NOTES & HOMEWORK

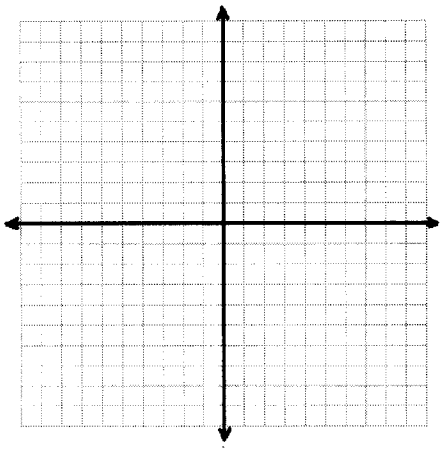
Name_____
Date _____ Period _____

Exploring Quadratic Functions

Complete the tables of values and plot the points on the graphs provided for the given equations.

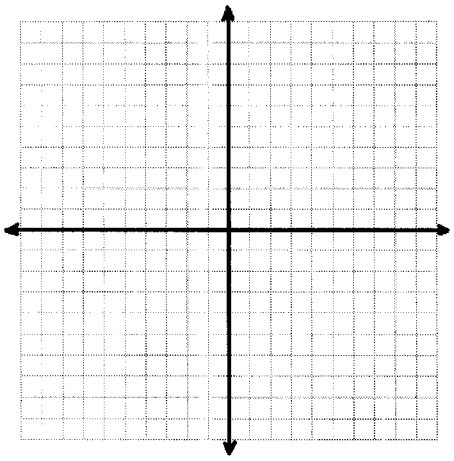
$y = x^2$

x	y
-2	
-1	
0	
1	
2	



$y = 3x^2$

x	y
-2	
-1	
0	
1	
2	

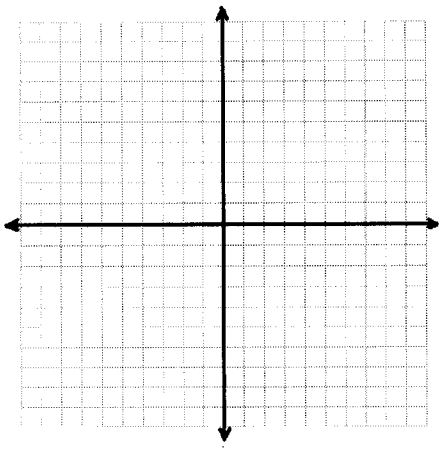


How do the two graphs above look alike?

How do they look different?

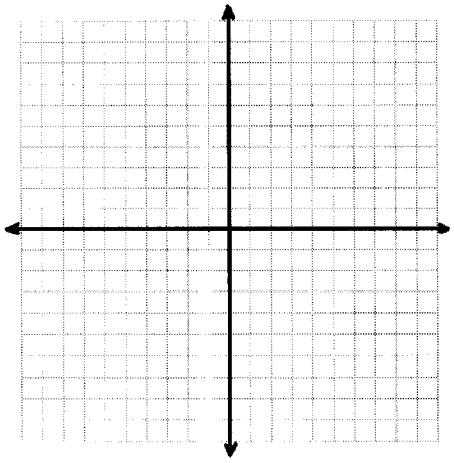
$y = -x^2$

x	y
-2	
-1	
0	
1	
2	



$y = -3x^2$

x	y
-2	
-1	
0	
1	
2	



How do the two graphs above look like the graphs on the first page?

How do they look different?

The graphs you have just analyzed are all examples of **parabolas**. If you draw a parabola on a piece of paper, you can fold the paper down the middle of the parabola and the two sides will match exactly. The line down the middle of the parabola is the _____.

Quadratic Function

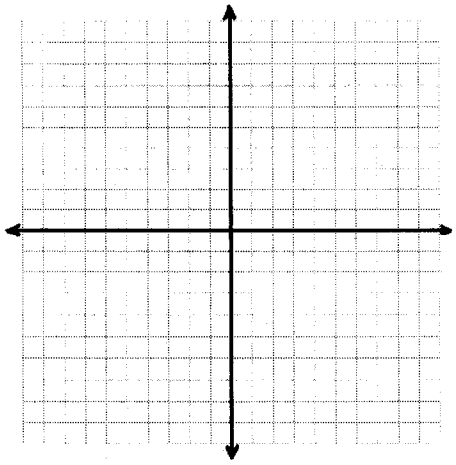
The function $y = ax^2 + bx + c$ is a quadratic function.

Examples: $y = 2x^2$ $y = x^2 + 2$ $y = -x^2 - x - 3$

Complete the table of values and graph the quadratic functions:

$y = 2x^2$ and $y = -2x^2$

x	$y = 2x^2$	$y = -2x^2$
-3		
-2		
-1		
0		
1		
2		
3		

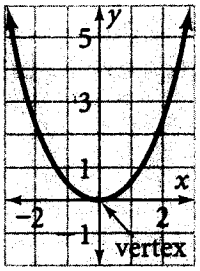


What is the axis of symmetry for the graphs above?

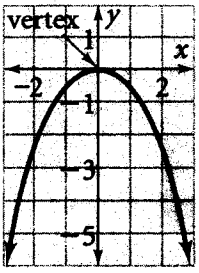
What would happen to the graph of $y = 2x^2$ if you could fold the graph over the x-axis? Explain.

The highest or lowest point on a parabola is called the **vertex** of the parabola.

When a parabola opens upward, the *y*-coordinate of the vertex is the **minimum value** of the function.



When a parabola opens downward, the *y*-coordinate of the vertex is the **maximum value** of the function.



Using your graphing calculator, graph the following equations and sketch it below:

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

Describe the differences between the graphs.

Find the values of *a*, *b*, and *c* for each quadratic function.

1. $y = x^2 + 2x + 4$
2. $y = 2x^2$
3. $y = -x^2 - 3x - 9$
4. $y = -2x^2 + 5$

Tell whether each parabola opens *upward* or *downward* and whether the *y*-coordinate of the vertex is a *maximum* or a *minimum*.

5. $y = x^2$
6. $y = 9x^2$
7. $y = -\frac{2}{5}x^2$
8. $y = -6x^2$

Graph each quadratic function.

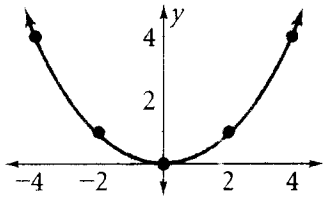
9. $y = \frac{1}{2}x^2$
10. $y = 1.5x^2$
11. $y = -4x^2$
12. $y = -\frac{1}{3}x^2$
13. $y = 4x^2$
14. $y = \frac{1}{3}x^2$
15. $y = -1.5x^2$
16. $y = -\frac{1}{2}x^2$

Order each group of quadratic functions from widest to narrowest graph.

17. $y = 3x^2$, $y = x^2$, $y = 7x^2$
18. $y = 4x^2$, $y = \frac{1}{3}x^2$, $y = x^2$
19. $y = -2x^2$, $y = -\frac{2}{3}x^2$, $y = -4x^2$
20. $y = -\frac{1}{2}x^2$, $y = 5x^2$, $y = -\frac{1}{4}x^2$

draw its axis of symmetry.

25.



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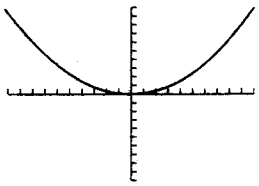

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28.

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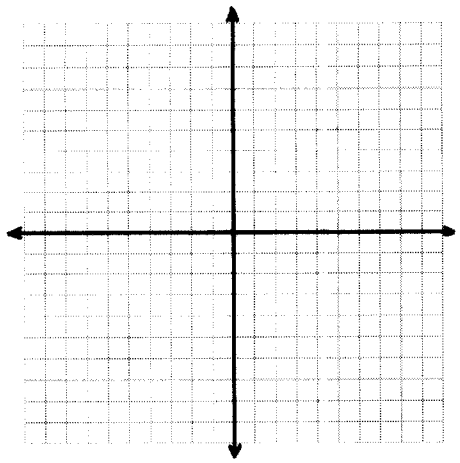

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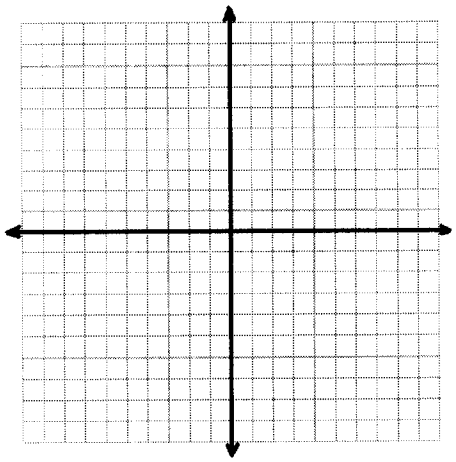

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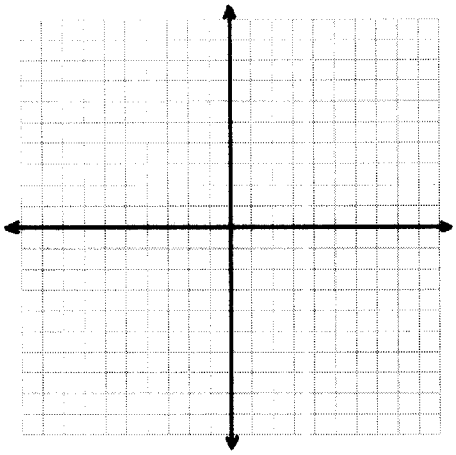

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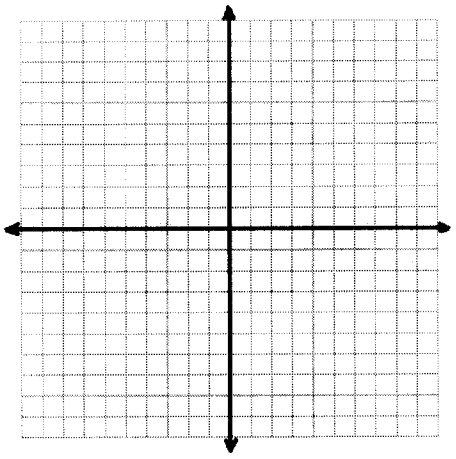

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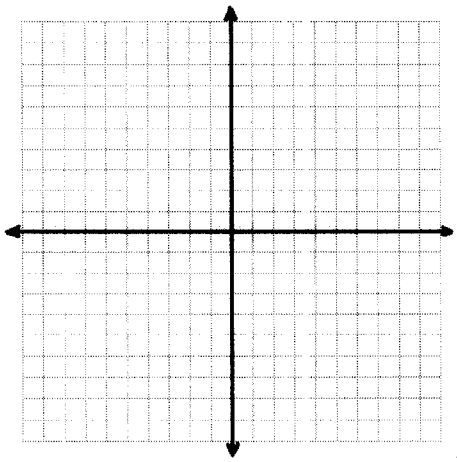

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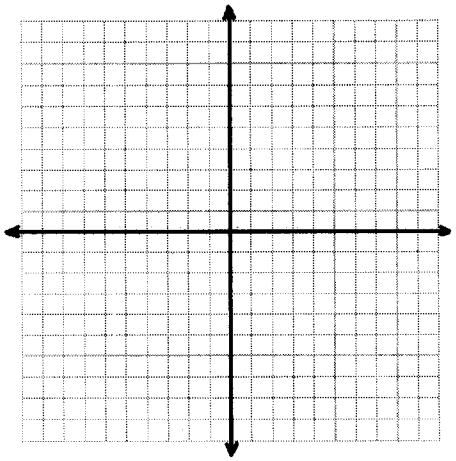

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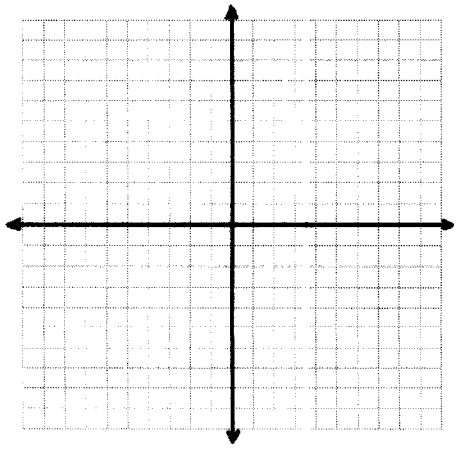

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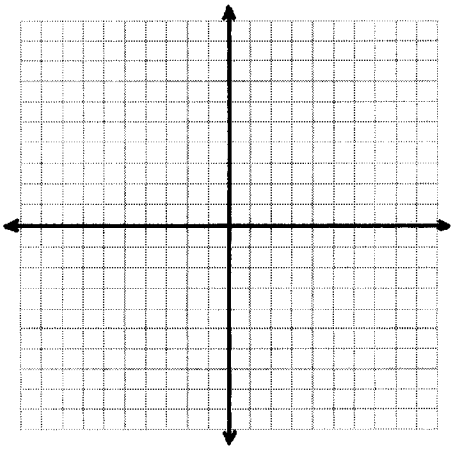


Writing **Without graphing, describe how each graph differs from the graph of $y = x^2$.**

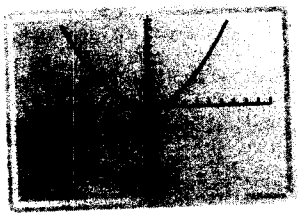
29. $y = 2x^2$ **30.** $y = -x^2$ **31.** $y = 1.5x^2$ **32.** $y = \frac{1}{2}x^2$

Match each function with its graph.

A. $y = x^2$ **B.** $y = -x^2$ **C.** $y = 3.5x^2$ **D.** $y = -3.5x^2$ **E.** $y = \frac{1}{4}x^2$ **F.** $y = -\frac{1}{4}x^2$

34.

35.



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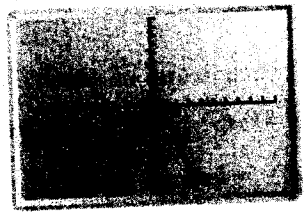

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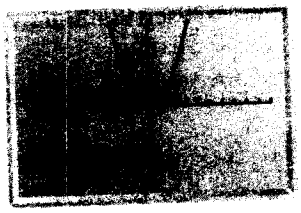

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