Notes: Writing Equations of Parabolas

Parametric Equations
$x = aT^2 + h$
$y = T + K$
left/rt

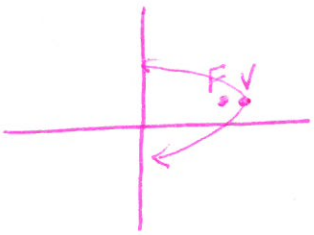
* reverse for up/down

**main use to check graphs that are $x = y^2$

* recall 'a' is pos for ↑ & ↻
'a' is neg for ↓ & ↺

Write the Cartesian equation of the parabola in vertex form. (Parametric included for practice)

1. Vertex (5, 1) focus $(4\frac{11}{12}, 1)$



* opens left

$x = -a(y-K)^2 + h$

$x = -a(y-1)^2 + 5$

p = distance from vertex to focus

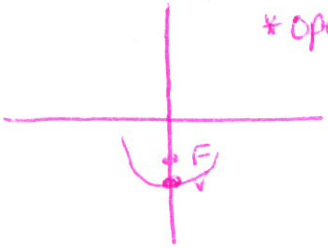
$p = \frac{1}{12}$

$a = \frac{1}{4p} = \frac{1}{4(\frac{1}{12})} = \frac{1}{\frac{1}{3}} = 3$

$x = -3(y-1)^2 + 5$

$x = -3T^2 + 5$
$y = T + 1$

2. Vertex (0, -4) focus $(0, -3\frac{7}{8})$



* opens up

$y = a(x-h)^2 + K$

$y = a(x)^2 - 4$

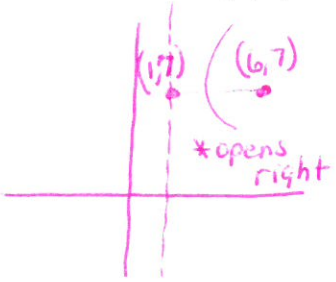
$p = \frac{1}{8}$ $a = \frac{1}{4(\frac{1}{8})} = \frac{1}{\frac{1}{2}}$

$a = 2$

$y = 2(x)^2 - 4$

$x = T$ $y = 2T^2 - 4$

3. Focus (6, 7) directrix x = 1



vertex mdpt. of focus & pt. on directrix

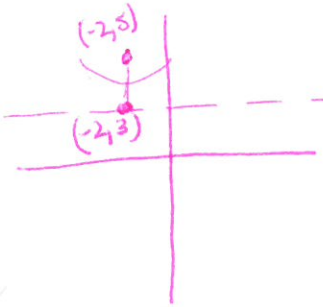
$V = (3\frac{1}{2}, 7)$

$p = 2\frac{1}{2}$ $a = \frac{1}{4(\frac{5}{2})} = \frac{1}{10}$

$x = \frac{1}{10}(y-7)^2 + 3\frac{1}{2}$

$x = \frac{1}{10}T^2 + 3\frac{1}{2}$
$y = T + 7$

4. Focus (-2, 5) directrix y = 3



Vertex (-2, 4)

$p = 1$

$a = \frac{1}{4(1)} = \frac{1}{4}$

* opens up

$y = \frac{1}{4}(x+2)^2 + 4$

$x = T - 2$
$y = \frac{1}{4}T^2 + 4$