Integrated Math 3
Unit 1: Analytic Geometry
1.15

Name: _____

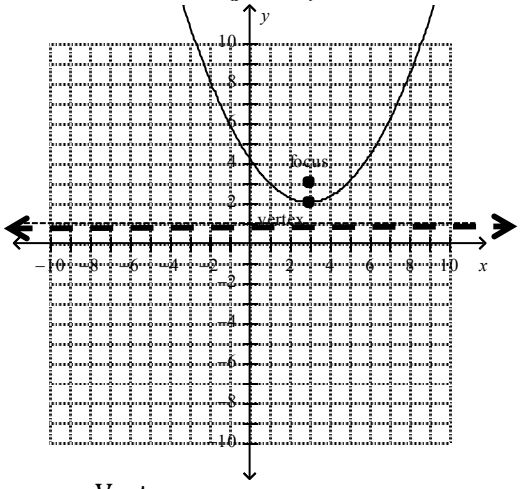
Date:_____ Period:_____

Objective: Determine patterns in parabolas

Exploration: Look at the equations below and the graphs. For each of the following, identify the vertex and focus by giving their coordinate points. **The dotted line represents the directrix of the parabola** – provide the equation for that line. Then answer the questions below.

Let's look at some equations with the x term squared.

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

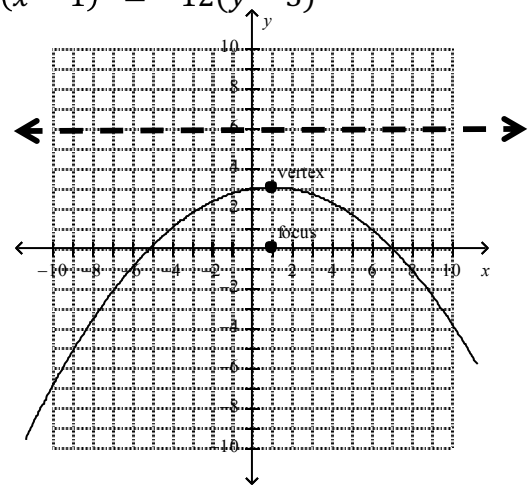


a. Vertex: _____

b. Focus: _____

c. Directrix: _____

2. $(x-1)^2 = -12(y-3)$

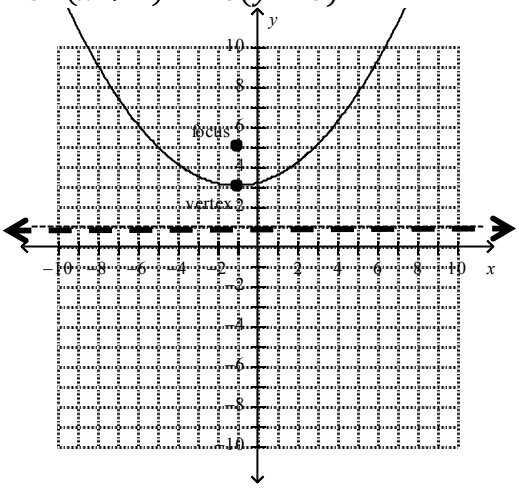


a. Vertex: _____

b. Focus: _____

c. Directrix: _____

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

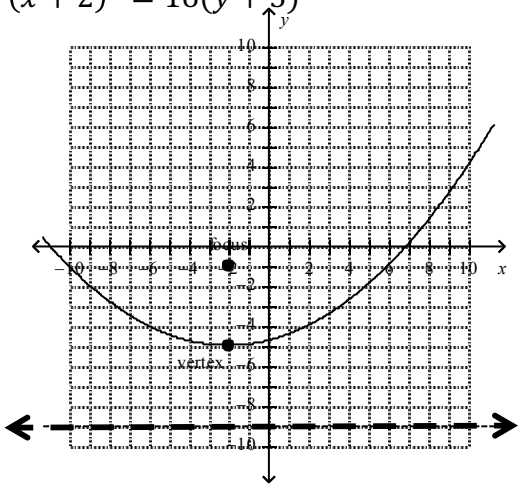


a. Vertex: _____

b. Focus: _____

c. Directrix: _____

4. $(x+2)^2 = 16(y+5)$



a. Vertex: _____

b. Focus: _____

c. Directrix: _____

Based on your information on the previous page...

1. What do you notice about the equation and the vertex?

   _____

   _____

2. What do you notice about the distance between your vertex to your focus and the distance between your vertex and your directrix? _____

3. What do you notice about that distance and the equation?

   _____

   _____

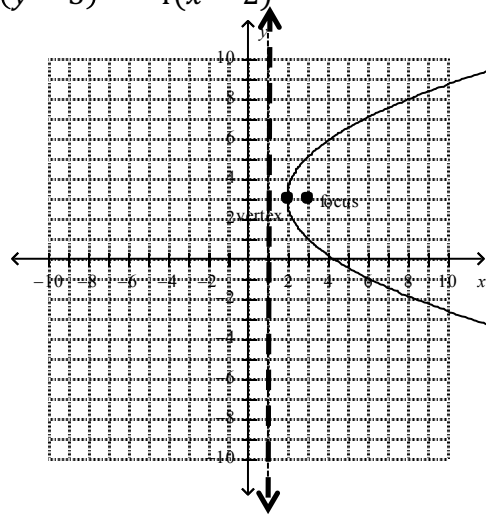
4. What do you notice about the direction the parabola opens and the equation?

   _____

5. If (h, k) represents the vertex and p represents the distance from the vertex to the focus, complete the equation: $(x - \quad)^2 = 4 \quad (y - \quad)$

Let's look at some equations with the y term squared.

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

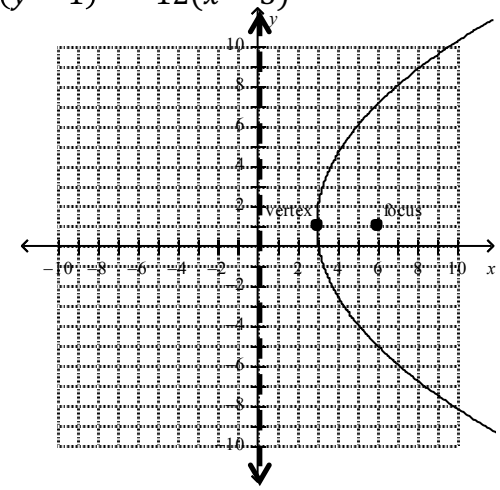


a. Vertex: _____

b. Focus: _____

c. Directrix: _____

2. $(y-1)^2 = 12(x-3)$

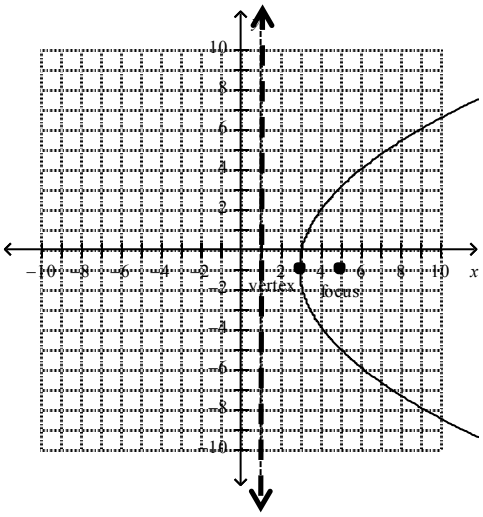


a. Vertex: _____

b. Focus: _____

c. Directrix: _____

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

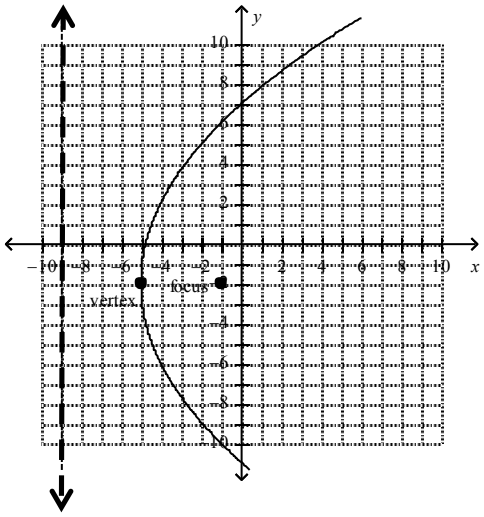


a. Vertex: _____

b. Focus: _____

c. Directrix: _____

4. $(y+2)^2 = 16(x+5)$



a. Vertex: _____

b. Focus: _____

c. Directrix: _____

Based on your information on the previous page...

1. What do you notice about the equation and the vertex?

_____

_____

2. What do you notice about the distance between your vertex to your focus and the distance between your vertex and your directrix? _____

3. What do you notice about that distance and the equation?

_____

_____

4. What do you notice about the direction the parabolas open?

_____

_____

5. If (h, k) represents the vertex and p represents the distance from the vertex to the focus, complete the equation: $(y - \quad)^2 = 4 \quad (x - \quad)$

6. How do you think the equation would have to change to get the parabolas to open in the opposite direction?

_____

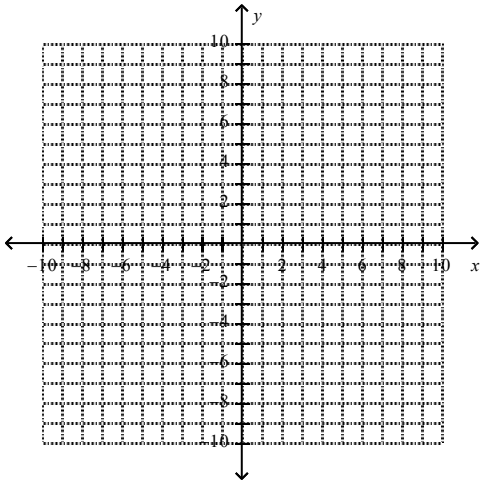
_____

IF YOU'RE CONFIDENT IN THE PATTERNS, CONTINUE WITH THE FOLLOWING; IF YOU'D LIKE TO CHECK YOUR ANSWERS, PLEASE RAISE YOUR HAND. THEN BEGIN THE NEXT SECTION AFTER THEY'VE BEEN CHECKED.

Name _____

For each of the following parabolas, identify the key features: vertex, focus, p-value and directrix. Then graph the key features you found.

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



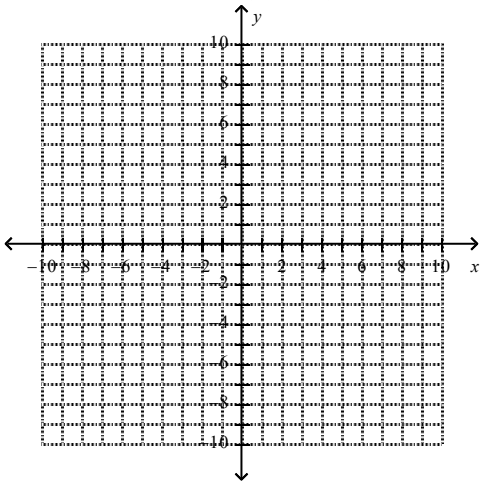
a. Vertex: _____

b. P-value: _____

c. Focus: _____

d. Directrix: _____

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



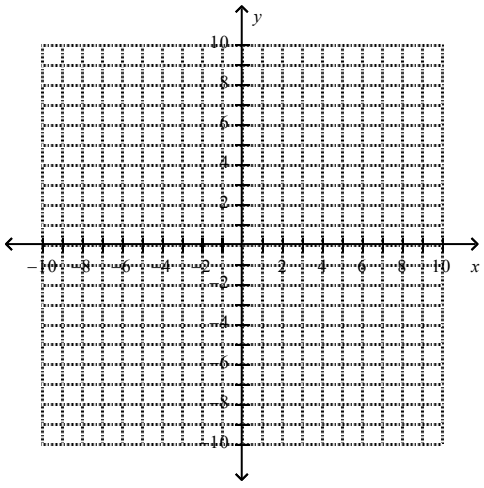
a. Vertex: _____

b. P-value: _____

c. Focus: _____

d. Directrix: _____

3. $(y-1)^2 = 12(x-4)$



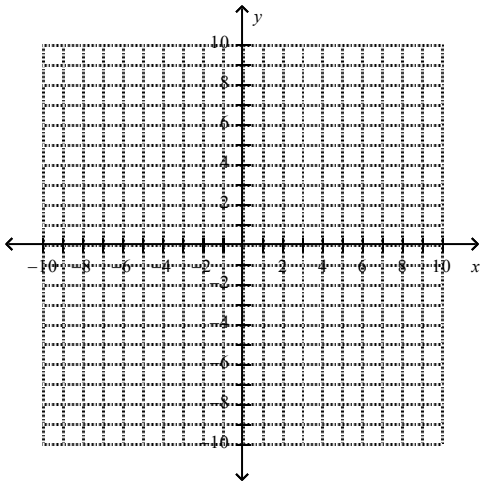
a. Vertex: _____

b. P-value: _____

c. Focus: _____

a. Directrix: _____

4. $x^2 = -2(y+5)$



a. Vertex: _____

b. P-value: _____

c. Focus: _____

d. Directrix: _____