

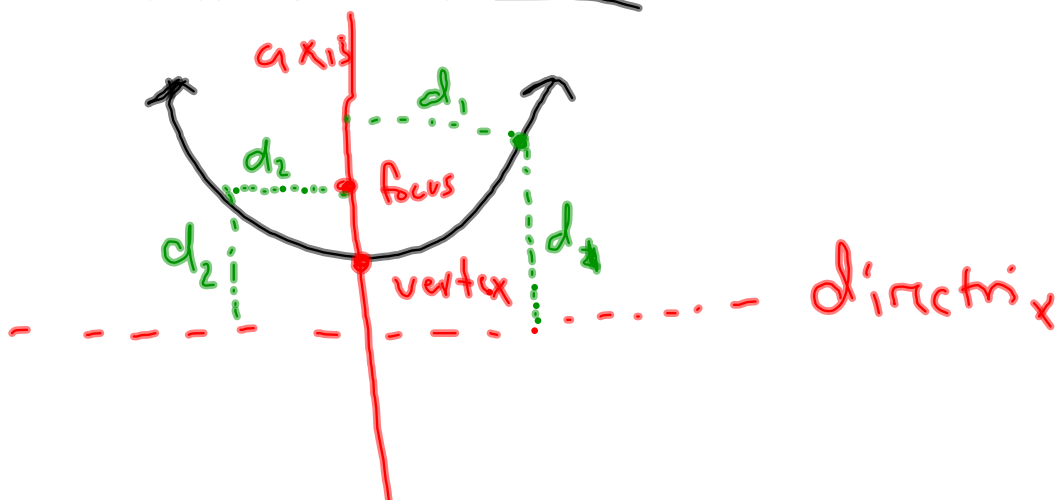
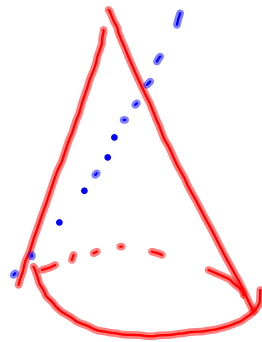
## 8.7 Parabolas

set of all points  $(x, y)$  that are equidistant from a fixed line, the directrix, and a fixed point, called the focus.

vertex: midpoint

between the focus and directrix.

the line passing through the focus and vertex is the axis of the parabola.



Standard form of a parabola with vertex at the origin with a focus  $p$  units away from the origin is:

$$x^2 = 4py \quad \text{upright parabola} \quad \curvearrowright \curvearrowleft$$

$$y^2 = 4px \quad \text{sideways parabola} \quad \curvearrowleft \curvearrowright$$

Standard form of a parabola with vertex  $(h, k)$  and focus  $p$  units from the vertex is:

$$(x-h)^2 = 4p(y-k) \quad \text{upright}$$

$$(y-k)^2 = 4p(x-h) \quad \text{sideways}$$

Find the vertex and focus of

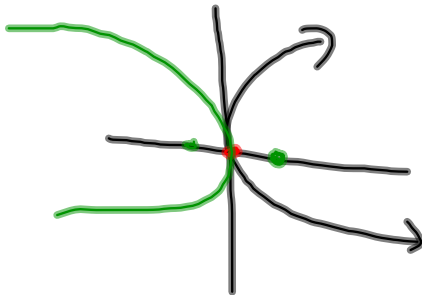
$$\frac{x}{2} = 2\frac{y^2}{2} \quad \text{and sketch the graph.}$$

$$y^2 = \frac{1}{2}x \rightarrow y^2 = 4px$$

$$y^2 = 4\left(\frac{1}{8}\right)x$$

$$\text{vertex: } (0, 0)$$

$$\text{focus: } \left(\frac{1}{4}, 0\right)$$



Ex: Find the vertex and focus

$$\text{of } -4(x-3) + (y-1)^2 = 0.$$

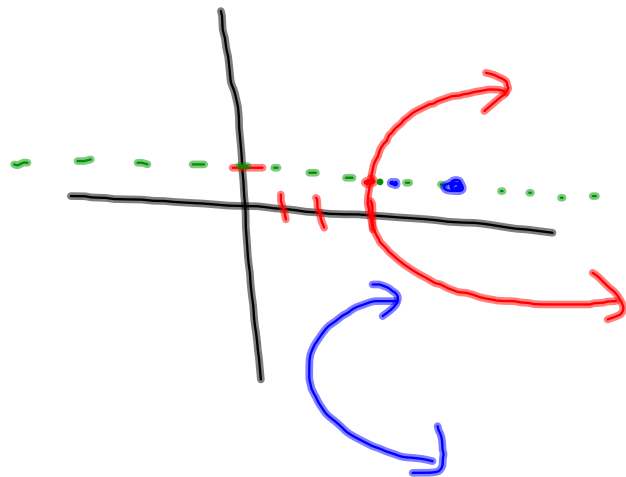
$+4(x-3)$   $+4(x-3)$

$$(y-1)^2 = 4(x-3)$$

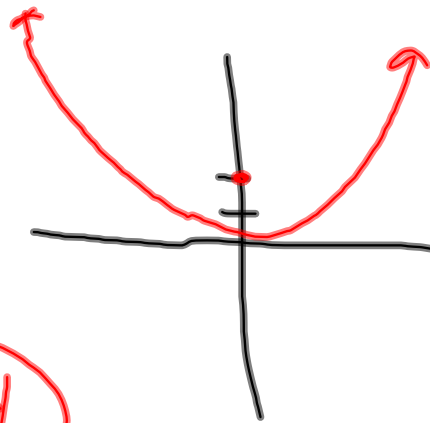
$$(y-1)^2 = 4(\underline{1})(x-3)$$

vertex: (3, 1)

focus: (4, 1)



Find standard form equation of a parabola with a focus at  $(0, \underline{2})$  and a vertex at  $(0, 0)$ .



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

HW: p. 563

2-16, 30-40 even