

RD SHARMA

Solutions

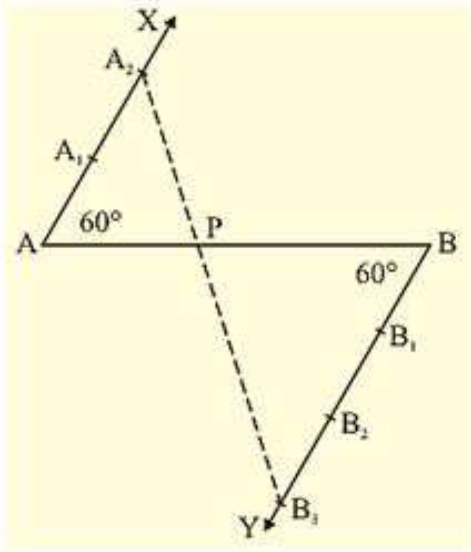
Class 10 Maths

Chapter 11

Ex 11.1

Q.1: Determine a point which divides a line segment of length 12 cm internally in the ratio of 2:3. Also, justify your construction.

Solution:



Steps of Construction:

1. Draw a line segment AB of 12 cm
2. Through the points A and B draw two parallel line on the opposite side of AB
3. Cut 2 equal parts on AX and 3 equal parts on BY such that $AX_1 = X_1X_2$
 $AX_1 = X_1X_2$ and $BX_1 = Y_1Y_2 = Y_2Y_3$ $BX_1 = Y_1Y_2 = Y_2Y_3$.
4. Join X_2Y_3 which intersects AB at P $\therefore AP:PB = 2:3 \therefore \frac{AP}{PB} = \frac{2}{3}$.

Justification:

In $\triangle AX_2P$ and $\triangle BY_3P$, we have

$\angle APX_2 = \angle BPY_3$ { Because they are vertically opposite angle }

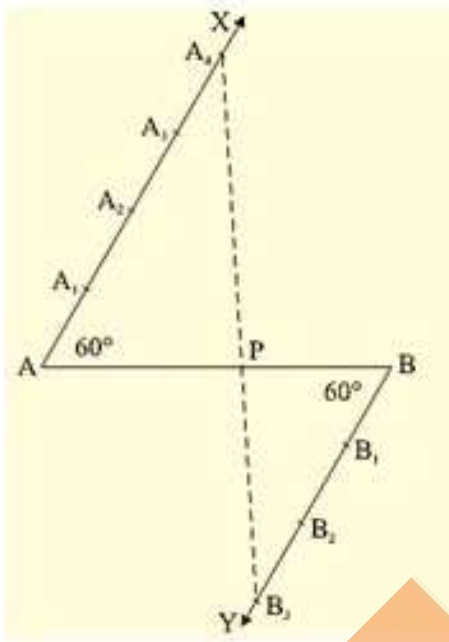
$\angle X_2AP = \angle Y_3BP$ { Because they are alternate interior angles }

$\triangle AX_2P \sim \triangle BY_3P$ { Because AA similarity }

$$\therefore AP:BP = AX_2:BY_3 = 2:3 \quad \left\{ \text{Because of C.P.C.T} \right\}$$

Q.2: Divide a line segment of length 9 cm internally in the ratio 4:3. Also, give justification for the construction.

Solution:



Steps of construction:

1. Draw a line segment AB of 9 cm
2. Through the points, A and B, draw two parallel lines AX and BY on the opposite side of AB
3. Cut 4 equal parts on AX and 3 equal parts on BY such that: $AX_1 = X_1X_2 = X_2X_3 = X_3X_4$
 $AX_1 = X_1X_2 = X_2X_3 = X_3X_4$ and $BY_1 = Y_1Y_2 = Y_2Y_3$
4. Join X_4Y_3 which intersects AB at P

$$\therefore AP:PB = 4:3 \quad \therefore \frac{AP}{PB} = \frac{4}{3}$$

Justification:

In $\triangle APX_4 \triangle APX_4$ and $\triangle BPY_3 \triangle BPY_3$, we have

$\angle APX_4 = \angle BPY_3$ $\angle APX_4 = \angle BPY_3$ { Because they are vertically opposite angles }

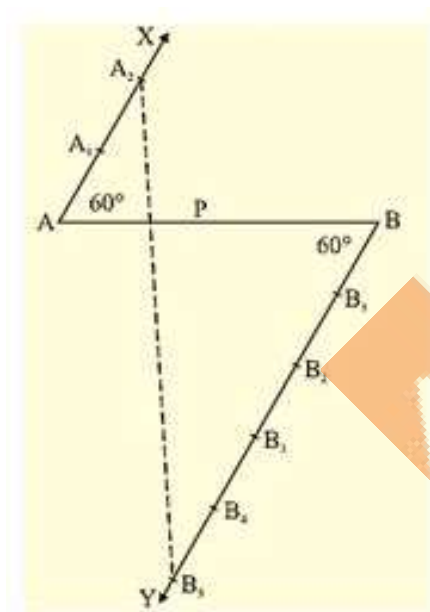
$\angle PAX_4 = \angle PBY_3$ $\angle PAX_4 = \angle PBY_3$ { Because they are alternate interior angle }

$\triangle APX_4 \triangle APX_4$ $\triangle BPY_3 \triangle BPY_3$ { Because AA similarity }

$\therefore \frac{PA}{PB} = \frac{AX_4}{BY_3} = \frac{4}{3}$ { Because of C.P.C.T }

Q.3: Divide a line segment of length 14 cm internally in the ratio 2:5. Also, give justification for the construction.

Solution:



Steps of construction:

(i) Draw a line segment AB of 14 cm

(ii) Through the points A and B, draw two parallel lines AX and BY on the opposite side of AB

(iii) Starting from A, Cut 2 equal parts on AX and starting from B, cut 5 equal parts on BY such that:

$AX_1 = X_1X_2$ and $BY_1 = Y_1Y_2 = Y_2Y_3 = Y_3Y_4 = Y_4Y_5$
 $BY_1 = Y_1Y_2 = Y_2Y_3 = Y_3Y_4 = Y_4Y_5$

(iv) Join X_2Y_5 which intersects AB at P

$$\therefore AP \cdot PB = 25 \therefore \frac{AP}{PB} = \frac{2}{5}$$

Justification:

In $\triangle APX_2$ and $\triangle BPY_5$, we have

$$\angle APX_2 = \angle BPY_5 \quad \{ \text{Because they are vertically opposite angles} \}$$

$$\angle PAX_2 = \angle PBY_5 \quad \{ \text{Because they are alternate interior angles} \}$$

Then, $\triangle APX_2 \sim \triangle BPY_5$ { Because AA similarity }

$$\therefore AP \cdot PB = AX_2 \cdot BY_5 = 25 \therefore \frac{AP}{PB} = \frac{AX_2}{BY_5} = \frac{2}{5} \quad \{ \text{Because of C.P.C.T} \}$$

