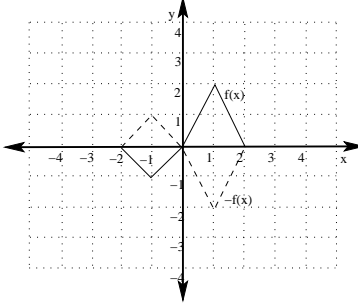
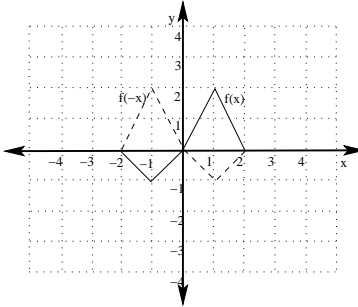
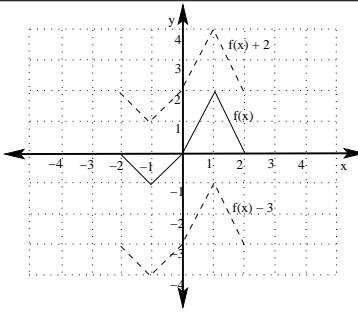
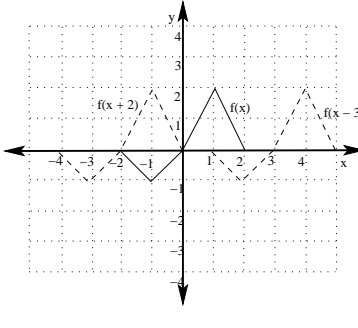
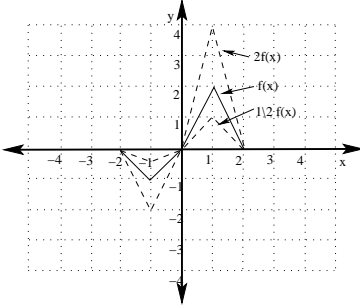
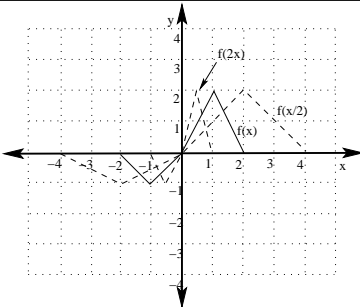


**The Six Major Types of Shifts**

Equation	Effect on the graph	Example:
$y = -f(x)$	Reflection across the $x$ -axis	 <p>The graph shows a coordinate plane with x and y axes ranging from -4 to 4. A solid triangle labeled <math>f(x)</math> has vertices at <math>(0,0)</math>, <math>(1,2)</math>, and <math>(2,0)</math>. A dashed triangle labeled <math>-f(x)</math> is its reflection across the x-axis, with vertices at <math>(0,0)</math>, <math>(1,-2)</math>, and <math>(2,0)</math>.</p>
$y = f(-x)$	Reflection across the $y$ -axis	 <p>The graph shows a coordinate plane with x and y axes ranging from -4 to 4. A solid triangle labeled <math>f(x)</math> has vertices at <math>(0,0)</math>, <math>(1,2)</math>, and <math>(2,0)</math>. A dashed triangle labeled <math>f(-x)</math> is its reflection across the y-axis, with vertices at <math>(0,0)</math>, <math>(-1,2)</math>, and <math>(-2,0)</math>.</p>
$y = f(x) + c$	Shifted Up if $c > 0$ Shifted Down if $c < 0$	 <p>The graph shows a coordinate plane with x and y axes ranging from -4 to 4. A solid triangle labeled <math>f(x)</math> has vertices at <math>(0,0)</math>, <math>(1,2)</math>, and <math>(2,0)</math>. A dashed triangle labeled <math>f(x)+2</math> is shifted 2 units up, with vertices at <math>(0,2)</math>, <math>(1,4)</math>, and <math>(2,2)</math>. Another dashed triangle labeled <math>f(x)-3</math> is shifted 3 units down, with vertices at <math>(0,-3)</math>, <math>(1,-1)</math>, and <math>(2,-3)</math>.</p>
$y = f(x - c)$	Shifted Right if $c > 0$ Shifted Left if $c < 0$	 <p>The graph shows a coordinate plane with x and y axes ranging from -4 to 4. A solid triangle labeled <math>f(x)</math> has vertices at <math>(0,0)</math>, <math>(1,2)</math>, and <math>(2,0)</math>. A dashed triangle labeled <math>f(x+2)</math> is shifted 2 units left, with vertices at <math>(-2,0)</math>, <math>(-1,2)</math>, and <math>(0,0)</math>. Another dashed triangle labeled <math>f(x-3)</math> is shifted 3 units right, with vertices at <math>(3,0)</math>, <math>(4,2)</math>, and <math>(5,0)</math>.</p>

Equation	Effect on the graph	Example:
$y = cf(x), c > 0$	Vertical stretch if $c > 1$ Vertical compression if $0 < c < 1$	
$y = f(cx), c > 0$	Horizontal compression if $c > 1$ Horizontal stretch if $0 < c < 1$	

**Note:** We will often combine more than one shift together to form one new function.

**Example:** Given  $f(x)$ , sketch the graph of  $2f(x - 1) + 3$

