A straight line through a fixed point $(2, 3)$ intersects the coordinates axes at distinct points P and Q. If O is the origin and the rectangle OPRQ is completed, then the locus of R is

A $3x + 2y = xy$

B $3x + 2y = 6xy$

C $3x + 2y = 6$

D $2x + 3y = xy$

Correct option is A)

$y - y_1 = m(x - x_1)$

$\therefore y - 3 = m(x - 2)$

$\Rightarrow mx - y - 2m + 3 = 0$

$\Rightarrow mx - y = 2m - 3$

X-intercept $= \dfrac{2m - 3}{m}$

Y-intercept $= 3 - 2m$

$\therefore$ Co-ordinates of rectangle $(0, 0)$

$\Rightarrow \left(\dfrac{2m - 3}{m}, 0 \right)$

$\Rightarrow (0, 3 - 2m)$

$\therefore$ Co-ordinates of R is $\left(\dfrac{2m - 3}{m}, 3 - 2m \right)$

$\Rightarrow x = \dfrac{2m - 3}{m}$ & $y = 3 - 2m$

$y = 3 - 2m$

$\Rightarrow m = \dfrac{3 - y}{2}$

$\therefore x = \dfrac{2m - 3}{m}$

$= 2 - \dfrac{3}{m}$

$x = 2 - \dfrac{3(2)}{(3 - y)}$

$\Rightarrow x(3 - y) = 2(3 - 4) - 6$

$\Rightarrow 3x - xy = 6 - 2y - 6$

$\Rightarrow 3x + 2y = xy$ is the locus.

options (1)