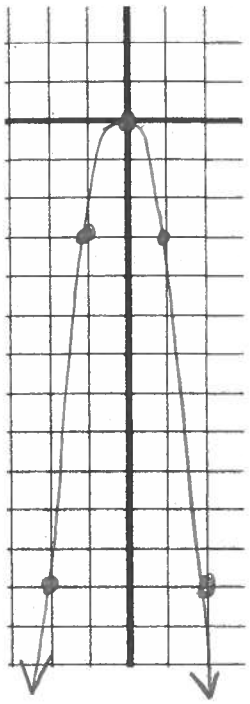
LESSON 9-1 QUADRATIC GRAPHS AND THEIR PROPERTIES

Graph each of the following quadratic functions (parabolas). Identify the vertex. Tell if each vertex is a minimum or a maximum.

1. $y = -3x^2$

x	y
-2	-12
-1	-3
0	0
1	-3
2	-12

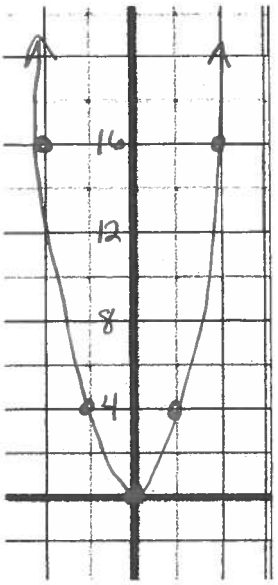
vertex (0,0)
maximum



2. $y = 4x^2$

x	y
-2	16
-1	4
0	0
1	4
2	16

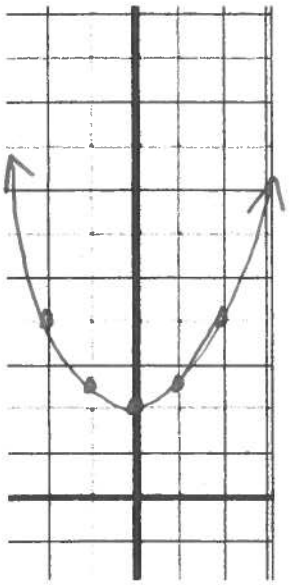
vertex (0,0)
minimum



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

x	y
-2	4
-1	2.5
0	2
1	2.5
2	4

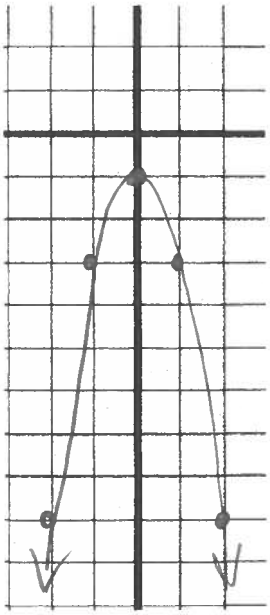
vertex (0,2)
minimum



4. $y = -2x^2 - 1$

x	y
-2	-9
-1	-3
0	-1
1	-3
2	-9

vertex (0,-1)
maximum

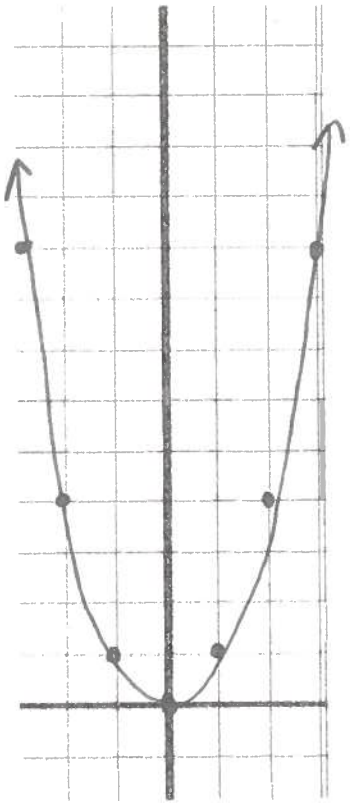


LESSON 9-1 QUADRATIC GRAPHS AND THEIR PROPERTIES

The vertex of a parabola is the lowest (minimum) or highest (maximum) point.

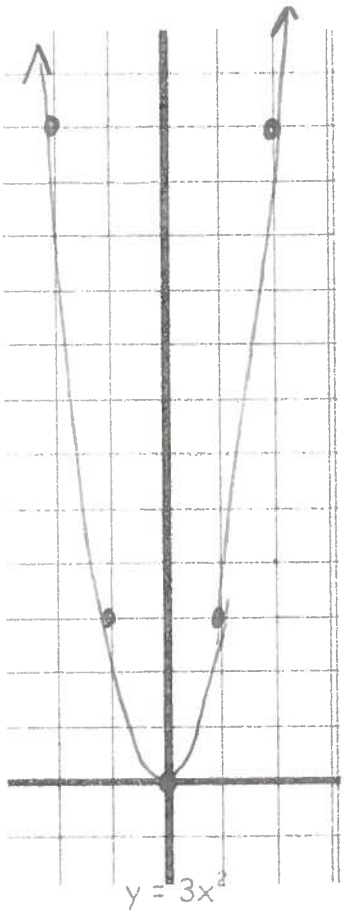
In the equation $y = ax^2 + bx + c$, if a is positive, the parabola opens upward and the vertex is a minimum. If a is negative, the parabola opens downward and the vertex is a maximum.

The "a" coefficient also affects the width of the graph. The larger the absolute value of "a", the narrower (or steeper) the graph.



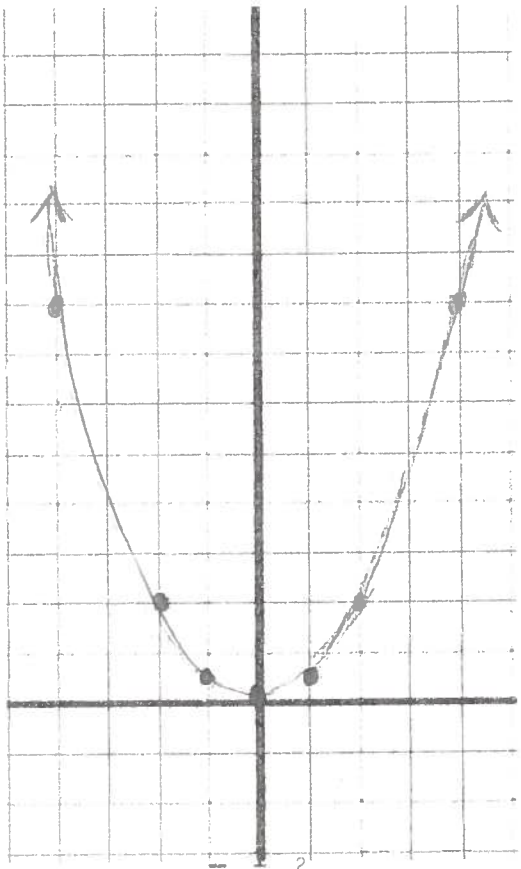
$y = x^2$

x	y
-2	4
-1	1
0	0
1	1
2	4
3	9
-3	9



$y = 3x^2$

x	y
-2	12
-1	3
0	0
1	3
2	12



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

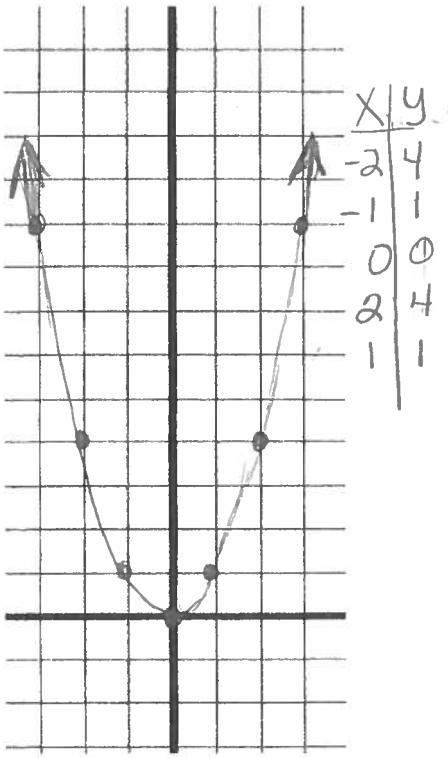
$y = 1/2\,x^2$

x	y
-4	8
-2	2
-1	0.5
0	0
1	0.5
2	2
4	8

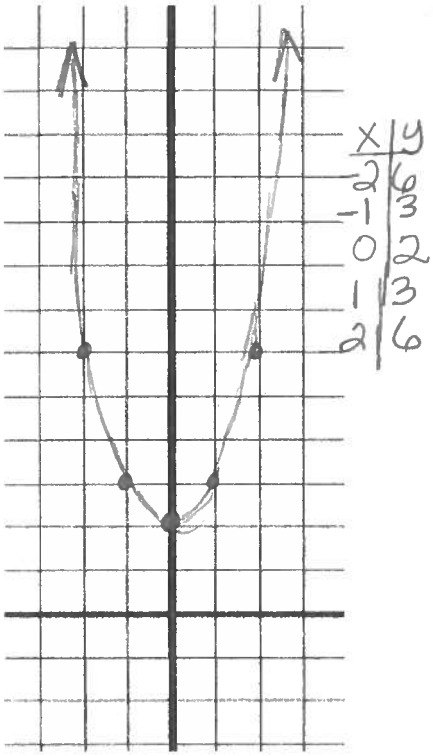
LESSON 9-1 QUADRATIC GRAPHS AND THEIR PROPERTIES

The "c" value of $y = ax^2 + bx + c$ shifts (translates) the graph up if c is positive and down is c is negative.

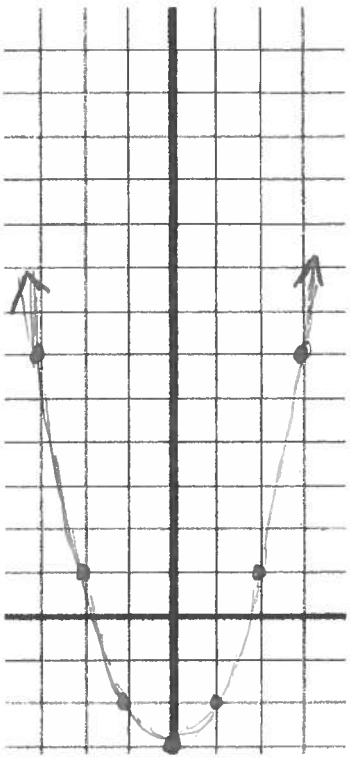
$y = x^2$ $\quad$ $y = x^2 + 2$ $\quad$ $y = x^2 - 3$



x	y
-2	4
-1	1
0	0
2	4
1	1



x	y
-2	6
-1	3
0	2
1	3
2	6



x	y
-2	1
-1	-2
0	-3
1	-2
2	1
3	6
-3	6

5. When is the vertex of a parabola the minimum point? If "a" is positive ∪

When is it the maximum point? If a is negative ∩

6. How are the graphs $y = -\frac{1}{2}x^2$ and $y = -\frac{1}{2}x^2 + 1$ similar? How are they different? Both are parabolas opening downward; both have same width. Have different vertices ($-\frac{1}{2}x^2+1$ is shifted up 1 unit)

Assignment: Page 538 # 7-9, 10-24 even

LESSON 9-1 QUADRATIC GRAPHS AND THEIR PROPERTIES

Page 538

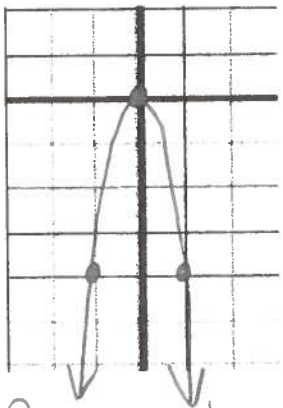
7. Vertex (2, 3) max.

8. Vertex: (-3, -2) min.

9. Vertex: (2, 1) min

10. $y = -4x^2$

x	y
-1	-4
0	0
1	-4

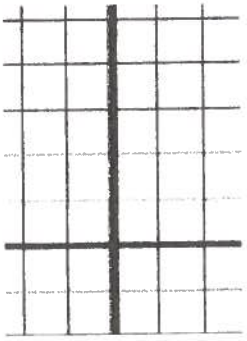


Domain: all Real numbers

Range: $y \leq 0$

12. $f(x) = 3x^2$

x	y
-1	
0	
1	



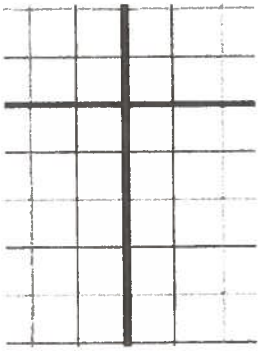
Domain: _____

Range: _____

Widest to narrowest

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

x	y
-2	
0	
2	



16. $y = 3x^2, y = 2x^2, y = 4x^2$

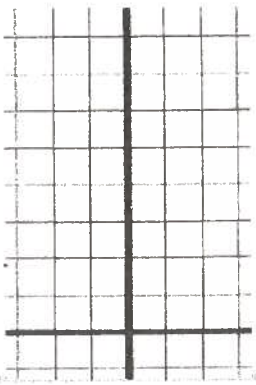
$y = 2x^2;\ y = 3x^2,\ y = 4x^2$

18. $y = -\frac{1}{2}x^2,\ y = 5x^2,\ y = -\frac{1}{4}x^2$

_____

20. $f(x) = x^2 + 4$

x	y
-1	
0	
1	



24. $y = -2x^2 + 4$

x	y
-1	
0	
1