11.1 Parabolas

Name:_____

Distance Formula
The distance between two points (x_1, y_1) and (x_2, y_2) is

$$d =$$

Midpoint Formula
The midpoint between two points (x_1, y_1) and (x_2, y_2) is

$$M(x, y) = \left(\qquad\qquad \right)$$
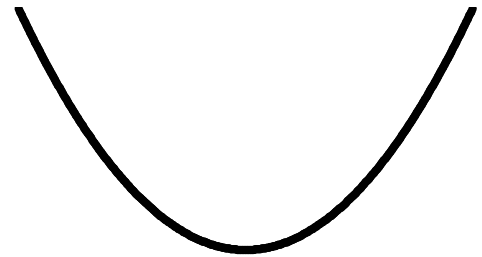
RECALL: Standard form of a quadratic function:
Vertex form of a quadratic function:
The graph is called a _____.

What's old:	What's new:
The graph opens up or down	
Solve for y	

LABEL THE GRAPH:
vertex
axis of symmetry
focus
directrix

Transformational Form
Opens up or down with a vertex at (h, k).

Opens left or right with a vertex at (h, k).
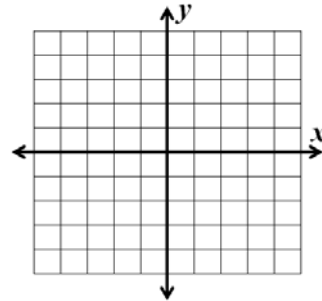

| **What is p?**	What is the distance between the focus and the directrix?

For each equation, identify all the of the parts listed, then sketch a graph.

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

   Coordinate of vertex:

   Direction it opens:

   Axis of symmetry:

   Coordinate of focus:

   Equation for directrix:

Focal Width: The _____ of the parabola at the _____. The width is _____.

2. $(y + 1)^2 = -6(x - 4)$

   Coordinate of vertex:

   Direction it opens:

   Axis of symmetry:

   Coordinate of focus:

   Equation for directrix:
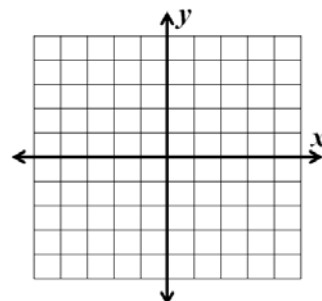
3. If $(1, -4)$ is the vertex and $(5, -4)$ is the focus, write an equation for the parabola.

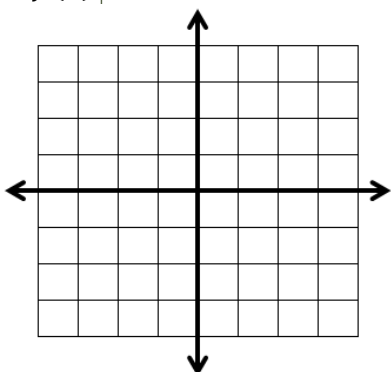4. If $(-3, -6)$ is the focus and $y = 1$ is the directrix, write an equation for the parabola.

Now summarize what you learned!

_____

_____

_____

_____

Algebra Skillz:

1. Graph $f(x) = -\sqrt{x - 3} + 1$

Multiply.

2. $(2 + \sqrt{3})(3 - \sqrt{3})$

3. $(2 + \sqrt{x})(3 - \sqrt{3})$

Solve by factoring.

4. $x^2 + 16x = 0$

5. $x^4 - 5x^2 + 4 = 0$

11.1 Practice – Parabolas

Name: _____

In exercises 1-4, Sketch the graph of the given equation and fill in the blanks for the given information.
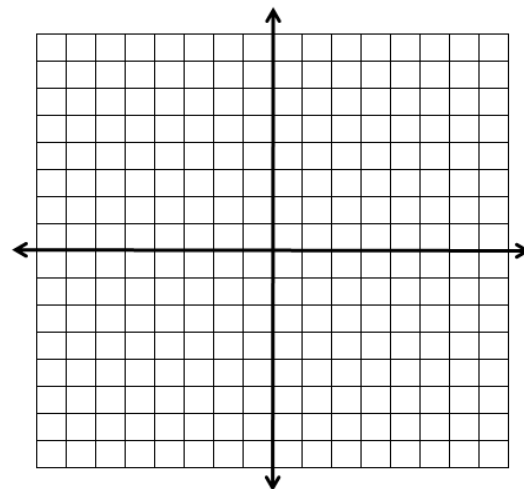
1. $(x + 2)^2 = -12(y + 1)$ Coordinate of vertex:

   Direction it opens:

   Axis of symmetry:

   Coordinate of focus:

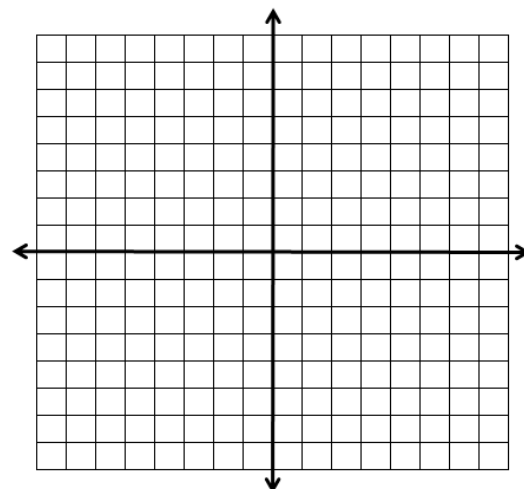   Equation for directrix:

2. $(y + 2)^2 = 16(x + 3)$ Coordinate of vertex:

   Direction it opens:

   Axis of symmetry:

   Coordinate of focus:
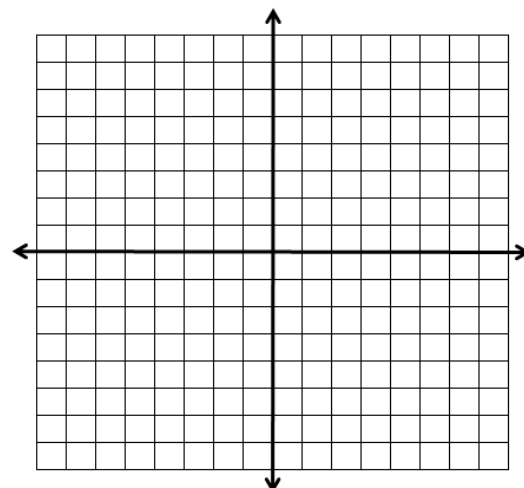
   Equation for directrix:

3. $(y - 1)^2 = 8(x + 3)$ Coordinate of vertex:

   Direction it opens:

   Axis of symmetry:

   Coordinate of focus:

   Equation for directrix:
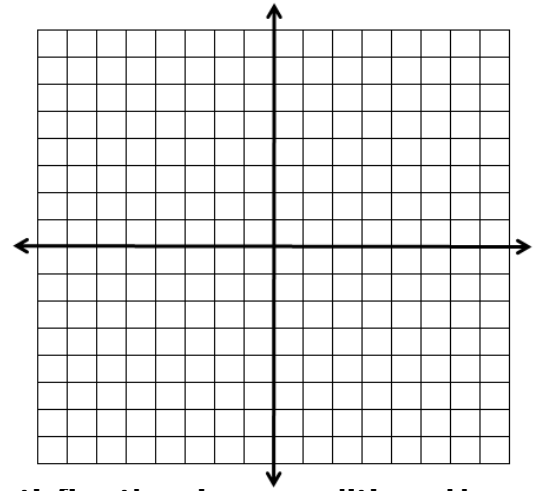
4. $(x - 1)^2 = -2(y - 4)$ Coordinate of vertex:

Direction it opens:

Axis of symmetry:

Coordinate of focus:

Equation for directrix:

In exercises 5-14, find an equation for the parabola that satisfies the given condition. Use transformational form (just like the notes, the quantity squared will be isolated).

5. Vertex: $(0, 0)$, focus: $(-3, 0)$

6. Vertex: $(-4, -4)$, focus: $(-2, -4)$

7. Vertex: $(-5, 6)$, focus: $(-5, 3)$

8. Vertex: $(4, 3)$, directrix: $x = 6$

9. Vertex: $(1, -5)$, directrix: $y = -9$

10. Vertex: $(-2, -8)$, directrix: $x = 0$

11. Focus: $(0, 1)$, directrix: $x = 10$

12. Focus: $(3, 4)$, directrix: $y = 1$

13. Focus: $(-4, 9)$, directrix: $x = -6$

14. Focus: $\left(8, -\frac{23}{12}\right)$, directrix: $y = -\frac{25}{12}$

11.1 Application and Extension

Find an equation for the parabola that satisfies the given condition. Use transformational form.

1. Vertex: $(-4, 3)$, Focus: $(-4, 0)$

2. Focus: $(8, 7)$, directrix: $y = 5$

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3. In order to watch the Armed Forces Network, you need an AFN decoder along with a satellite. In order to better understand conics, Mr. Kelly climbed on your roof and took down your satellite dish – crazy stalker! Laying it on the ground pointing straight up, the receiver is located at the focus, which is 14 inches above the vertex. The satellite is 50 inches wide (think about the x-value).

    a. Draw a sketch of the satellite fitting the above information.

    b. Find an equation for the cross section of the dish assuming the vertex is at the origin.

    c. How deep is the dish?

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4. While camping in Switzerland, you discover the campground will not allow you to make any fires. The problem is you brought hotdogs to eat for lunch every day of the trip! To solve the problem, you decide to build a solar hot dog cooker. You take a large piece of cardboard and build a parabolic trough that is 12 inches wide and 4 inches deep.
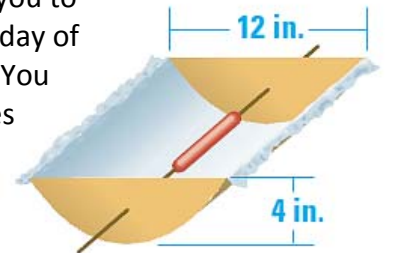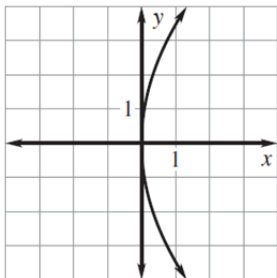
    Next, you line the trough with tin-foil to reflect the heat of the sun. You then create a hole in the sides at the focus of each parabola. Your hot dog is then placed on a skewer through the focus so that the sun is reflecting and cooking your meal. How far from the bottom should the wire be placed?

SAT Prep:

$$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

1. What is the focus of the graph shown?

    (A) $(0, -3)$
    (B) $(0, 3)$
    (C) $(-3, 0)$
    (D) $(3, 0)$

2. The distance between $(3, -1)$ and $(-3, \ y)$ is $2\sqrt{10}$. What is a positive value for y?