19. Locus of the image of the point (2, 3) in the line (2x – 3y + 4) + k (x – 2y + 3) = 0, k ϵ R R, is a

(1) Straight line parallel to x-axis

(2) Straight line parallel to y-axis

(3) Circle of radius √2

(4) Circle of radius 3

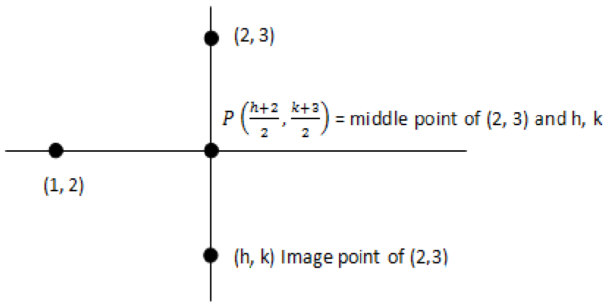
Answer:

(2x – 3y + 4) + k (x – 2y + 3) = 0 this equation combines two straight line, solving both to find point of intersection

$2x - 3y + 4 = 0 \rightarrow (1)$

$x - 2y + 3 = 0 \rightarrow (2)$

We get $2(2y-3) - 3y + 4 = 0,$
$y = 2\ hence\ x = 2y - 3 = 1,$
$common\ point\ (1,2)$



The line joining points (h, k) , (2,3) and (1,2), $P\left(\frac{h+2}{2}, \frac{k+3}{2}\right)$ are at right angle hence
$m_1 \times m_2 = -1$

$$\frac{k-3}{h-2} \times \frac{\frac{k+3}{2} - 2}{\frac{h+2}{2} - 1} = -1$$

$$or\ \frac{k-3}{h-2} \times \frac{k-1}{h} = -1$$

$$or\ (k-3)(k-1) = -h(h-2)\ replacing\ (h,k) by\ (x,y)$$

$$we\ get\ y^2 - y - 3y + 3 + x^2 - 2x = 0$$

$$or\ x^2 + y^2 - 2x - 4y + 3 = 0$$

$$or\ (x-1)^2 + (y-2)^2 = \left(\sqrt{2}\right)^2$$

Radius of the circle =$\sqrt{2}$

Correct option is (3) Circle of radius √2