

## MATH 1650: SECTION 7.2: PARABOLAS

### THE STANDARD EQUATION OF PARABOLAS:

- The equation of a (vertical) parabola with vertex  $(h, k)$  and focal length  $|p|$  is

$$(x - h)^2 = 4p(y - k)$$

If  $p > 0$ , the parabola opens upwards; if  $p < 0$ , it opens downwards.

- The equation of a (horizontal) parabola with vertex  $(h, k)$  and focal length  $|p|$  is

$$(y - k)^2 = 4p(x - h)$$

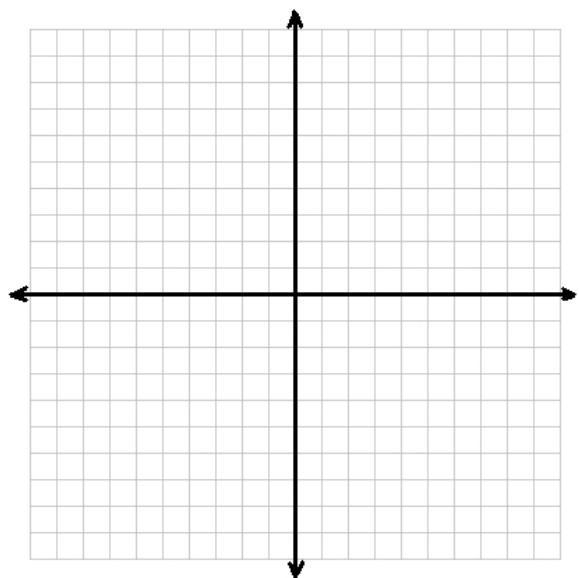
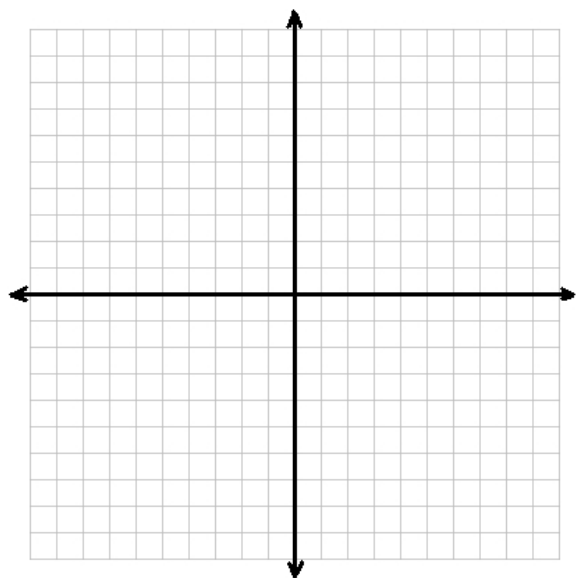
If  $p > 0$ , the parabola opens to the right; if  $p < 0$ , it opens to the left.

### EXAMPLE:

- Graph each of the following equations below in the  $xy$ -plane. Find the vertex, focus, and directrix.

(a)  $(x + 1)^2 = -8(y - 3)$ .

(b)  $y^2 + 4y + 8x = 4$ .



2. Represent the parabola  $y^2 + 4y + 8x = 4$  as the graphs of two or more functions of  $x$ .

3. Find the standard form of the parabola satisfying the following characteristics:

(a) Find the standard form of the equation of the parabola with focus  $(2, 1)$  and directrix  $y = -4$ .

(b) The parabola sketched below:

