

For  $y = ax^2$

- ① If  $a > 0$ , parabola branches upwards.  
If  $a < 0$ , parabola branches downward.
- ② Vertex:  $(0, 0)$  ← origin.
- ③ If  $1 < |a|$ , for example,  $y = 2x^2$ ,  
the graph is narrower than the basic parabola.
- ④ If  $0 < |a| < 1$ , for example,  $y = \frac{1}{2}x^2$ ,  
the graph is wider than that of  $y = x^2$ .
- ⑤ For  $y = x^2$ , the jumps are: 1, 3, 5, 7, 9, 11, ...  
For  $y = 2x^2$ , the jumps are: 2, 6, 10, 14, 18, 22, ...  
For  $y = \frac{1}{2}x^2$ , the jumps are:  $\frac{1}{2}, \frac{3}{2}, \frac{5}{2}, \frac{7}{2}, \frac{9}{2}, \frac{11}{2}, \dots$   
⋮  
For  $y = ax^2$ , the jumps are:  $1a, 3a, 5a, 7a, \dots$