

GeoGebra Dynamic Worksheet: Parabolas 1

Answer Sheet

Go to www.doublecrosseducation.com/fetc.htm. Click on Parabola 1.
This shows the graph of the parabola in the form:

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

You can manipulate the graph by changing the value(s) of h , k and p which are called the **parameters** of the equation. In this worksheet we will examine how each of these parameters changes the graph of the parabola.

- Start with $h=0$, $k=0$ and $p=2$.

1. Write the equation of this parabola using the form above. $y = \frac{1}{8}x^2$
2. Write the equation of the directrix, coordinates of the vertex and focus.
Directrix: $y=-2$, vertex: $(0,0)$, focus: $(0,2)$

- Set $h=2$, $k=0$, $p=2$.

3. Write the equation for this parabola. $y = \frac{1}{8}(x-2)^2$
4. Write the equation of the directrix, coordinates of the vertex and focus.
Directrix: $y=-2$, vertex: $(2,0)$, focus: $(2,2)$

- Set $h=2$, $k=3$, $p=2$.

5. Write the equation for this parabola. $y - 3 = \frac{1}{8}(x-2)^2$
6. Write the equation of the directrix, coordinates of the vertex and focus.
Directrix: $y=1$, vertex: $(2,3)$, focus: $(2,5)$

- Set $h=-2$, $k=-1$, $p=2$.

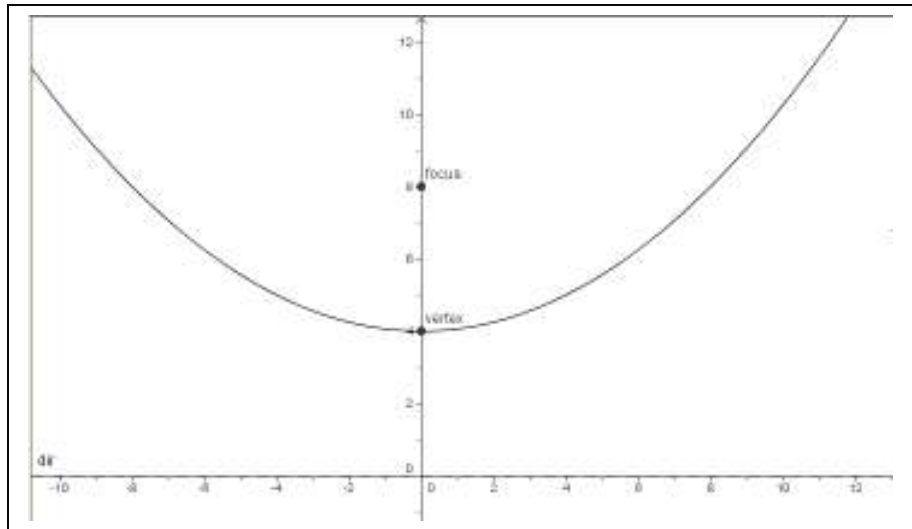
7. Write the equation for this parabola. $y + 1 = \frac{1}{8}(x+2)^2$
8. Write the equation of the directrix, coordinates of the vertex and focus.
Directrix: $y=-3$, vertex: $(-2,-1)$, focus: $(-2,1)$

- Summarize how changing the value of h and k in the equation affects the graph of the parabola. Include any effects on the vertex, focus and directrix.
The values of h and k are the coordinates of the vertex. Moving the slider h in a positive direction (right) moves the parabola right. Moving the slider k right moves the parabola up.
- Set $h = 0$, $k = 0$, $p = 2$. Move slider p and note the changes in the graph. Summarize what happens to the graph as p gets larger. What happens when p becomes negative?
 When $|p|$ gets larger, the parabola gets wider. When p becomes negative, the parabola reflects over the x -axis.

Use the Dynamic Worksheet to help you to sketch a graph of each of the parabolas below. Show the location of the vertex, focus and directrix.

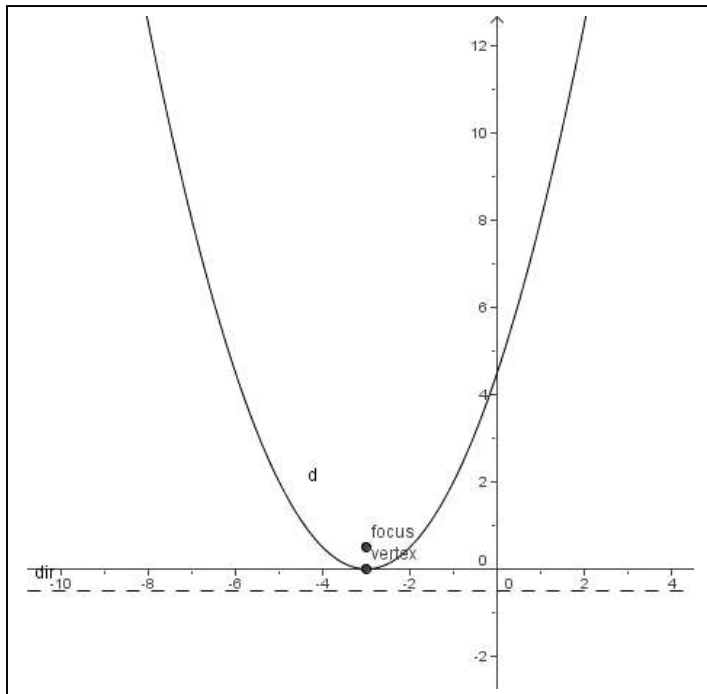
9. $y - 4 = \frac{1}{16}x^2$

Vertex $(0, 4)$
 Focus $(0, 8)$
 Directrix $y = 0$



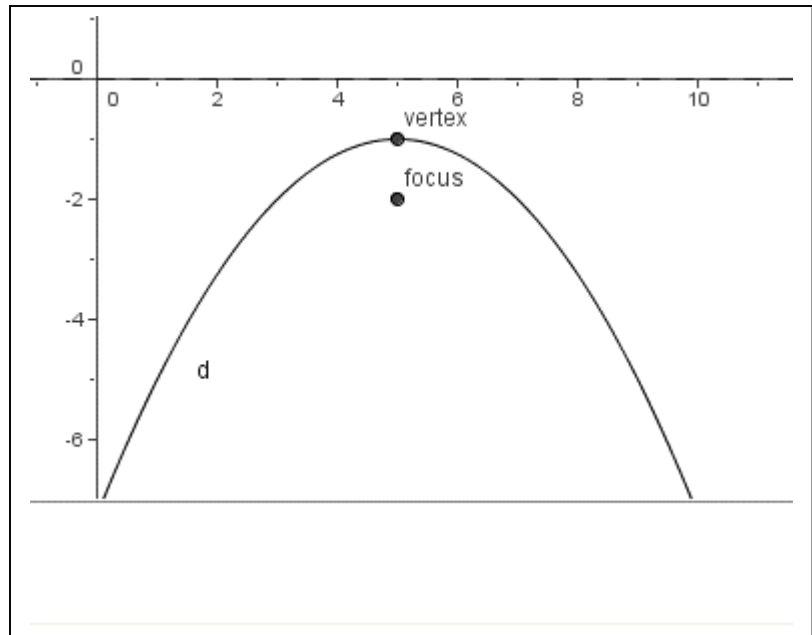
10. $y = \frac{1}{2}(x + 3)^2$

Vertex $(-3, 0)$
 Focus $(-3, \frac{1}{2})$
 Directrix $y = -1/2$



$$11. y + 1 = -\frac{1}{4}(x - 5)^2$$

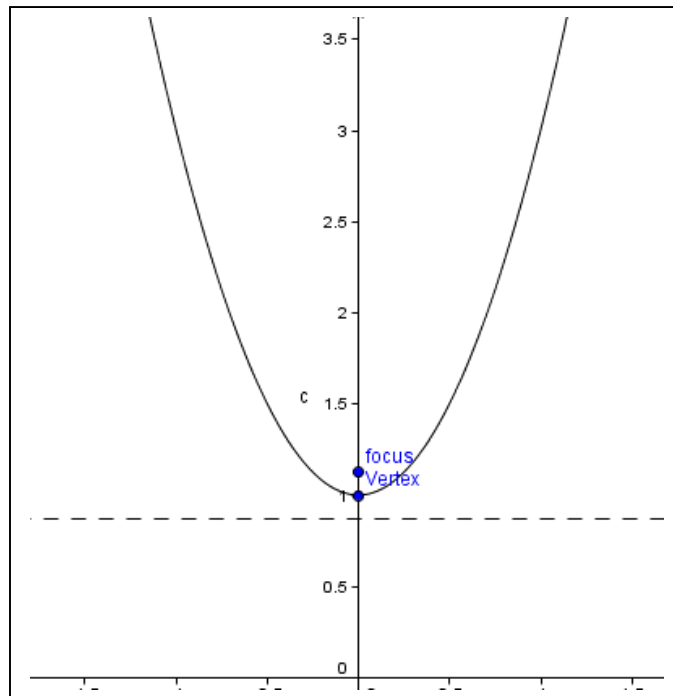
Vertex (5, -1)
Focus (5, -2)
Directrix $y = 0$



Graph each parabola below without using the Dynamic Worksheet.

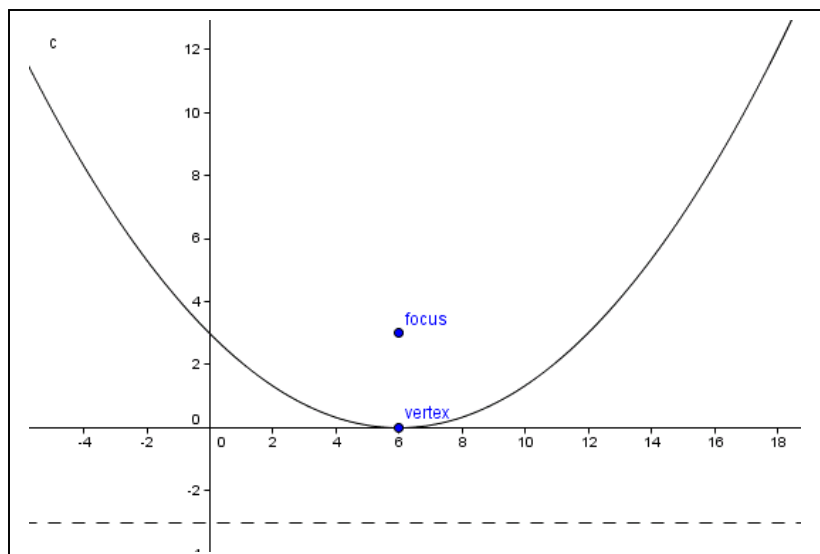
$$12. y - 1 = 2x^2$$

Vertex (0, 1)
Focus (0, 9/8)
Directrix $y = 7/8$



$$13. y = \frac{1}{12}(x - 6)^2$$

Vertex (6, 0)
Focus (6, 3)
Directrix $y = -3$

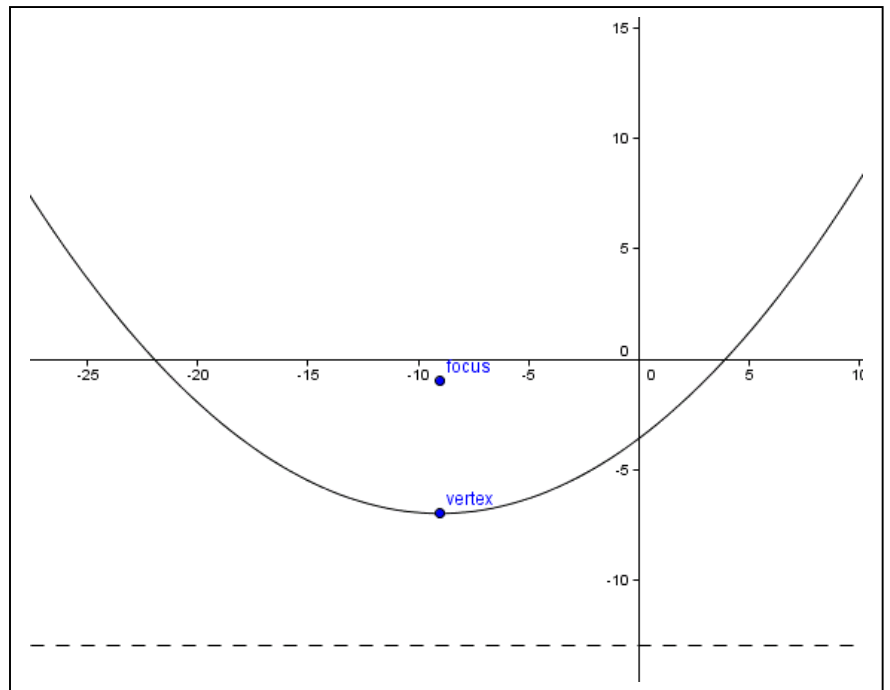


$$14. y + 7 = \frac{1}{24}(x + 9)^2$$

Vertex $(-9, -7)$

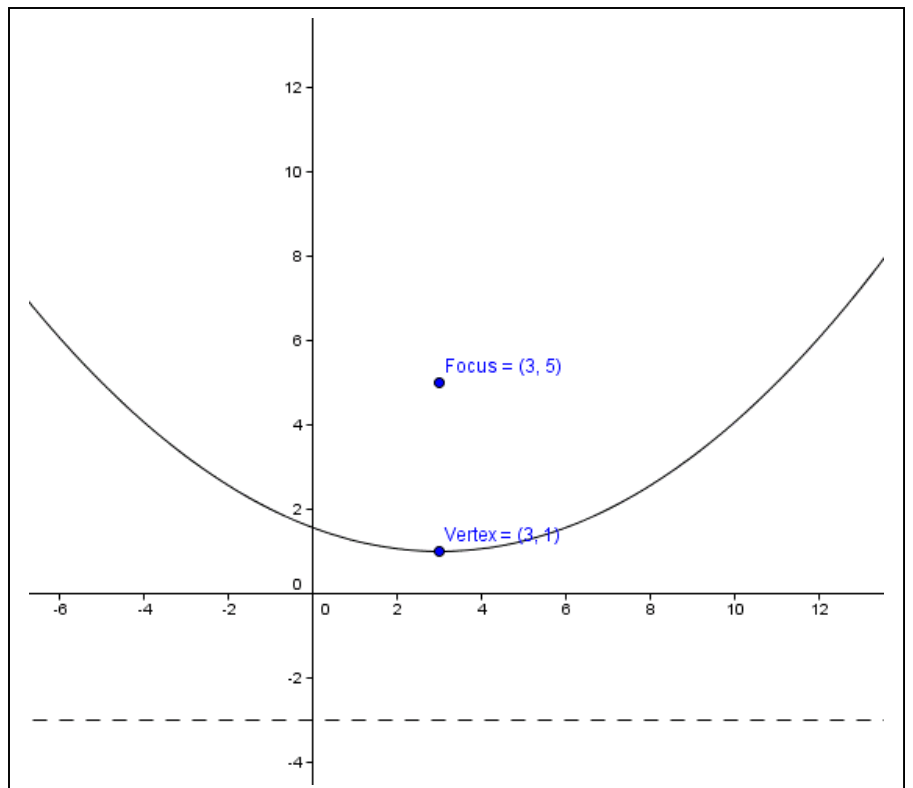
Focus $(-9, -1)$

Directrix $y = -13$



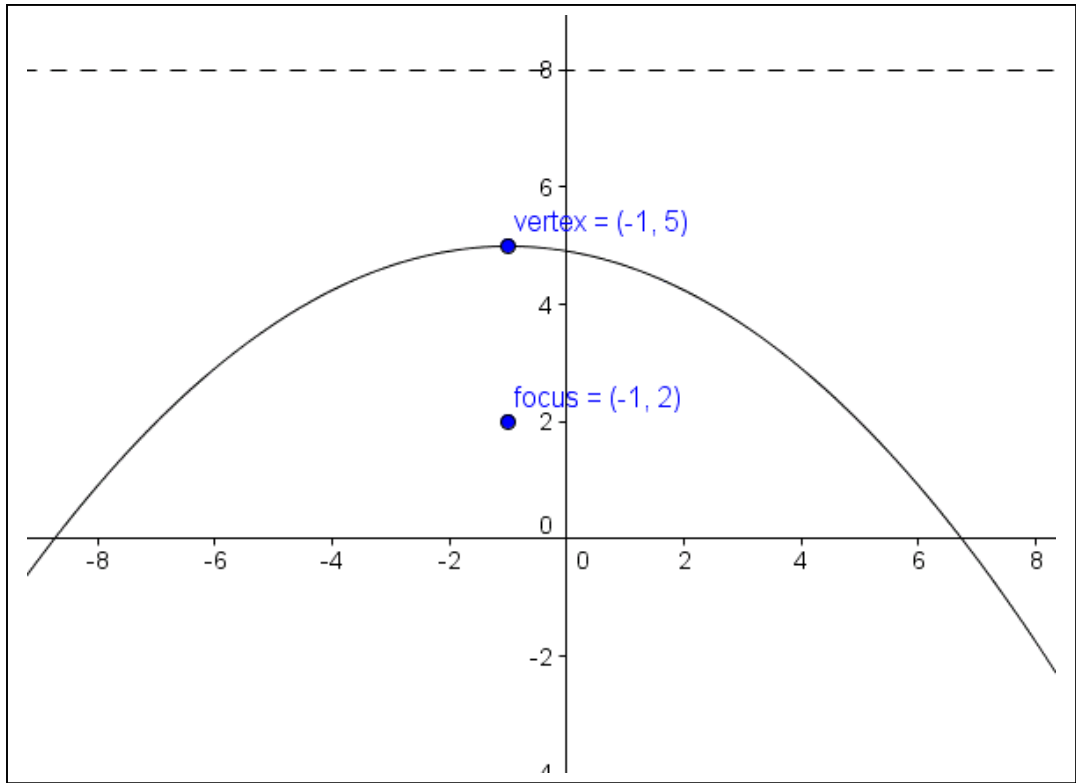
Write the equation for each parabola shown below.
15.

$$y - 1 = \frac{1}{16}(x - 3)^2$$



16.

$$y - 5 = -\frac{1}{12}(x + 1)^2$$



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

