Reflections of Functions

Example 1: Given $f(x) = \sqrt{x}$, graph y = f(x) and y = -f(x) and compare the two.
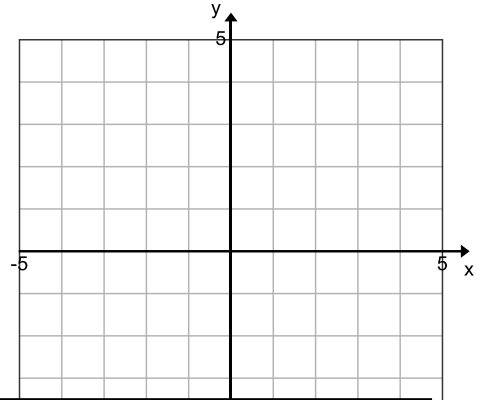
$f(x) = \sqrt{x}$

x	y
0	
1	
4	

Multiply the y's by negative 1

$-f(x)$ = _____

x	y

How do the graphs compare?

_____

_____

The graph of y = -f(x) is a <u>reflection</u> of the graph of y = f(x) in the <u>x-axis</u>. (x, y) ⟹(x, -y)	Points that are <u>unaltered</u> by a transformation are said to be <u>invariant</u>.

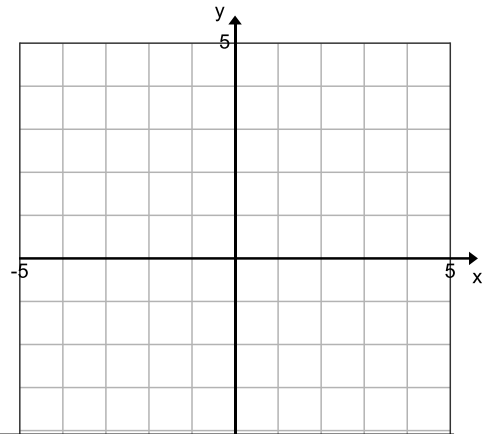**Example 2**: Given $f(x) = \sqrt{x}$, graph y = f(x) and y = f(-x) and compare the two.

$f(x) = \sqrt{x}$

x	y
0	0
1	1
4	2

Multiply the x's by negative 1

y = f(-x) = _____

x	y

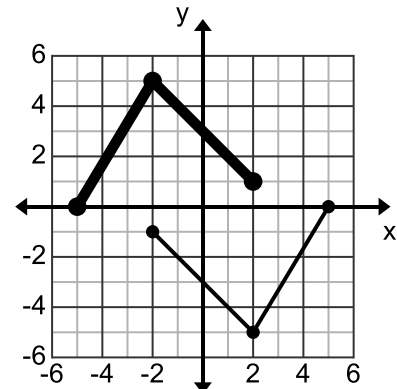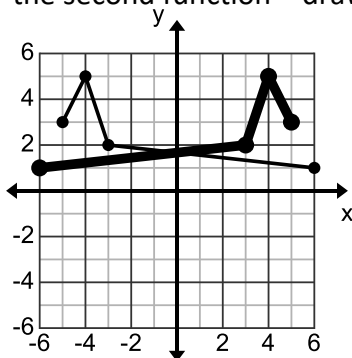How do the graphs compare?

_____

_____

The graph of y = f(-x) is a <u>reflection</u> of the graph of y = f(x) in the <u>y-axis</u>.   (x, y) ⟹ (-x, y)

Example 3:   If f(x) = 3x + 2, state the equation of the function that is:

(a) reflection in the y-axis   (b) reflection in the x-axis

Example 4: In each graph below, $f(x)$ is indicated and drawn with a thin line. Give the correct function notation for the second function – drawn with the thicker line.
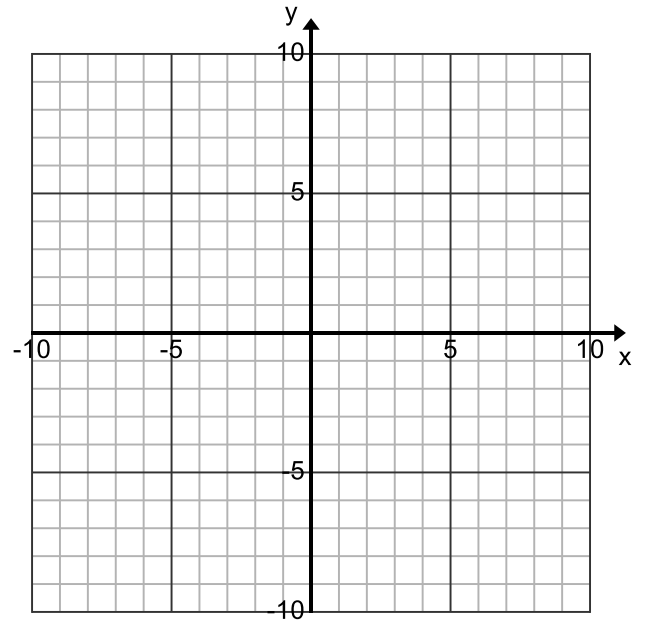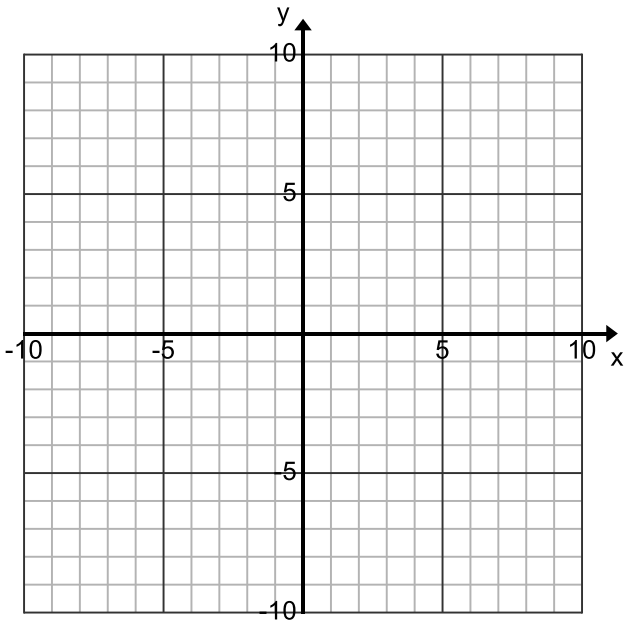
Example 5:

If $f(x) = \sqrt{x-3}$, compare its graph, domain and range to f(-x) and -f(x).

$f(x) = \sqrt{x-3}$ -f(x) = _____   f(-x) = _____   Invariants?

D: {　　　　　}   D: {　　　　　}   D: {　　　　　}

R: {　　　　　}   R: {　　　　　}   R: {　　　　　}

x	y
3	
4	
7	

x	y
3	
4	
7	

x	y
-3	
-4	
-7	

Example 6: If $f(x) = \dfrac{1}{x}$, write an equation for –f(x) and f(−x). Describe and sketch the three graphs on the same axes.

y = -f(x)   y = f(-x)

Example 7: Given $f(x) = x^2 + 4x$. Compare the vertex and x-intercepts of –f(x) and f(-x).

p. 203 #1c, 2abc, 3, 5, 7, 10

	f(x)	-f(x)	f(-x)
Vertex			
x-intercepts			