

YOU & MATHS So many letters! Consider the following system of equations in (x, y) :

$$\begin{cases} (x+k)^2 = (2x-h)^2 \\ y = 3kx \end{cases}.$$

Find the values of k and h such that the pair $(-2, -6)$ solves the system.

If $(-2, -6)$ is a solution, then we can substitute $x = -2$, $y = -6$ in the two equations of the system and get:

$$\begin{cases} (-2+k)^2 = (-4-h)^2 \\ -6 = 3k \cdot (-2) \end{cases}.$$

The second equation is:

$$-6 = 3k \cdot (-2) = -6k,$$

therefore $k = 1$.

Now let us consider the first equation, with $k = 1$, and let us do some calculations:

$$(-2+1)^2 = (-4-h)^2 \rightarrow 1 = (h+4)^2 \rightarrow h+4 = 1 \text{ or } h+4 = -1 \rightarrow h = -3 \text{ or } h = -5.$$

Then the solution is $k = 1$ and $h = -3$, or $k = 1$ and $h = -5$.