Example 2A: Translating Quadratic Functions
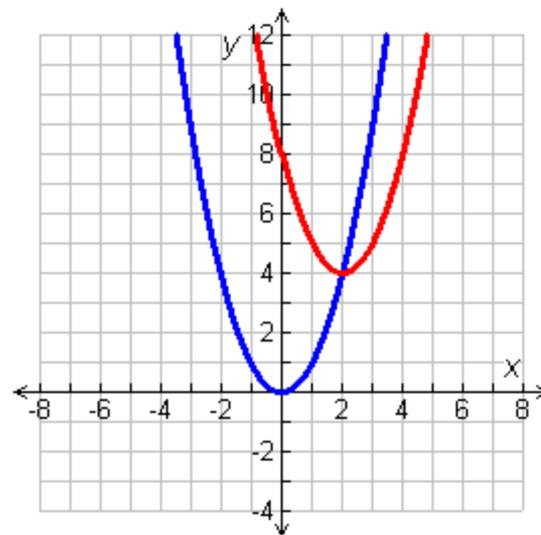
Use the graph of $f(x) = x^2$ as a guide, describe the transformations and then graph each function.

$g(x) = (x - 2)^2 + 4$

Identify h and k.

$g(x) = (x - 2)^2 + 4$

$\uparrow$ $\quad$ $\uparrow$

h $\quad\quad$ k

Because $h = 2$, the graph is translated **2 units right**.
Because $k = 4$, the graph is translated **4 units up**.
Therefore, g is f translated 2 units right and 4 units up.
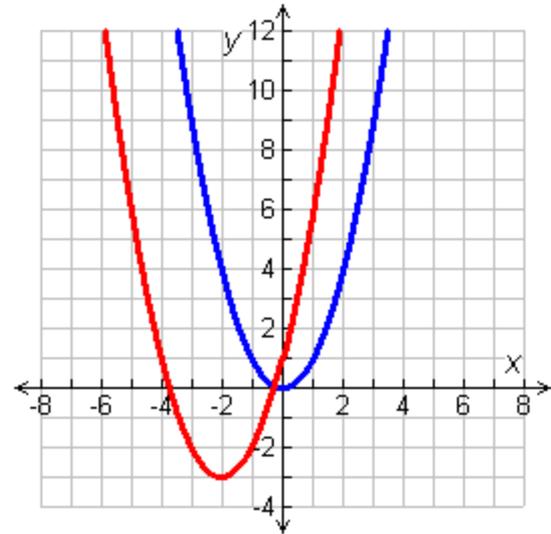
Example 2B: Translating Quadratic Functions

Use the graph of $f(x) = x^2$ as a guide, describe the transformations and then graph each function.

$g(x) = (x + 2)^2 - 3$

Identify h and k.

$g(x) = (x - (-2))^2 + (-3)$

       ↑   ↑

       h k

Because $h = -2$, the graph is translated **2 units left**.
Because $k = -3$, the graph is translated **3 units down**.
Therefore, g is f translated 2 units left and 4 units down.
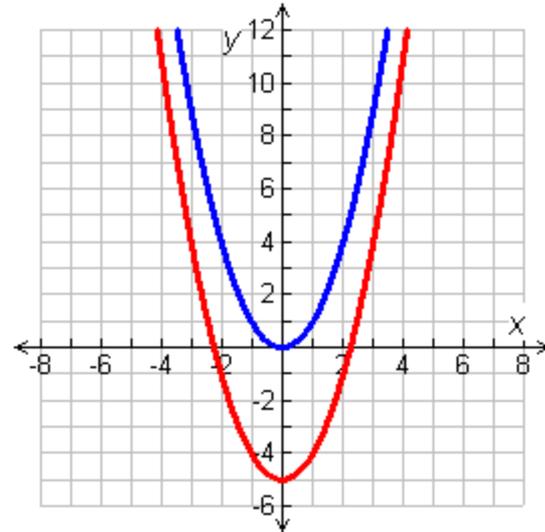
Check It Out! Example 2a

Using the graph of $f(x) = x^2$ as a guide, describe the transformations and then graph each function.

$g(x) = x^2 - 5$

Identify h and k.

$g(x) = x^2 - 5$

↑

k

Because $h = 0$, the graph is not translated horizontally. Because $k = -5$, the graph is translated **5 units down**. Therefore, g is f is translated **5 units down**.
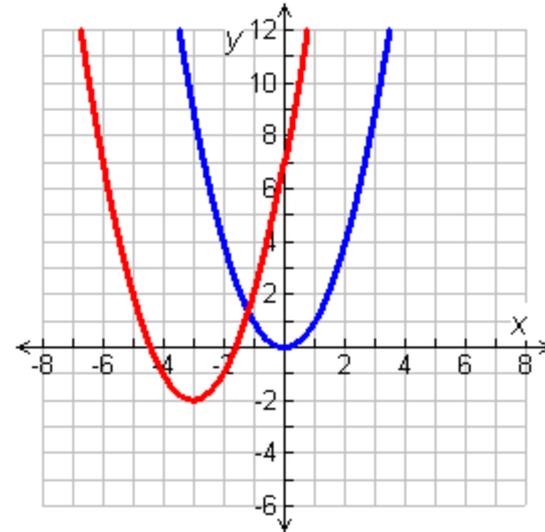
Check It Out! Example 2b

Use the graph of $f(x) = x^2$ as a guide, describe the transformations and then graph each function.

$g(x) = (x + 3)^2 - 2$

Identify h and k.

$g(x) = (x - (-3))^2 + (-2)$

$\qquad\qquad\;\;\uparrow\qquad\qquad\uparrow$

$\qquad\qquad\;\;h\qquad\qquad k$

Because $h = -3$, the graph is translated **3 units left**.
Because $k = -2$, the graph is translated **2 units down**.
Therefore, g is f translated 3 units left and 2 units down.