Activity 1 of Lesson 4:
Derive the Equation of a General Parabola with Vertex at the Origin

Between class and Homework 3, you derived the following equations for parabolas that all had a vertex at the origin:

- $y = \frac{x^2}{4}$ for a parabola with a distance between vertex and focus of 1
- $y = \frac{x^2}{8}$ for a parabola with a distance between vertex and focus of 2
- $y = \frac{x^2}{12}$ for a parabola with a distance between vertex and focus of 3

Now consider a general parabola with vertex at the origin and distance between the vertex and the focus of **p**. Use the definition of a parabola and the Pythagorean Theorem to **derive its equation**. **Explain** your thinking. Save your work and be prepared to share with the class.