

Answer on questions # 53932-Math-Calculus

Find the standard form of the equation of the parabola with a focus at (0, 6) and a directrix at $y = -6$.

Solution:

Since directrix is a horizontal line, this is a regular vertical parabola, where the x part is squared.

The equation of a vertical parabola is:

$$(x - h)^2 = 4p(y - k)$$

where, (h, k) - are the coordinates of the vertex; p = distance from the vertex to the focus.

So, we need to find out h, k and p and plug those values in our equation.

We know that the vertex of a parabola is halfway between focus and the directrix.

We know the focus (0,6) and directrix $y = -6$. Therefore, vertex $(h, k) = (0,0)$.

Now, p = distance from the vertex to the focus = distance from the (0,0) to the (0,6) = 6.

Plug all the values in our equation:

$$(x - 0)^2 = 4 * 6(y - 0);$$

$$x^2 = 24y;$$

$$y = \frac{x^2}{24};$$

Answer:

Standard form of the equation of the parabola:

$$y = \frac{x^2}{24};$$