

Step-1

Point (x, y) is collinear with points $(2, 8), (4, 7)$ (*i.e* lying on the line passing through $(2, 8), (4, 7)$) if and only if the area of the triangle formed by the vertices $(x, y), (2, 8), (4, 7)$ is zero.

Step-2

But the area of the triangle is

$$\frac{1}{2} |x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)|$$

$$= \frac{1}{2} |x(8 - 7) + 2(7 - y) + 4(y - 8)|$$

$$= \frac{1}{2} |x + 2y - 18|$$

$$= \frac{1}{2} \begin{vmatrix} x & y & 1 \\ 2 & 8 & 1 \\ 4 & 7 & 1 \end{vmatrix}$$

Step-3

Hence (x, y) is collinear with $(2, 8)$ & $(4, 7)$

$$\Rightarrow \begin{vmatrix} x & y & 1 \\ 2 & 8 & 1 \\ 4 & 7 & 1 \end{vmatrix} = 0 \quad \text{Or } x + 2y - 18 = 0$$