Answer on Question #45102 – Math – Analytic Geometry

Question. Find the standard form of the equation of the parabola with a focus at $(3, 0)$ and a directrix at $x = -3$.

Solution. Recall that a standard form of the equation of parabola is

$$y^2 = 2px,$$

where $p > 0$. In this case the directrix of parabola is given by the equation

$$x = -p/2,$$

and the focus has coordinates:

$$F(p/2, 0).$$

In our case we have the following two identities:

- of directrix:

$$x = -3 = -p/2$$

- the focus:

$$(p/2, 0) = (3, 0).$$

It follows from each of them that

$$p/2 = 3 \qquad \Rightarrow \qquad p = 6.$$

Therefore such a parabola with a focus at $(3, 0)$ and a directrix at $x = -3$ exists and the standard form of its equation is

$$y^2 = 2 \cdot 6\, x = 12x.$$

Answer. $y^2 = 12x$.