Find the equation of a locus of point whose distance from the point (2,-2) is equal to its distance from the line $x - y = 0$

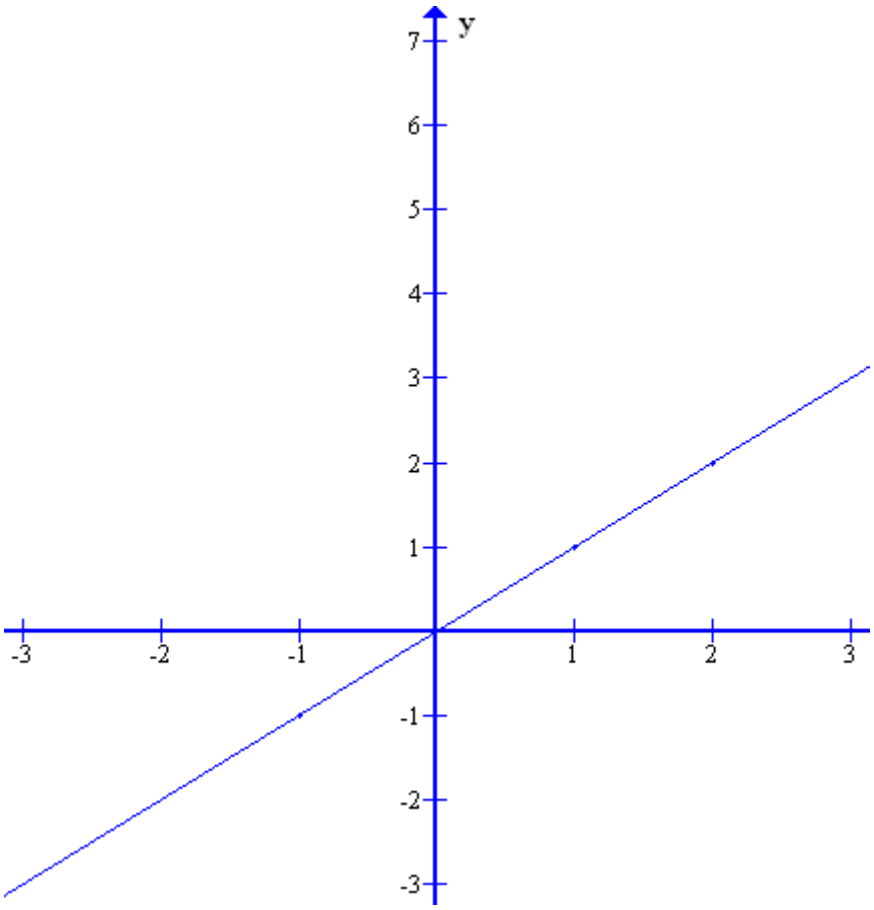
Solution:

The equation to a locus is the condition which the coordinates of each of the points of that locus and only those points must satisfy. In other words, the equation to a locus is nothing but the geometrical property expressed in algebraic language. Conversely, let (x, y) represent any point on the locus, x and y satisfy the equation of the locus and every point satisfying the equation lies on the locus. If the functional relation between x, y be $f\ (x, y) = 0$, then we say $f\ (x, y) = 0$ is the Cartesian equation of the locus. Thus in coordinate geometry a locus is represented by an equation. The set of points (x, y) satisfying a given equation $f\ (x, y) = 0$ is called the locus or graph of the equation.

In our case we have to find the equation for locus of a point $(2, -2)$ is equal to its distance from the line $x - y = 0$ $(or\ we\ can\ wite\ x = y)$

Let $P(\ x, y\ )$ be a point satisfying the geometrical condition, call point $A(2, -2)$ and $O\ (0,0)$

We can graph the line $x - y = 0$



$$PA = OP$$

$$=> PA^2 = OP^2$$

So we can find from equation of distance between points:

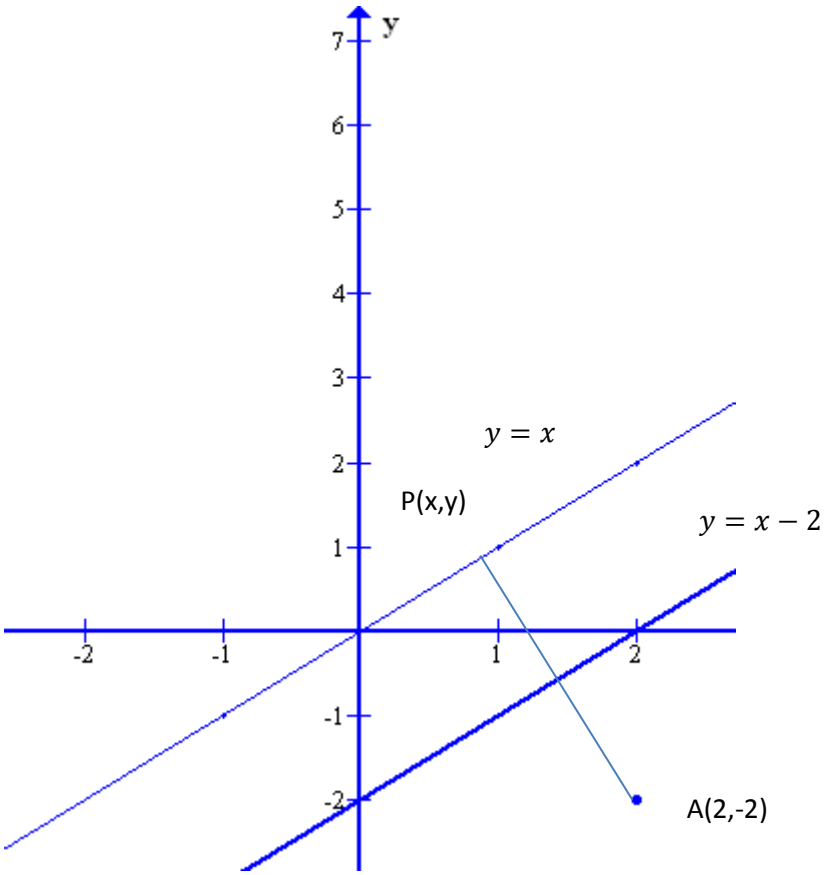
$(x-2)^2 + (y+2)^2 = x^2 + y^2$

$x^2 - 4x + 4 + y^2 + 4y + 4 = x^2 + y^2$

$-4x + 4 + 4y + 4 = 0$

$4y + 8 = 4x$

$y = x - 2$



Answer:$y = x - 2$