Name: Key

CC ALGEBRA 2

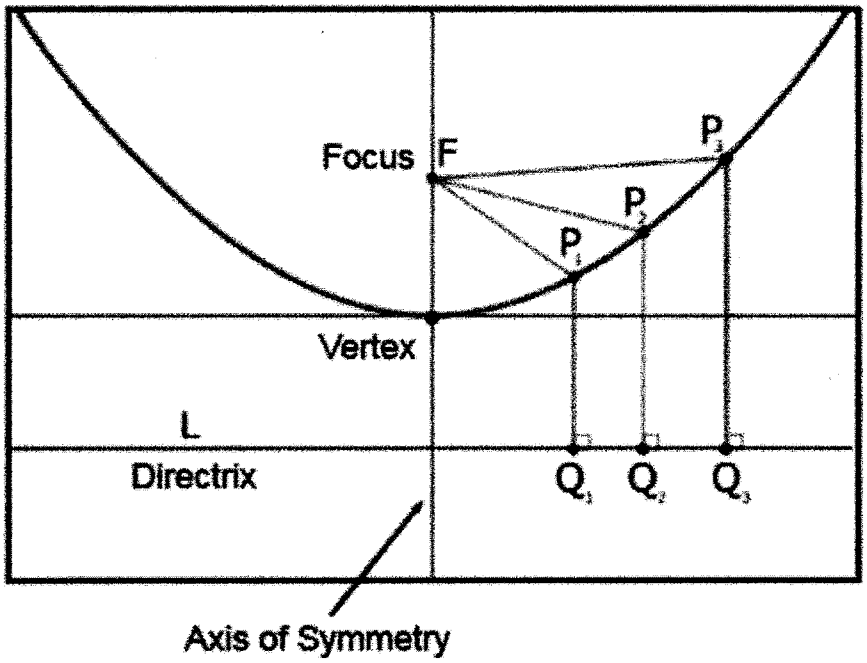
Date: 11/21/17

TROICI

LESSON #5: FOCUS AND DIRECTRIX

Do Now:

Definition of a parabola: The collection of all points equidistant from a fixed point (known as a **focus**) and a fixed line (known as a **directrix**).

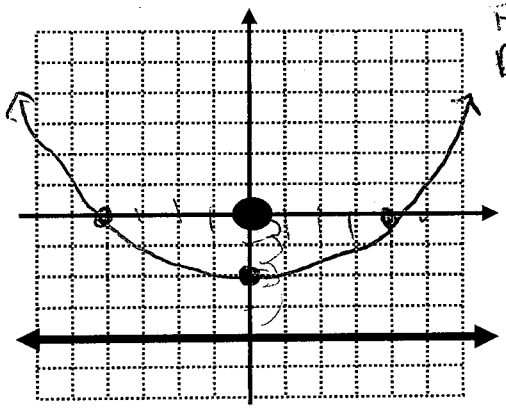


http://www.intmath.com/plane-analytic-geometry/parabola-interactive.php

When the vertex is at (h,k) and the **distance from the focus to the directrix** is ***p***, the equation of the parabola is:

$$(y-k)=\frac{1}{2p}(x-h)^2$$

1. Draw the parabola and write the equation for the focus and directrix given below.



focus = (0, 0)

directrix: $y = -4$

$p = 4$

vertex = (0, −2)

h K

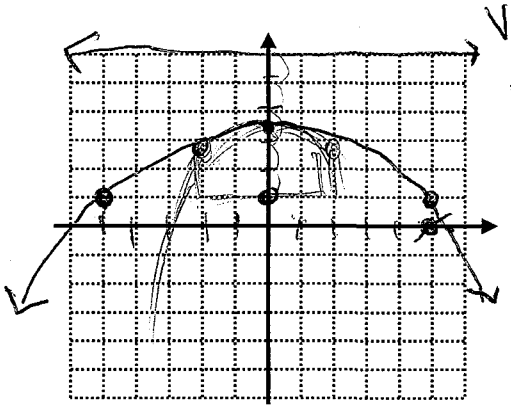
$y-(-2)=\frac{1}{2(4)}(x-0)^2$

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

$-2 \quad -2$

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

2. Draw the parabola and write the equation whose ***focus*** is $(0,1)$ and directrix is $y = 6$.



vertex: (0, 3.5)
h, k

$p = 5$

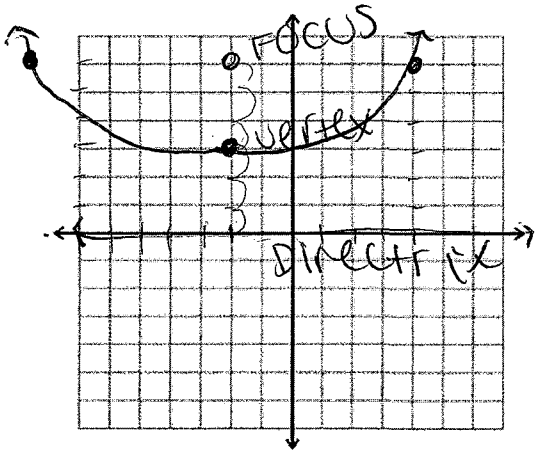
$y - (3.5) = \frac{1}{2(5)}(x-0)^2$

$y - 3.5 = \frac{1}{-10}x^2$

$+3.5 \quad +3.5$

$\boxed{y = \frac{1}{10}x^2 + 3.5}$

3. Draw the parabola and write the equation whose ***vertex*** is $(-2,3)$ and directrix is the x-axis.



vertex (-2, 3)
h k

$p = 6$

$y - 3 = \frac{1}{2(6)}(x - -2)^2$

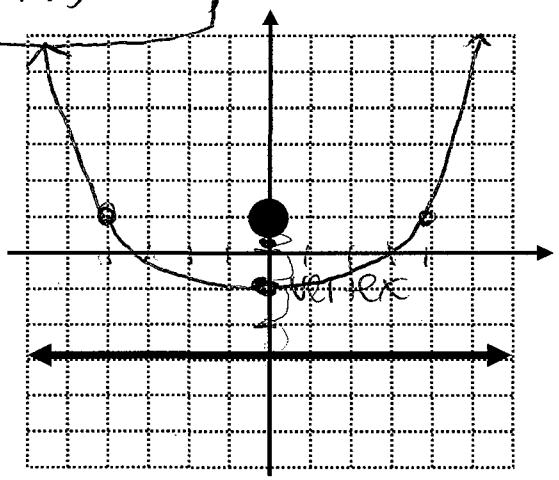
$y - 3 = \frac{1}{12}(x+2)^2$

$+3 \quad +3$

$\boxed{y = \frac{1}{12}(x+2)^2 + 3}$

Partner Practice:

4. Draw the parabola and write the equation of the parabola for the focus and directrix given to the right.



vertex: (0, -1)

$p = 4$

$y - (-1) = \frac{1}{2(4)}(x-0)^2$

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

$-1 \quad -1$

$\boxed{y = \frac{1}{8}x^2 - 1}$

June 2016 Regents (2 points)

30 The directrix of the parabola $12(y + 3) = (x - 4)^2$ has the equation $y = -6$. Find the coordinates of the focus of the parabola.

$\frac{12}{12}$

$y+3 = \frac{1}{12}(x-4)^2$

$-3 \quad -3$

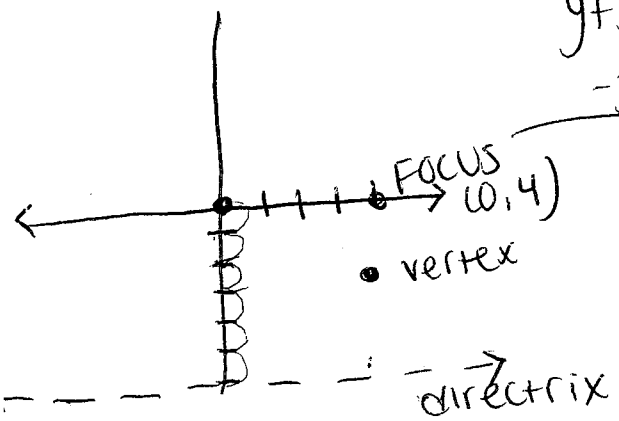
$y = \frac{1}{12}(x-4)^2 - 3$

↳ $2p = 12$

$p = 6$

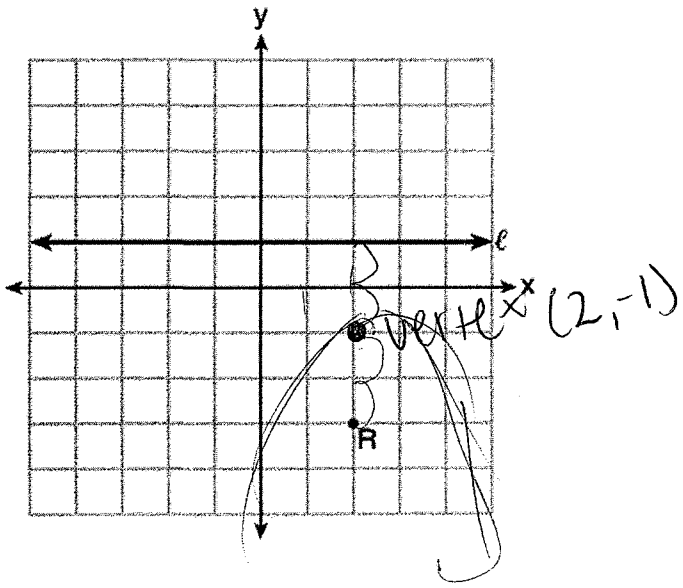
vertex $= (4, -3)$

FOCUS $= (0, 4)$



August 2016 (2 points)

19 Which equation represents the set of points equidistant from line l and point R shown on the graph below?



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

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

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

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

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LAB #12

1) Find the standard form of the equation of a parabola with the given characteristics:

vertex (0, 0) and directrix at y = -3

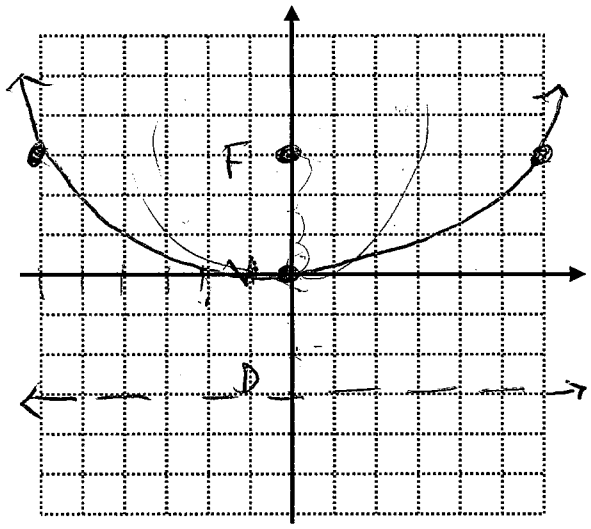
$p = 6$

vertex = (0, 0)

h k

$y - 0 = \frac{1}{2(6)}(x-0)^2$

$\boxed{y = \frac{1}{12}x^2}$



2) Write the equation of a parabola whose directrix is y = 2 and focus is (1, 0).

vertex = (1, 1)

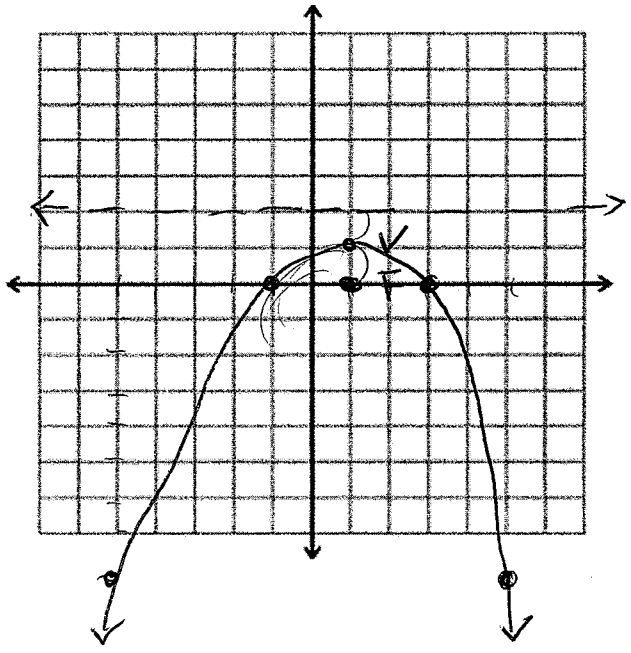
$p = -2$

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

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

$+1 \quad +1$

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



3) Write the coordinates of the focus of a parabola if the turning point (vertex) is (2, -1) and the directrix is $y = 2$.

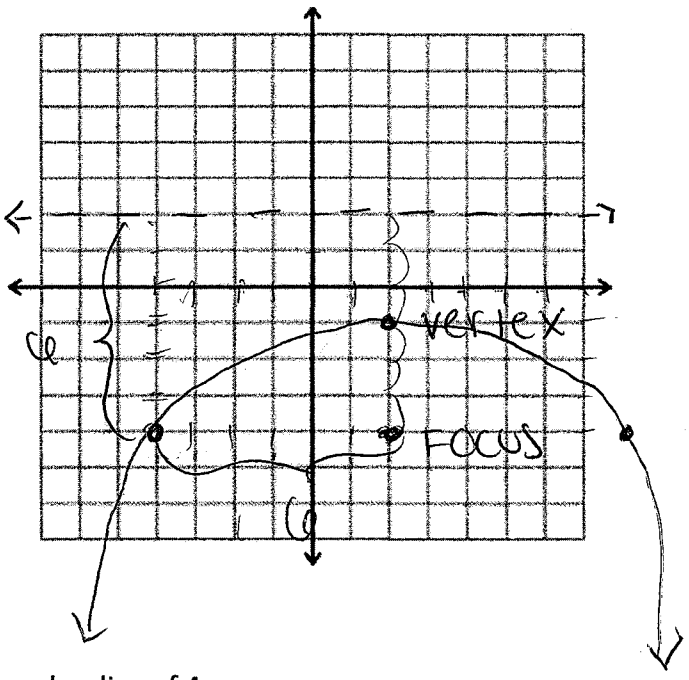
$p = -6$

vertex $= (2, -1)$
$h \quad k$

$$y - (-1) = \frac{1}{2(-6)}(x-2)^2$$

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

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



REVIEW:

4) Find the **standard form** of a circle with center (2, -3) and radius of 4.

$$(x-2)^2 + (y+3)^2 = 4^2$$
$$(x-2)(x-2) + (y+3)(y+3) = 16$$
$$x^2 - 2x - 2x + 4 + y^2 + 3y + 3y + 9 = 16$$
$$x^2 - 4x + 4 + y^2 + 6y + 9 = 16$$
$$x^2 - 4x +$$

5) a) Write the equation of a circle in **center-radius form**:

$x^2 + y^2 - 2x - 6y - 6 = 0$
$\quad +6 \quad +6$

$$x^2\left(-\frac{2}{2}\right)^2 x + 1 + y^2\left(-\frac{6}{2}\right)^2 y + 9 = 6 + 1 + 9$$

$$(x-1)^2 + (y-3)^2 = 16$$

$\boxed{\text{center} = (1, 3)}$
$\boxed{\text{radius} = 4}$

b) Identify the center and radius.