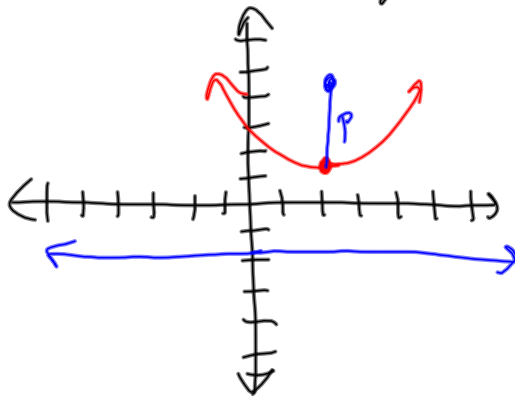


Parabolas directrix

A parabola has a focus of $(2, 4)$
and a directrix of $y = -2$.

What is the equation for the parabola?



① Graph the focus and directrix

② Find the vertex (between the focus and directrix.)

$$v: (2, 1)$$

③ Find $a = \frac{1}{4p}$ $y = a(x-h)^2 + k$

④ Is $a = \begin{matrix} \oplus \rightarrow \text{opens up} \\ \ominus \rightarrow \text{opens down} \end{matrix}$ $y = \frac{1}{4p}(x-h)^2 + k$

\oplus

⑤ Find p : distance from the vertex to the focus.

$$p = 3$$

$$\text{⑥ } \frac{1}{4p} = \frac{1}{4 \cdot 3} = \frac{1}{12}$$

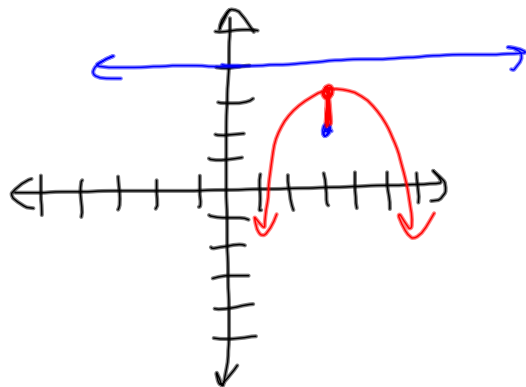
$$a = \oplus \frac{1}{12}$$

⑦ Write the equation $y = a(x-h)^2 + k$

$$y = \frac{1}{12}(x-2)^2 + 1$$

b. focus : $(3, 2)$

directrix : $y = 4$



$v: (3, 3)$

$a: \ominus$

$p = 1$

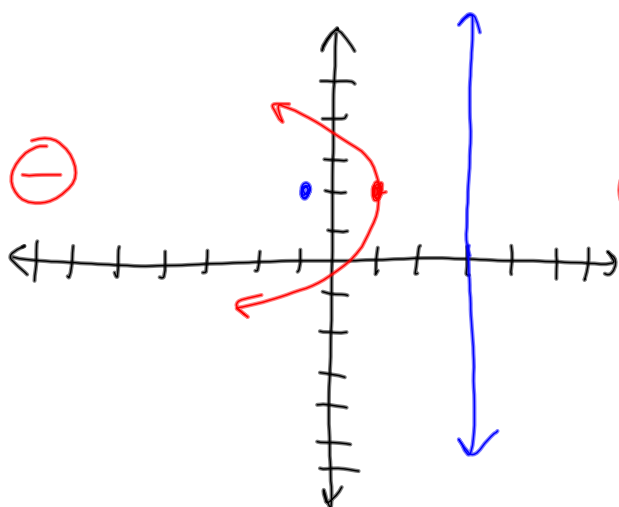
$$\frac{1}{4p} = \frac{1}{4 \cdot 1} = \frac{1}{4}$$

$a = -\frac{1}{4}$

$$y = -\frac{1}{4}(x-3)^2 + 3$$

c. focus : $(-1, 2)$

directrix : $x = 3$



$v: (1, 2)$

$a: \ominus$

\oplus

$p: 2$

$$\frac{1}{4p} = \frac{1}{4 \cdot 2} = \frac{1}{8}$$

$$a = -\frac{1}{8}$$

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

$$x = -\frac{1}{8}(y-2)^2 + 1$$