

8.4 graph & transform vertex form

Vertex form of a quadratic function

$f(x) = a(x+h)^2 + k$ 'a' is positive \rightarrow opens up | 'a' is negative \rightarrow opens down

if $|a| > 1 \rightarrow$ Vertically stretched (Narrow)

- if $|a| = 1 \rightarrow$ Normal width

if $0 < |a| < 1 \rightarrow$ Vertically compressed (wide)

(fraction smaller than one)

* vertex is at $(-h, k)$

Note: 'h' value in the vertex is opposite of what's in the equation

Examples: Describe each transformation when compared to the parent function. 1) $g(x) = \frac{2}{3}(x+9)^2 - 1$ $f(x) = x^2$ vertex op

• vertex $(-9, -1)$ • opens up • Vertically compressed (wide) • Shifted left +9, down 1

2) $h(x) = -\frac{5}{3}(x-2)^2 - 4$

• vertex $(2, -4)$ • opens down • Vertically stretched (narrow) • Shifted right +2, down 4

Write a quadratic function to illustrate the transformation on

$f(x) = x^2$

vertex $-8, 2$

① opens down, stretched by factor of 4, shifted left 8 + up 2

$g(x) = a(x+h)^2 + k$ // $g(x) = -4(x+8)^2 + 2$

② opens up, wide, vertex $(4, -1)$

$h(x) = \frac{1}{2}(x-4)^2 - 1$