Name: _____ Date: _____ # ____

Section 10-2 Parabolas

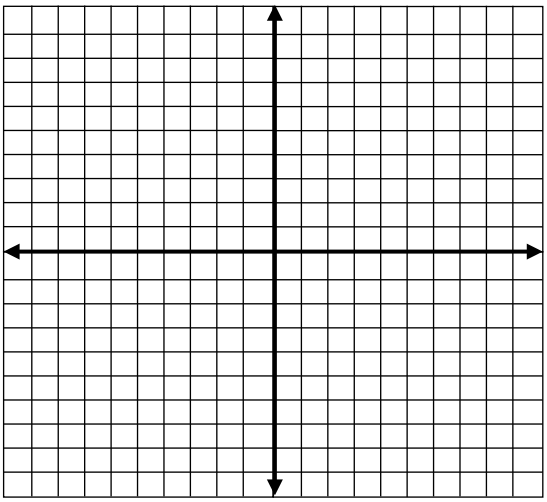
Learning Goal: To understand how to write the equation of a parabola and to graph parabolas.

Essential Questions:

What is the intersection of a cone and a plane parallel to a line along the side of a cone?
What is the difference between the algebraic representations of ellipses and hyperbolas?
Does the graph of a conic section ever intersect its focus or foci?
Which conic sections are symmetric? How can you identify their axes of symmetry?
Compare the standard-form equations of the conic sections. How can you identify each type of conic from the equation?

Warm Up:

1) Graph the equation. $y = |x+1| - 4$



2) You borrowed \$59,000 for 2 years at 11% which was compounded annually. What total will you pay back?

3) Your allowance of \$190 got 11% compounded monthly for $1\frac{2}{3}$ years. What's it worth after the $1\frac{2}{3}$ years?

4) Your $6\frac{1}{4}$ year investment of $40,000 at 14% compounded quarterly is worth how much now?

5) You have $10,000 to put into one of the three accounts below. Find out how much each account would be worth after 10 years.

a) Look at the accounts on the chart below and note their specifics rates. Begin by predicting which accounts will give you the most money. How did you come to this prediction?

Account 1	**Account 2**	**Account 3**
Simple Interest I=prt	Compounded Annually $A=P(1+r)^t$	Compounded Monthly $A = P\left(1+\frac{r}{n}\right)^{nt}$
Rate: 1.2%	Rate: 1.2%	Rate: 1.2%

b) Which account gives you the most money after 10 years?

c) By how much, in dollars, does the best account above outperform the worst account above?

Vocabulary:

Recall: In chapter 4 we looked at parabolas. We studied a parabolas vertex and axis of symmetry.

Parabola: is the set of all points in a plane that are the same distance from a fixed line and a fixed point not on the line.

Focus of a parabola: fixed point of the parabola.

Directrix: fixed line of the parabola.

Focal length: the distance between the vertex and the focus of the parabola.

Two types of parabolas

1. Vertical parabola (has a vertical axis of symmetry and a horizontal directrix)
2. Horizontal parabola (has horizontal axis of symmetry and a vertical directrix)

You can find the equation of a vertical parabola with vertex at the origin by using the geometric definition. If you denote the focus by (0,c), the directrix is the line with equation y = -c

Parabolas with Equation $y = ax^2$

Vertical Parabolas: $y = ax^2$

Vertex (0, 0)

$a = \frac{1}{4c}$ (c = "distance" between vertex and focus)

Focus: $(0, c)$

Directrix: $y = -c$

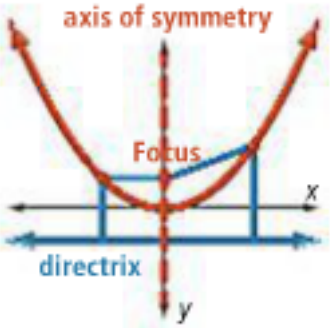
Horizontal Parabolas: $x = ay^2$

Vertex (0, 0)

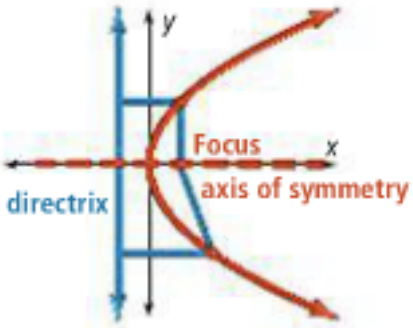
$a = \frac{1}{4c}$ (c = "distance" between vertex and focus)

Focus: $(c, 0)$

Directrix: $x = -c$



Vertical Parabola



Horizontal Parabola

You try:

Write the equation given the focus or directrix.

1. What is an equation of the parabola with vertex at the origin and focus (0, 2)?

2. What is an equation of the parabola with vertex at the origin and directrix x = 1.25?

3. What is an equation of the parabola with vertex at the origin and focus (-1.5, 0)?

4. What is an equation of the parabola with vertex at the origin and directrix $y = -\frac{5}{2}$?

5. What is an equation of the parabola with vertex at the origin and focus $\left(0, \frac{1}{2}\right)$

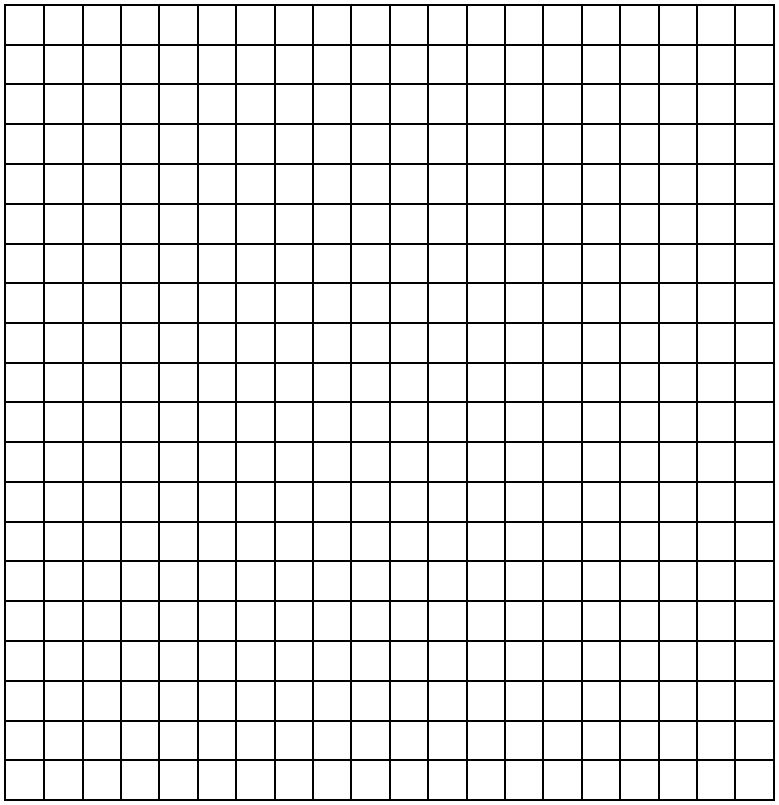
6. What are the focus and directrix of the parabola with equation $y = 6x^2$?

7. What are the vertex, focus and directrix of the parabolas with equation $y = \frac{x^2}{4}$?

Parabolas with equation $x = ay^2$

8. What is an equation of a parabola with vertex at the origin and directrix x = 1.125?

9. What are the vertex, focus, and directrix of the parabola with equation $x = .75y^2$? Then sketch the graph of the parabola.



10. Identify the vertex, focus, and directrix of the parabola with equation $y = -\frac{1}{12}x^2$. Then sketch the graph of the parabola.

Recap:

take note

Key Concept Transformations of a Parabola

Vertical Parabola	**Vertex (0, 0)**	**Vertex (*h*, *k*)**
Equation	$y = \frac{1}{4c}x^2$	$y = \frac{1}{4c}(x - h)^2 + k$
Focus	$(0, c)$	$(h, k + c)$
Directrix	$y = -c$	$y = k - c$
Horizontal Parabola	**Vertex (0, 0)**	**Vertex (*h*, *k*)**
Equation	$x = \frac{1}{4c}y^2$	$x = \frac{1}{4c}(y - k)^2 + h$
Focus	$(c, 0)$	$(h + c, k)$
Directrix	$x = -c$	$x = h - c$

Closure: What is true about the set of points on a parabola, its focus, and its directrix?

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Assignment: section 10.2 # 7,8,13,14,18,30,31,34,35 (9 problems)