Still doing §10.1

\( x^2 = 4py \) is the NSF for a parabola with vertex at the origin. This parabola is vertical. It opens upward if \( p \) is positive. It opens downward if \( p \) is negative.

The focus is located \([F(0, p)]\).
The eq. of the directrix is \([y = -p]\).

**Example** \( x^2 = 8y \)

\[
\begin{align*}
\text{I'm seeing } x^2 &= 4py \\
\therefore 4p &= 8 \\
\therefore p &= 2
\end{align*}
\]

\( \therefore F(0, 2) \leftarrow \text{focus.} \)
\( y = -2 \leftarrow \text{directrix} \)

The line \( y = 2 \) must intersect our parabola in two points. Let's see where this happens.

System \( \begin{cases} 
x^2 = 8y \\
y = 2 
\end{cases} \rightarrow x^2 = 8(2) = 16 \therefore (x = \pm 4) \)

And when \( x = 4, y = 2 \) and when \( x = -4, y = 2 \).
So the points of intersection are \((4, 2)\) and \((-4, 2)\).
The line segment from \((-4,2)\) to \((4,2)\) is called the **latus rectum**.
The length of the latus rectum is called the **focal length of the parabola**.

What is the f.l. of this parabola? *Ans.* \([8 \text{ units}]\)

Notice NSF \(x^2 = 8y\)

f.l. = \(|4p|\)

**Problem:** §10.1: p.751: #27: Find eq. \((NSF)\) for parabola w/ vertex @ origin and.

\[ F(-8,0) \]

**Solu:** \[
\begin{align*}
\text{Ans} & : y^2 = -32x \\
\text{f.l.} & = |4p| = |-32| = 32
\end{align*}
\]

**#32 Same instructions Directrix \(x = -\frac{1}{8}\)**

**Solu:** \[
\begin{align*}
\text{F(1/8,0) opens right (horiz)} & : y^2 = 4px \\
& \begin{cases} 
\text{F(1/8,0) opens right (horiz)} & : x^2 = 4py \\
& y^2 = \frac{1}{2}x
\end{cases}
\end{align*}
\]