Parabolas

Standard Form

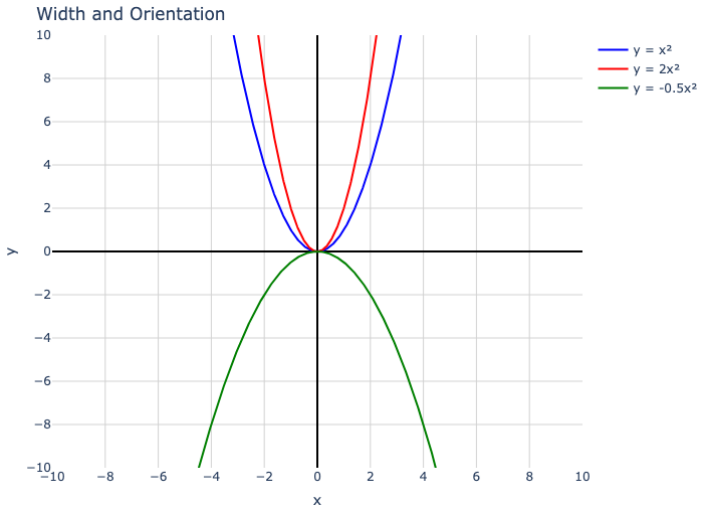
$f(x) = ax^2 + bx + c$

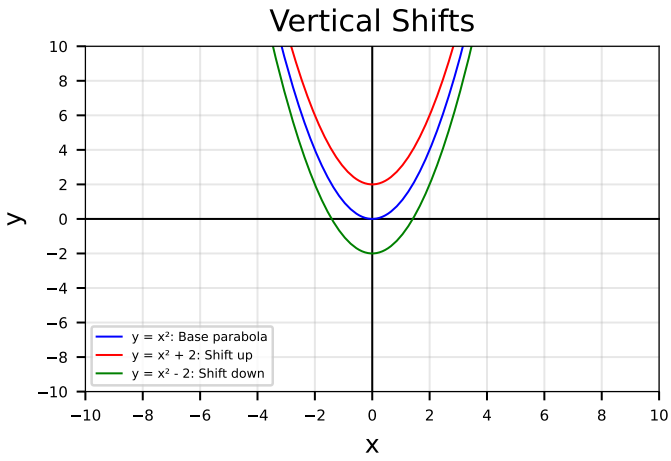
The coefficient a determines both width and direction:

- $\mathbf{a > 0}$: Opens upward
- $\mathbf{a < 0}$: Opens downward
- $\mathbf{|a| > 1}$: Narrower
- $\mathbf{|a| < 1}$: Wider

The constant term c controls vertical position:

- $\mathbf{c > 0}$: shift up
- $\mathbf{c < 0}$: shift down





Vertex Form

$f(x) = a(x - h)^2 + k$

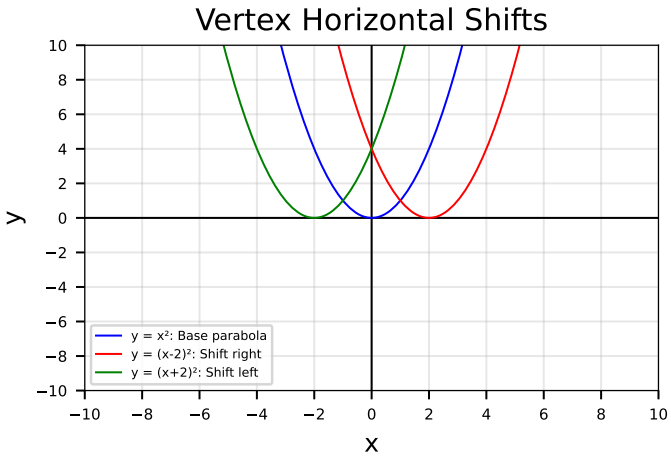
- h controls **horizontal shift**
  - $h > 0$: shift right
  - $h < 0$: shift left
- k is the **vertical position** of the vertex
  - $k > 0$: shift up
  - $k < 0$: shift down

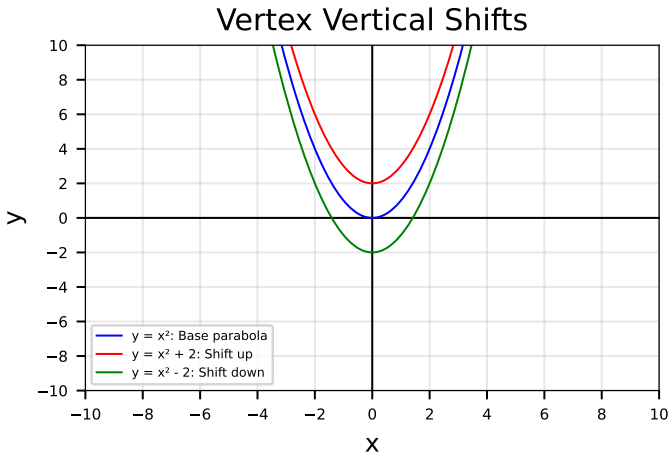
Try it out!

Explore more

Parabolas appear in many real-world applications. Check out how they are used in:

- Bridges and Architecture: Learn how parabolic shapes provide structural efficiency in suspension bridges and architectural designs.
- Projectile Motion: Discover how parabolas describe the path of objects moving under gravity.





- Antennas and Satellite Dishes: Explore how parabolic reflectors focus signals in communication systems.