

# Reflections and Stretches

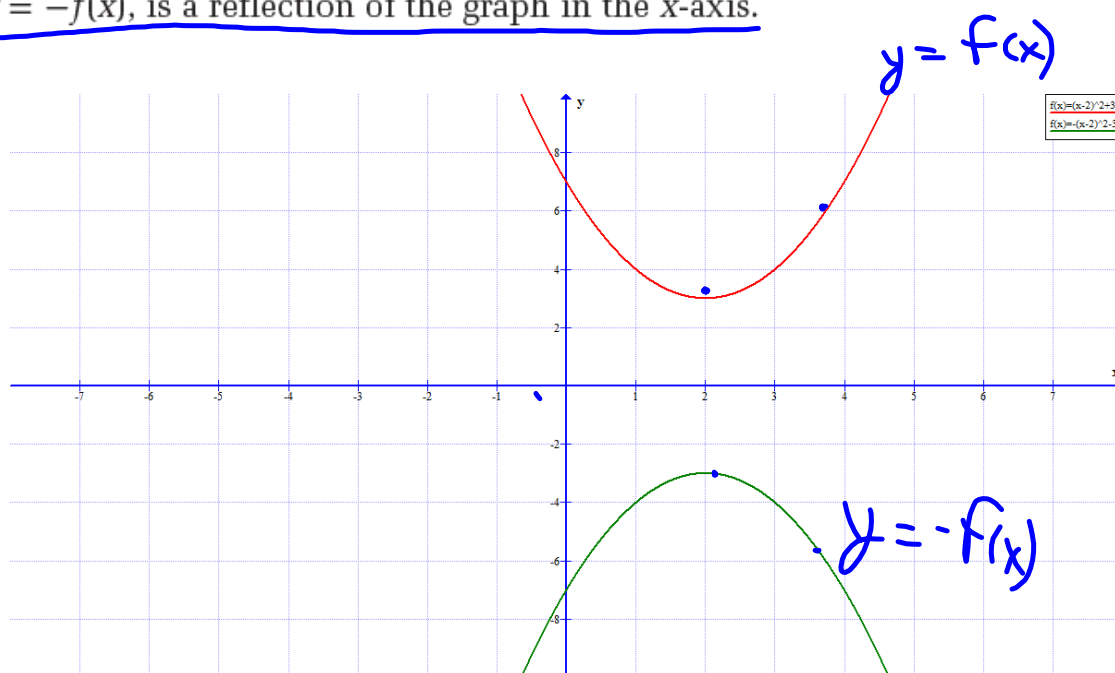
## Focus on...

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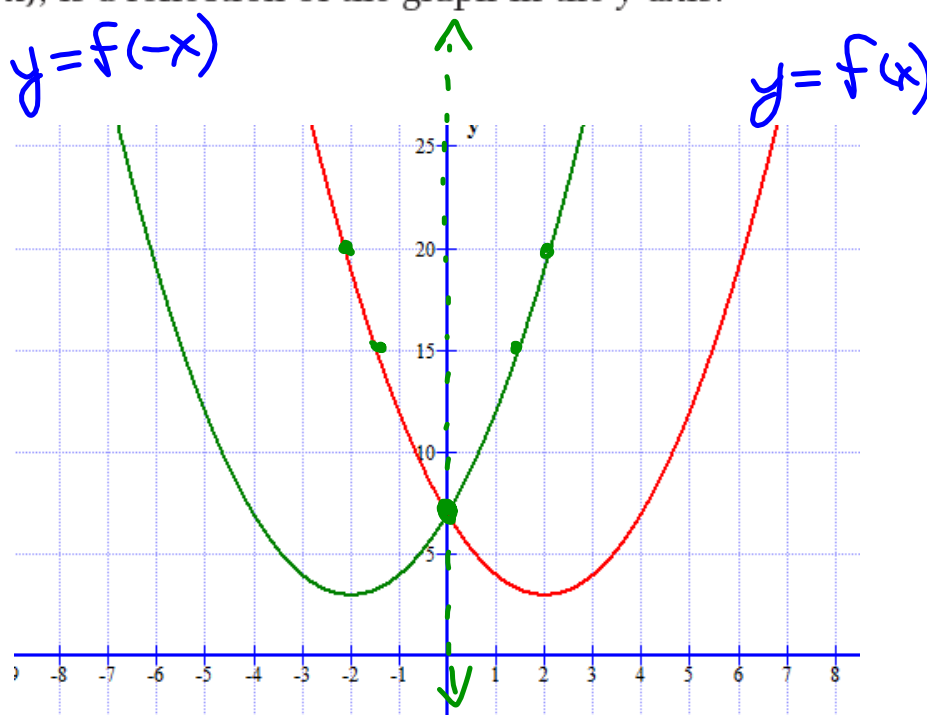
- developing an understanding of the effects of reflections on the graphs of functions and their related equations
- developing an understanding of the effects of vertical and horizontal stretches on the graphs of functions and their related equations

A **reflection** of a graph creates a mirror image in a line called the line of reflection. Reflections, like translations, do not change the shape of the graph. However, unlike translations, reflections may change the orientation of the graph.

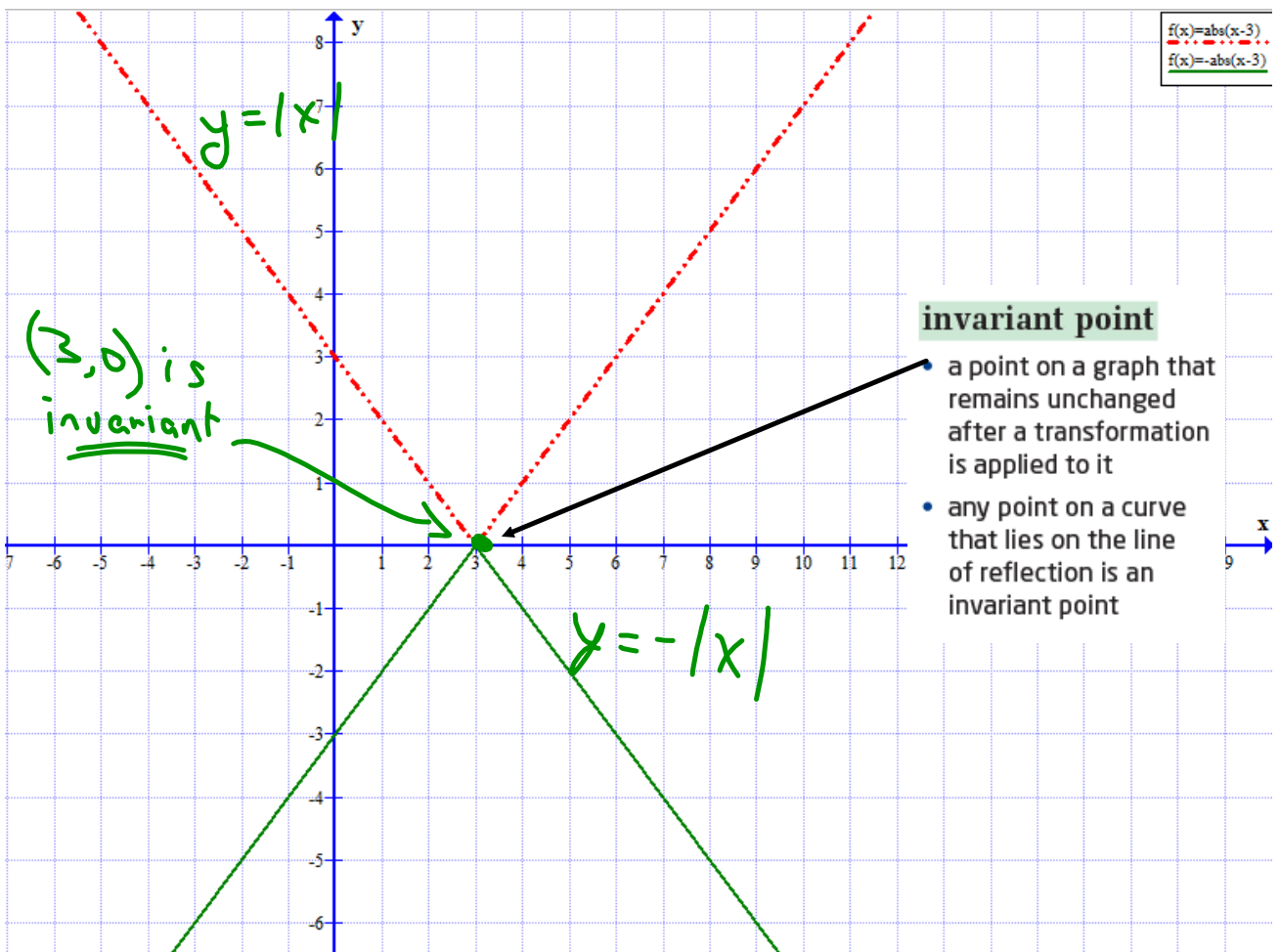
- When the output of a function  $y = f(x)$  is multiplied by  $-1$ , the result,  $y = -f(x)$ , is a reflection of the graph in the  $x$ -axis.



- When the input of a function  $y = f(x)$  is multiplied by  $-1$ , the result,  $y = f(-x)$ , is a reflection of the graph in the  $y$ -axis.



# Invariant Point



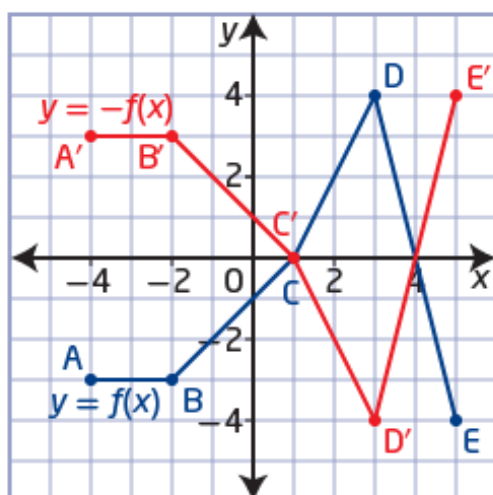
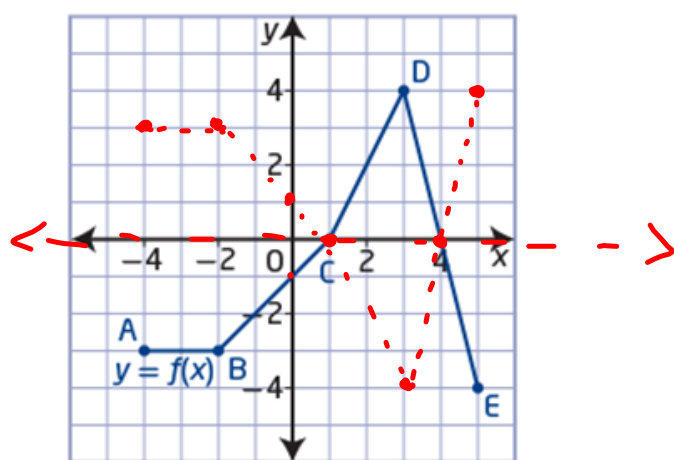
## invariant point

a point on a graph that remains unchanged after a transformation is applied to it

- any point on a curve that lies on the line of reflection is an invariant point

## Remember...

- When the output of a function  $y = f(x)$  is multiplied by  $-1$ , the result,  $y = -f(x)$ , is a reflection of the graph in the  $x$ -axis.
- Sketch  $y = -f(x)$  on the axis below



## Remember...

- When the input of a function  $y = f(x)$  is multiplied by  $-1$ , the result,  $y = f(-x)$ , is a reflection of the graph in the  $y$ -axis.
- Sketch  $y = f(-x)$  on the axis below

