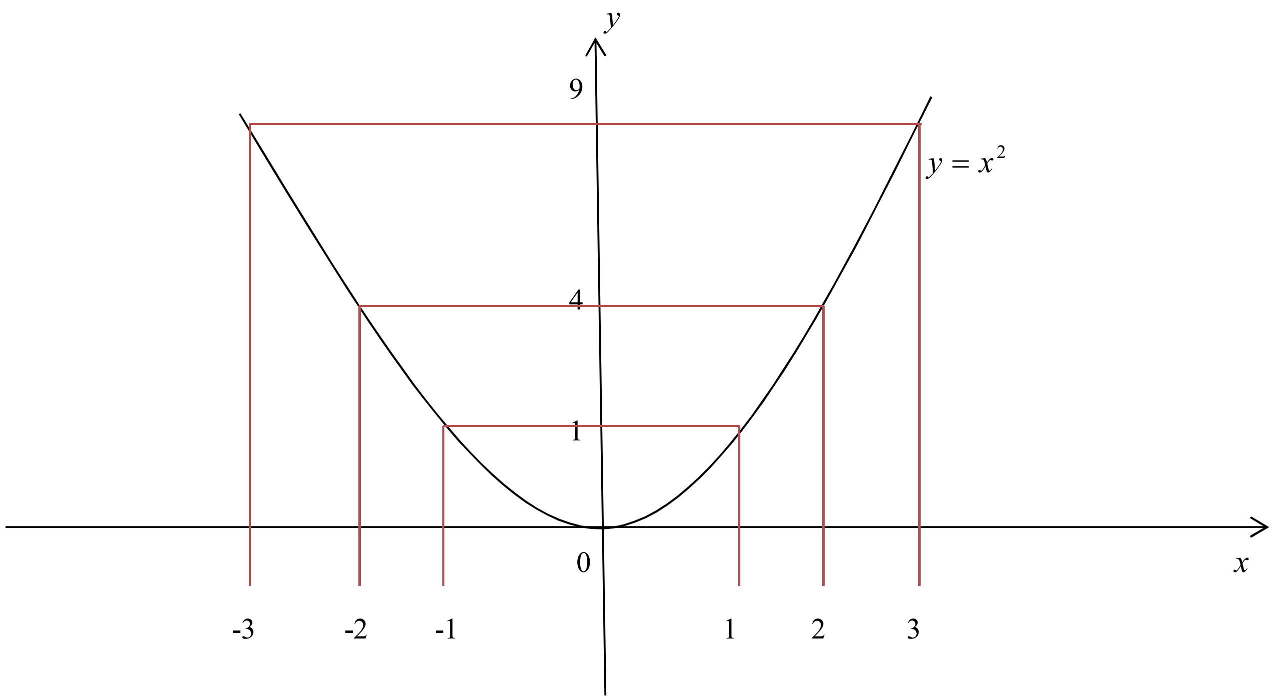
Why is the basic parabola $y = x^2$ is symmetrical about the $y-$axis? Spend a moment to study its graphical output below:




Symmetry exists NOT because the graph looks as such, but because we know that $(-1)^2 = (1)^2 = 1$ for $x = \pm 1$, $(-2)^2 = (2)^2 = 4$ for $x = \pm 2$, $(-3)^2 = (3)^2 = 9$ for $x = \pm 3$. And we can clearly see that things don't just end there, because to prove it is also true for all $x \in \Re$, a non-exhaustive list of attempts must be undertaken.

Which is why we seek to apply a general treatment of the above observation, and it can be stated as follows:

> For $y = f(x)$, its graph is **symmetrical** about the $y-$axis for all $x \in (-a,\ a)$ where $a$ is a positive real value **IF AND ONLY IF** $f(x) = f(-x)$.

Applying this assertion to $y = x^2$, we have $(x)^2 = (-x)^2$; so yes we can conclude the parabola is indeed a reflection of itself in the vertical axis.