Standard Form of Quadratic: $y = ax^2 + bx + c$

The Family of Parabolas

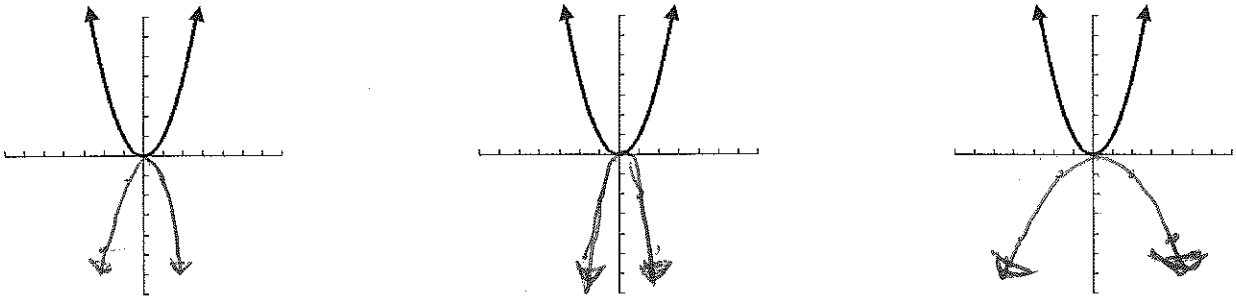
PreAP Homework

Name KEY

Date _____ Period _____

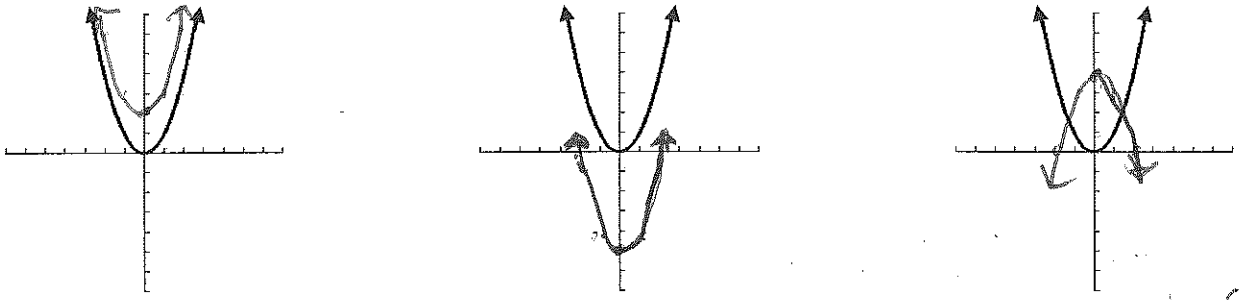
The parent graph $y = x^2$ is shown on each set of axes. Without using a graphing calculator, sketch the graph of the given equations. Compare each sketch to the parent graph.

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



What do the sketches have in common? The all are reflected over the x-axis & open down

2. $y = x^2 + 2$ $\quad y = x^2 - 5$ $\quad y = -x^2 + 4$



What do the sketches have in common? They have all been shifted

3. Given the following equations, tell whether the parabola will open up or down. State the vertex point, the domain and the range.

	A. $y = -x^2$	B. $y = \frac{2}{3}x^2 + 2$	C. $y = -2x^2 - 3$
Opens	down	UP	down
Vertex	(0,0) max	(0,2) min	(0,-3)
Domain	$\mathbb{R}$	$\mathbb{R}$	$\mathbb{R}$
Range	$\mathbb{R} \leq 0$	$\mathbb{R} \geq 2$	$\mathbb{R} \leq -3$

D. When graphed, which equation represents the widest parabola?

B. $y = \frac{2}{3}x^2 + 2$

E. When graphed, which equation represents the narrowest parabola?

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

'a'

4. Write a sentence comparing the graphs of equations with a positive coefficient of x^2 and graphs with a negative coefficient of x^2.

Parabolas with a positive 'a' will open up, but parabolas with a negative 'a' will open down.

5. What is the relationship among the following equations?

$y = 2x^2 + 3$ $y = 2x^2 - 3$ $y = 2x^2 + 1$

same width shifted up & down

6. What is the relationship among the following equations?

All vertex are (0,5)

$y = 4x^2 + 5$ $y = 2x^2 + 5$ $y = -2x^2 + 5$

widest same width but reflection

7. What is the relationship among the following equations?

$y = 3x^2 + 1$ $3y = 6x^2 + 3$ $5y = 20x^2 - (-5)$

$y = 2x^2 + 1$ $y = 4x^2 + 1$

same vertex last one is the widest

8. What is the relationship among the following equations?

$4y = 2x^2 - 8$ $y = \frac{1}{2}x^2 - 2$ $8y = 4x^2 - 16$

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

same parabola

9. Write an equation of a parabola whose graph lies between the graphs of $y = 2x^2 + 3$ and $y = 2x^2 + 5$.

$y = 2x^2 + 4$

10. Write an equation of a parabola whose graph lies between the graphs of $y = x^2 + 1$ and $y = x^2 + 2$.

$y = x^2 + 1.5$

11. Write an equation of a parabola whose graph lies between the graphs of $y = -3x^2$ and $y = -3x^2 - 2$.

$y = -3x^2 - 1$

12. Given the equation $y = x^2 + 2$, write the equation of the parabola if the graph has been shifted up 3.

$y = x^2 + 5$

13. Given the equation $y = -3x^2 + 1$, write the equation of the parabola if the graph has been shifted up 5.

$y = -3x^2 + 6$

14. Given the equation $y = 4x^2 - 3$, write the equation of the parabola if the graph has been shifted down 4.

$y = 4x^2 - 7$

15. Given the equation $y = -2x^2 + 1$, write an equation of a parabola if the graph has been widened.

$y = \frac{1}{2}x^2 + 1$

16. Given the equation $y = -2x^2 + 5$, write an equation of a parabola if the graph has been narrowed.

$y = -6x^2 + 5$