

Horizontal Stretching and Shrinking Graphs

Let f be a function and c a positive real number.

- If $c > 1$, the graph of $y = f(cx)$ is the graph of $y = f(x)$ horizontally shrunk by dividing each of its x -coordinates by c .
 - Draw the graph of f and **divide each x -coordinate of $y = f(x)$ by c , horizontally shrinking the graph of f .**
 - Changes in the equation of $y = f(x)$: x is replaced with cx , $c > 1$.
- If $0 < c < 1$, the graph of $y = f(cx)$ is the graph of $y = f(x)$ horizontally stretched by dividing each of its x -coordinates by c .
 - Draw the graph of and **divide each x -coordinate of $y = f(x)$ by c , horizontally stretching the graph of f .**

Changes in the equation of $y = f(x)$: x is replaced with cx , $0 < c < 1$.

Example 5:

Use the graph of $y = f(x)$, shown below, to obtain each of the following graphs:

a. $g(x) = f(2x)$

b. $h(x) = f\left(\frac{1}{2}x\right)$

