

## Answer on Question #45115 – Math – Analytic Geometry

### Question

Find an equation in standard form for the hyperbola with vertices at  $(0; \pm 2)$  and foci at  $(0; \pm 7)$ .

### Solution

Since the vertices and foci are located on the  $y$ -axis, the general equation of this hyperbola has the form  $\frac{x^2}{a^2} - \frac{y^2}{b^2} = -1$ . Find  $a^2$  and  $b^2$ . Let  $x = 0, y = \pm 2$ . Then we have

$$-\frac{4}{b^2} = -1 \Leftrightarrow b^2 = 4. \text{ By hypothesis, a half of focal length } c \text{ is equal to } 7, \text{ so we have}$$

$$c^2 = a^2 + b^2 \Rightarrow 49 = a^2 + 4 \Rightarrow a^2 = 45.$$

**Answer:**  $\frac{x^2}{45} - \frac{y^2}{4} = -1.$