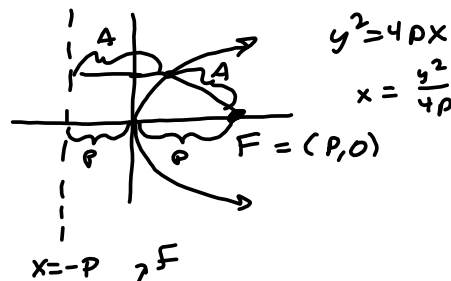
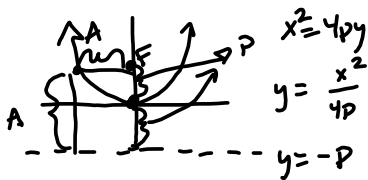


Section 7.1 - Parabolas

1 A parabola is the set of all points in the plane that are equidistant from a fixed point called the and a fixed line called the of the parabola.



2 The graph of the equation $x^2 = 4py$ is a parabola with focus $F(x, y) = (0, p)$ and directrix $y = -p$. So the graph of $x^2 = 8y$ is a parabola with focus $F(x, y) = (0, 2)$ and directrix $y = -2$.

$4p = 8$
 $p = 2$

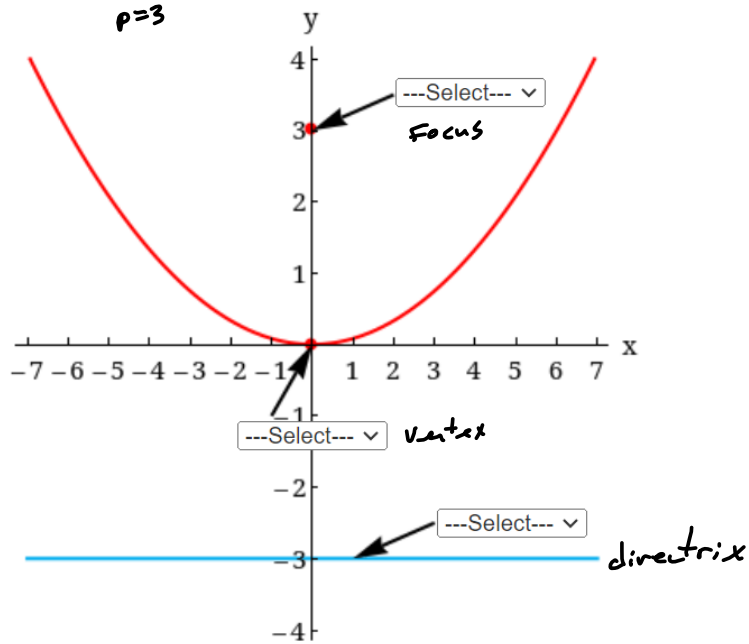
3 The graph of the equation $y^2 = 4px$ is a parabola with focus $F(x, y) = (p, 0)$ and directrix $x = -p$. So the graph of $y^2 = 12x$ is a parabola with focus $F(x, y) = (3, 0)$ and directrix $x = -3$.

$12 = 4p$
 $3 = p$

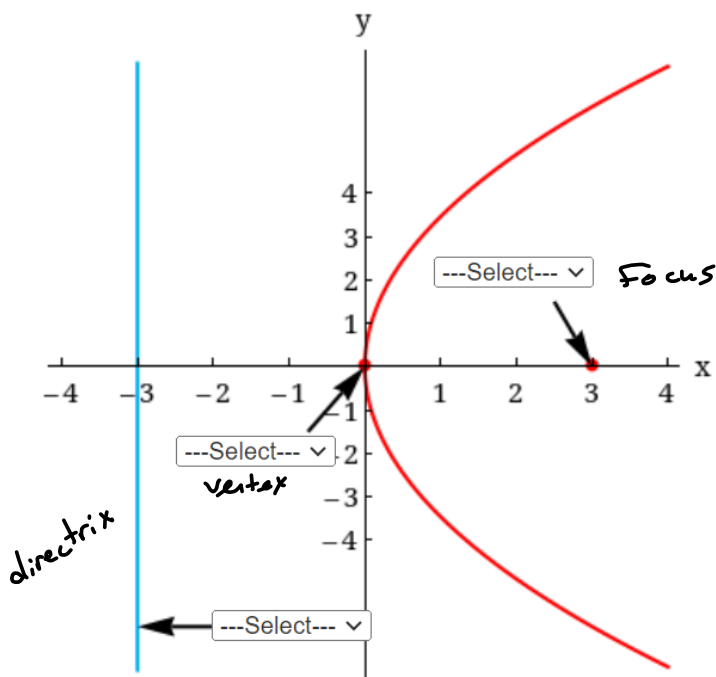
Label the focus, directrix, and vertex on the graphs of the following parabolas.

4

(a) $x^2 = 12y$
 $p=3$



(b) $y^2 = 12x$

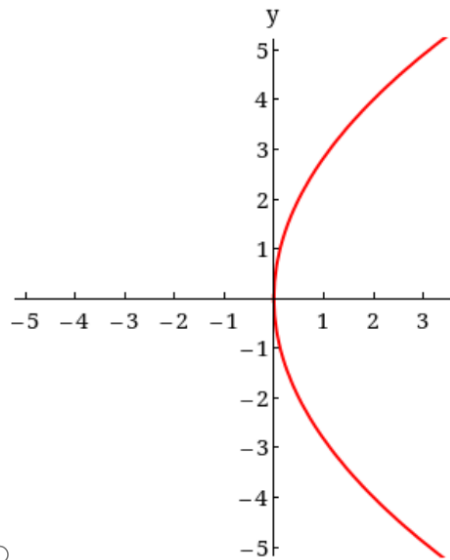
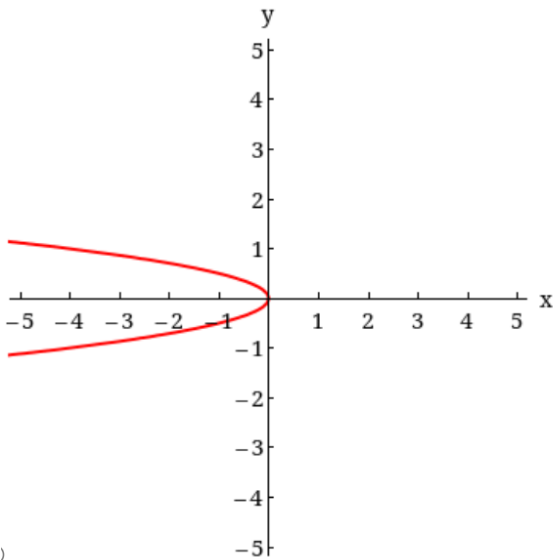
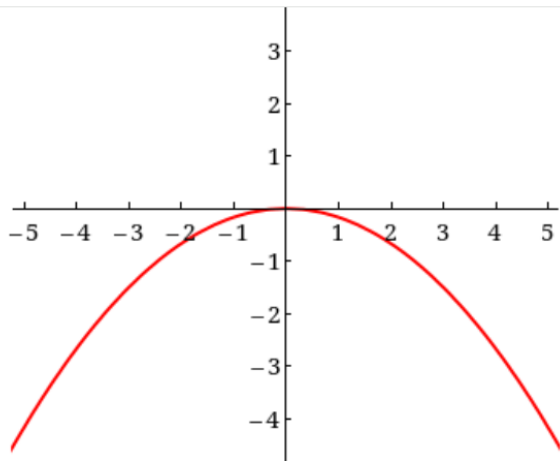
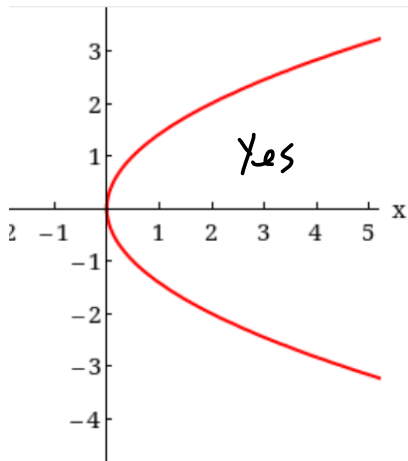
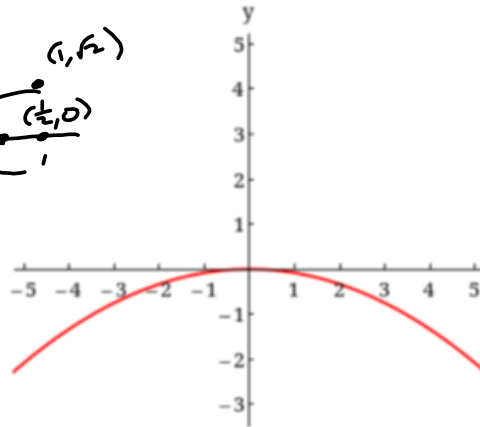
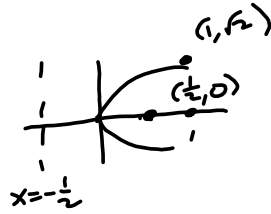
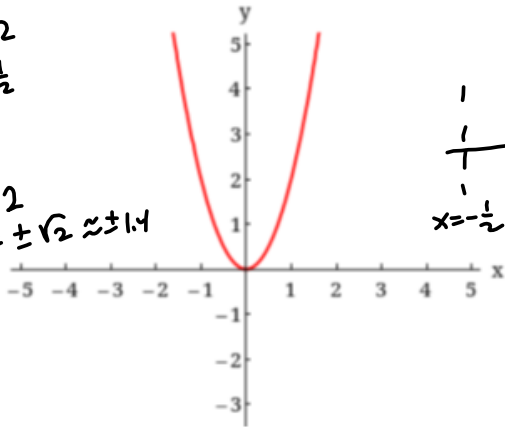


Match the equation with the graph.

5

$y^2 = 2x$

$4p = 2$
 $p = \frac{1}{2}$
 $x = 1$
 $b^2 = 2$
 $y = \pm\sqrt{2} \approx \pm 1.4$



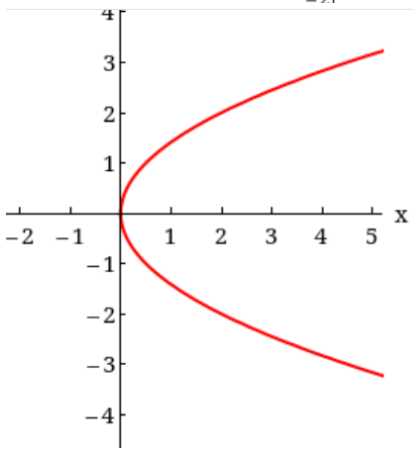
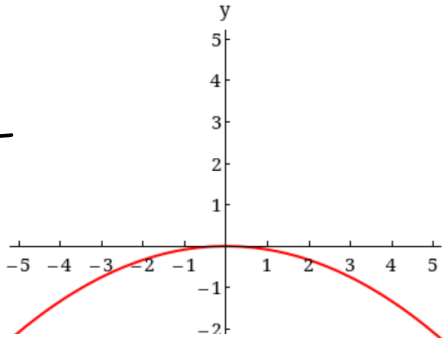
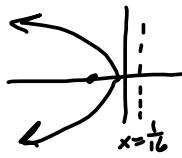
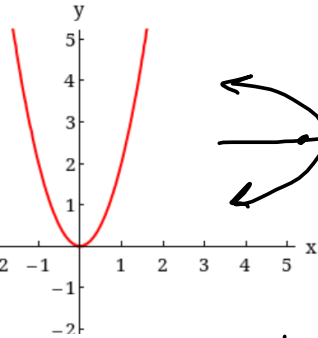
6 Match the equation with the graph.

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

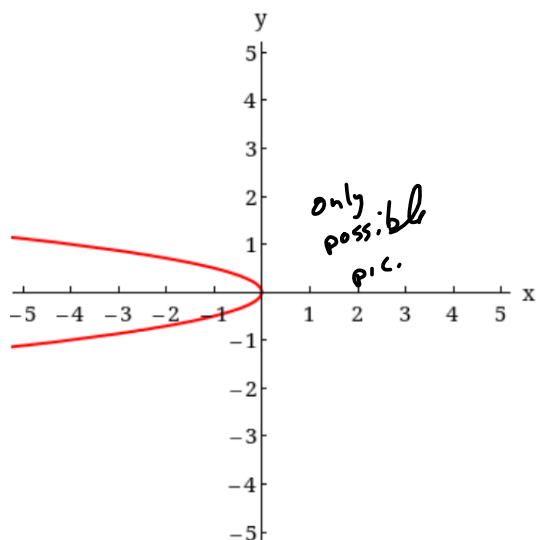
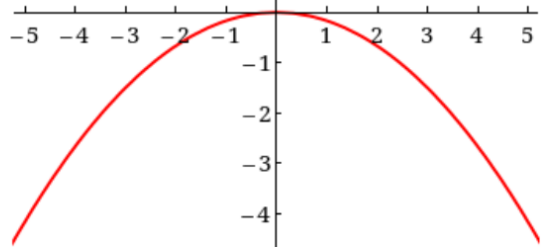
$$p = -\frac{1}{4}$$

$$p = -\frac{1}{16}$$

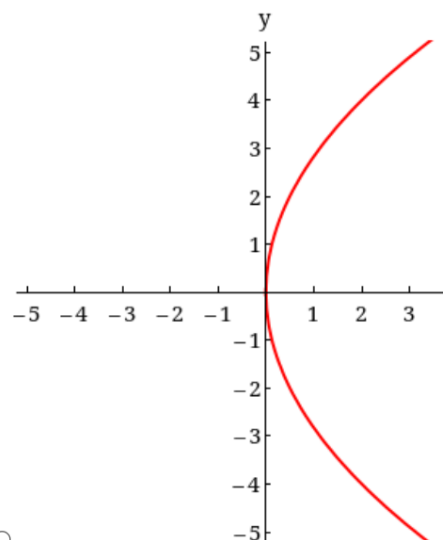
$x = 1$ } *Wrong!*
 $y^2 = -\frac{1}{4}$ }



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



only possible pic.



○

An equation of a parabola is given.

9

$x^2 = 4y$ $4p = 4 \Rightarrow p = 1$

(a) Find the focus, directrix, and focal diameter of the parabola.

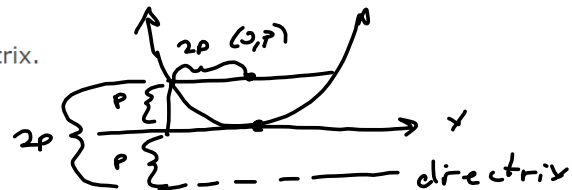
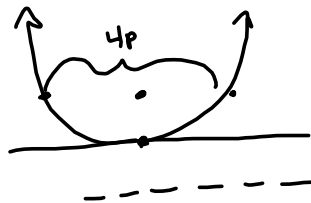
focus $(x, y) = (\boxed{0, 1})$

directrix $\boxed{y = -1}$

focal diameter $\boxed{4|p| = 4}$ = length of latus rectum?!



(b) Sketch a graph of the parabola and its directrix.



$4p =$ "focal diameter."

An equation of a parabola is given.

10

$x^2 = -4y$

(a) Find the focus, directrix, and focal diameter of the parabola.

focus $(x, y) = (\boxed{})$

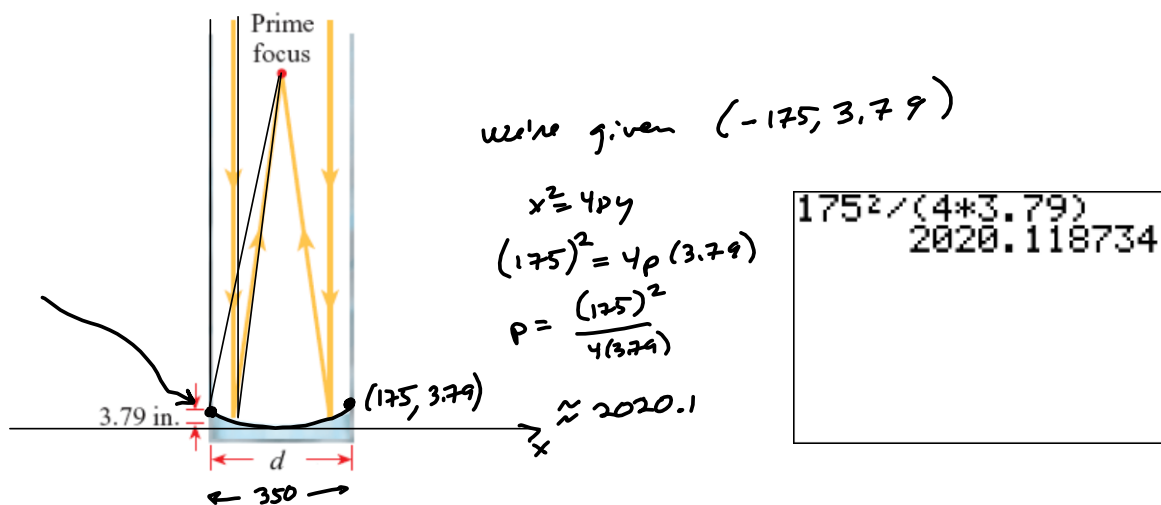
directrix $\boxed{}$

focal diameter $\boxed{}$

(b) Sketch a graph of the parabola and its directrix.

- 19 A telescope at a mountaintop observatory has a $d = 350$ -in. mirror, as shown in the figure. The mirror is constructed in a parabolic shape that collects light from the stars and focuses it at the **prime focus**, that is, the focus of the parabola. The mirror is 3.79 in. deep at its center. Find the **focal length** of this parabolic mirror, that is, the distance from the vertex to the focus. (Round your answer to one decimal place.)

✓ in



Watch the video below then answer the question.

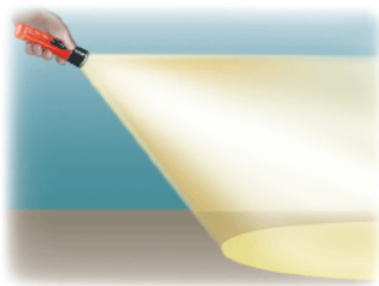
20

Parabolas of the form $x^2 = 4py$

The equation of the parabola with its vertex at the origin and passes through the point $(2, 2)$ has the form $x^2 = 4py$. Find p . (Enter an exact number as an integer, fraction, or decimal.)

$p =$

A flashlight is held to form a lighted area on the ground, as shown in the figure. Is it possible to angle the flashlight in such a way that the boundary of the lighted area is a parabola? Explain your answer.

21

- Yes, if a cone intersects a plane at an angle to the base of the cone, the resulting curve is a parabola.
- Yes, if a cone intersects a plane that is parallel to an edge of the cone, the resulting curve is a parabola.
- No, if a cone intersects a plane at an angle to the base of the cone, the resulting curve is a line.
- No, if a cone intersects a plane at any angle, the result is always a circle.