

y-axis

$(-a, y)$

(x, y)

$(-a, 0)$

$(a, 0)$

focus

x-axis

$x = -a$

parabola

directrix

$$y^2 = 4ax$$


The diagram illustrates the geometric properties of the parabola $y^2 = 4ax$. It is plotted in a Cartesian coordinate system with a horizontal x-axis and a vertical y-axis. The parabola opens to the right, with its vertex at the origin (0,0). A vertical line labeled 'directrix' is shown at $x = -a$. A point on this directrix is labeled $(-a, y)$. The focus of the parabola is marked on the x-axis at $(a, 0)$ and labeled 'focus'. A general point on the parabola is labeled (x, y) . A line segment connects the focus to this point. A horizontal line segment connects the point $(-a, y)$ on the directrix to the point (x, y) on the parabola, demonstrating that the distance from any point on the parabola to the focus is equal to its distance from the directrix.