle of 35° , it is required to draw tangents at the end points of those two radii of the circle. then find the angle between the two radii.

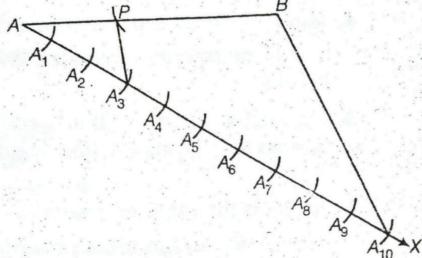
[CBSE 2011]

Sol. Angle between the two radii
 $= 180^\circ - 35^\circ = 145^\circ$

Short Question

Q. 2. Draw a line segment of length 5 cm and divide it in the ratio 3 : 7. [Board Term-2, 2015]

Sol.



Steps of construction :

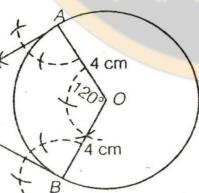
1. Draw a line segment $AB = 5\text{ cm}$.
2. Draw any ray AX making an acute angle downward with AB .
3. Mark the points $A_1, A_2, A_3, \dots, A_{10}$ on AX such that $AA_1 = A_1A_2 = \dots, A_9A_{10}$.
4. Join BA_{10} .
5. Through the point A_3 draw a line parallel to BA_{10} . To meet AB on P .

Hence $AP : PB = 3 : 7$

Q. 2. Draw a pair of tangents to a circle of radius 4 cm which are inclined to each other at an angle of 60° . [CBSE 2016]

Sol. Given A circle of radius 4 cm.

Required A pair of tangents, such that angle between them is 60° .



Steps of Construction

1. Draw a circle of radius 4 cm with centre O .
2. Draw any radius OA .
3. Draw another radius OB , such that $\angle AOB = 120^\circ$

$$\because \angle P + \angle O = 180^\circ \Rightarrow$$

$$60^\circ + \angle O = 180^\circ \Rightarrow \angle O = 120^\circ$$
4. At point A , draw AP perpendicular to OA .
5. At point B , draw BP perpendicular to OB and let the perpendiculars meet at P , such that $\angle P = 60^\circ$.

Hence, PA and PB are the required tangents.

Q. 1. 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 2016]

Sol. Given Two concentric circles of radii 3 cm and 5 cm.

Required A tangent from any point on the outer circle to inner circle.

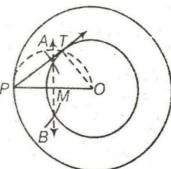
Steps of Construction

1. Draw two concentric circles with radii 3 cm and 5 cm, mark O as their centre.
2. Take any point P on the outer circle and join OP .
3. Draw AB , the perpendicular bisector of OP , let it intersect OP at M .
4. With M as centre and radius MP or MO , draw a semi-circle and let it intersect the inner circle at T .
5. Join PT .

Thus, PT is the required tangent.

On measurement, $PT = 4\text{ cm}$

By calculation,



Q. 3. Draw two tangents to a circle of radius 3.5 cm from a point P at a distance of 6.2 cm from its centre. [CBSE 2013]

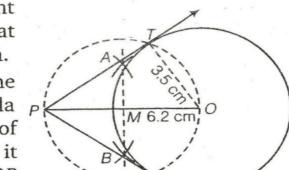
Sol. Given A circle of radius 3.5 cm and a point P , 6.2 cm away from its centre.

Required A pair of tangents.

Steps of Construction

1. Draw a circle with centre O and radius 3.5 cm.
2. Take a point P , such that $OP = 6.2\text{ cm}$.
3. Draw AB , the perpendicular bisector of OP and let it intersect OP at M .
4. With M as centre and PM or OM as radius, draw another circle intersecting the given circle at T and T' .
5. Join PT and PT' .

Hence, PT and PT' are the required tangents from point P to the circle.



Chapter - 10
Construction

Exercise No. 10.1

Multiple Choice Questions:

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 $\angle BAX$ 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

As given in the question,

A line segment AB in the ratio 5:7

So,

$A:B = 5:7$

We draw a ray AX making an acute angle $\angle BAX$,

And mark A+B points at equal distance.

$A=5$ and $B=7$

Therefore,

$$\begin{aligned}\text{Minimum number of these points} &= A+B \\ &= 5+7 = 12\end{aligned}$$

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, \dots 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}

As given in 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,

$$\begin{aligned}AX &= A+B \\&= 4+7 \\&= 11\end{aligned}$$

$A_1, A_2, A_3\dots$ 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 $\angle BAX$ is an acute angle, then draw a ray BY parallel to AX and the points A_1, A_2, A_3, \dots and B_1, B_2, B_3, \dots 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:

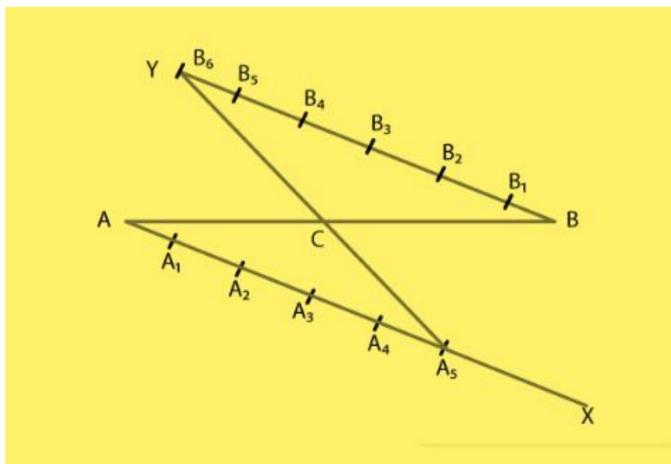
- (A)
 A_5 and B_6

As given in 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 $\parallel AX$, 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.
 $AC: BC = 5:6$



4. To construct a triangle similar to a given $\triangle ABC$ with its sides $\frac{3}{7}$ of the corresponding sides of $\triangle ABC$, first draw a ray BX such that $\angle CBX$ is an acute angle and X lies on the opposite side of A with respect to BC . Then locate points B_1, B_2, B_3, \dots on BX at equal distances and next step is to join

- (A) B_{10} to C
- (B) B_3 to C
- (C) B_7 to C
- (D) B_4 to C

Solution:

(C)

In this, we locate points $B_1, B_2, B_3, B_4, B_5, B_6$ and B_7 on BX at equal distance and in next step join the last point B_7 to C .

5. To construct a triangle similar to a given $\triangle ABC$ with its sides $\frac{8}{5}$ of the corresponding sides of $\triangle ABC$ draw a ray BX such that $\angle CBX$ is an acute angle and X is on the opposite side of A with respect to BC . The minimum number of points to be located at equal distances on ray BX is

- (A) 5
- (B) 8
- (C) 13
- (D) 3

Solution:

(B)

To construct a triangle similar to a given triangle, with its sides $\frac{m}{n}$ of the n corresponding sides of given triangle the minimum number of points to be located at equal distance is equal to the greater of m and n in $\frac{m}{n}$. Here, $\frac{m}{n} = \frac{8}{5}$ So, the minimum number of point to be located at equal distance on ray BX is 8.

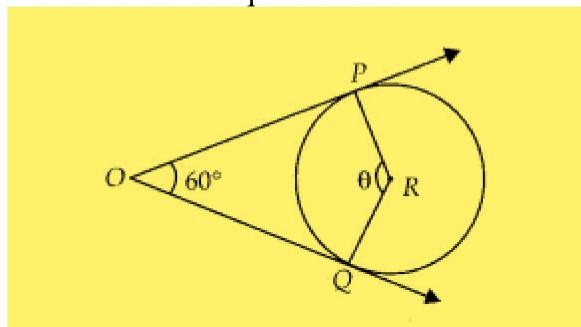
6. To draw a pair of tangents to a circle which are inclined to each other at an angle of 60° , it is required to draw tangents at end points of those two radii of the circle, the angle between them should be

- (A) 135°
- (B) 90°
- (C) 60°
- (D) 120°

Solution:

(D)

The angle between them should be 120° because in that case the figure formed by the intersection point of pair of tangent, the two end points of those two radii (at which tangents are drawn) and the centre of the circle is a quadrilateral.



From figure POQR is a quadrilateral,

$$\angle POQ + \angle PRQ = 180^\circ$$

$$60^\circ + \theta = 180^\circ$$

$$\theta = 120^\circ$$

[as, sum of opposite angles are 180°]

Therefore, the required angle between them is 120° .