

①

$$\begin{array}{c}
 \begin{array}{ccc}
 & P(x,y) & \\
 & \begin{array}{c} 2 \quad 3 \end{array} & \\
 \hline
 A(-1,7) & & B(4,-3)
 \end{array} \\
 x = \frac{2 \times 4 + 3 \times (-1)}{2+3}, \quad y = \frac{2 \times (-3) + 3 \times 7}{2+3} \\
 = \frac{8-3}{5}, \quad = \frac{-6+21}{5} \\
 = \frac{5}{5}, \quad = \frac{15}{5} \\
 = 1, \quad = 3
 \end{array}$$

$P(1,3)$ is required point.

②

$$\begin{array}{c}
 \begin{array}{ccc}
 & P(x_1, y_1) & Q(x_2, y_2) \\
 & \begin{array}{c} 1 \quad 2 \end{array} & \\
 \hline
 A(4,-1) & & B(-2,-3)
 \end{array}
 \end{array}$$

P and Q are points of trisection

$$\begin{array}{l}
 AP:PB = 1:2 \\
 x_1 = \frac{1 \times (-2) + 2 \times 4}{1+2}, \quad y = \frac{1 \times (-3) + 2 \times (-1)}{1+2} \\
 = \frac{-2+8}{3}, \quad = \frac{-3-2}{3} \\
 = \frac{6}{3}, \quad = \frac{-5}{3} \\
 = 2
 \end{array}$$

$$\therefore P(2, -\frac{5}{3})$$

Q is midpt. of PB

$$\begin{array}{l}
 x_2 = \frac{2 + (-2)}{2}, \quad y_2 = \frac{-\frac{5}{3} + (-3)}{2} \\
 = \frac{0}{2}, \quad = \frac{-5 + (-9)}{6} \\
 = 0, \quad = \frac{-14}{6} \\
 = -\frac{7}{3}
 \end{array}$$

$$\therefore Q(0, -\frac{7}{3})$$

③

$$\begin{array}{c}
 \begin{array}{ccc}
 & A(x,y) & \\
 \hline
 N(2,25) & & P(8,20)
 \end{array}
 \end{array}$$

A is midpoint of NP

$$\begin{array}{l}
 \therefore x = \frac{2+8}{2}, \quad y = \frac{25+20}{2} \\
 = \frac{10}{2}, \quad = \frac{45}{2} \\
 = 5, \quad = 22.5
 \end{array}$$

Rashmi posts her flag on the 5th line at a distance of 22.5 m

distance between flags of Niharika and Preet

$$\begin{array}{l}
 = \sqrt{(8-2)^2 + (20-25)^2} \\
 = \sqrt{36+25} \\
 = \sqrt{61}
 \end{array}$$