

Unit 7: Quadratics- Families of Parabolas

Classwork

Name:

Date:

Use a graphing calculator to explore the relationship for each of the following groups of parabolas.

- I. Exploring effects of changing the coefficient (a) in $y = ax^2 + c$
- 1. Which of the following parabolas is the narrowest (most vertically stretched).

A.
$$v = x^2$$

B.
$$v = 2x^2$$

C.
$$y = 3x^2$$

D.
$$y = 4x^2$$

2. Which of the following parabolas is the narrowest (most vertically stretched).

$$A. \ y = x^2$$

B.
$$y = \frac{1}{2}x^2$$

C.
$$y = \frac{1}{3}x^2$$

D.
$$y = \frac{1}{4}x^2$$

Now, explain what you discovered about the effects of changing the coefficient of x^2 ?

The great the coefficient of x^2 ?

The Smaller the attraction under the coefficient of x^2 ?

3. Which of the following parabolas opens up? A B positive a 4. Which of the following parabolas opens down? The positive a 4.

A.
$$y = x^2$$

B.
$$y = 3x^2$$

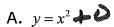
C.
$$y = -2x^2$$

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

Now explain what you discovered about the effect of changing the <u>sign</u> of the coefficient of x^2 ?

If coefficient of x2 is positive the parabola of the coefficient of x2 is regative the parabola of the parabola

- II. Exploring the effect of changing the constant (c) in $y = ax^2 + c$
- 5. Give the minimum value for y (y-value of the vertex) for each function.



B.
$$y = x^2 + 1$$

C.
$$y = 2x^2 + 3$$

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

min_______

6. Give the maximum value for y (y-value of the vertex) for each function.

A.
$$y = -x^2$$

B.
$$y = -x^2 + 1$$

C.
$$y = -2x^2 + 3$$

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

Now explain what you discovered about the vertex (minimum or maximum) of the graph of a quadratic function? The minimum or maximum) of the graph of a quadratic function?

7. How can you tell if it is a minimum or maximum?

The coefficient of X is regardly.

8. **Without** a calculator, determine the vertex for each graph and state if it is gives a maximum or minimum value for y. Then use a graphing calculator to check your answers.

A.
$$y = 4x^2$$

B.
$$y = -x^2 + 3$$

C.
$$y = x^2 - 5$$

D.
$$y = -6x^2 + 8$$

Vertex: (O,O)
min/max: (Min/max)

Summary: fill in the blanks describing the effects that a and c have on the graph $y = ax^2 + c$

If a is greater than 1 the graph gets Market

If a is less than 1 the graph gets Wder

If c is positive then the graph shifts

If c is negative then the graph shifts