


Math 30-1

Unit 1: Transformations



1.3 Reflections

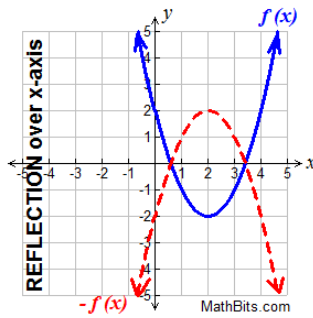
There are two types of reflections that may be applied to functions:

Vertical Reflections and Horizontal Reflections

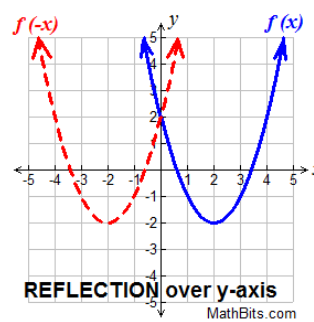
"about the x-axis"


"about the y-axis"

Ex.) Vertical Reflection




Ex.) Horizontal Reflections





$$y = a f[b(x-h)] + k$$

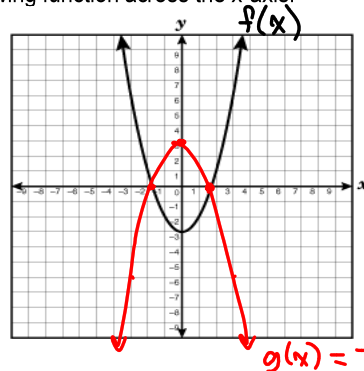


Vertical Reflections reflect over the x-axis. X-values remain the same and y-values switch signs. Invariant points lie on the x-axis.


$$(x, y) \longrightarrow (x, -y)$$

$$(x, f(x)) \longrightarrow (x, -f(x))$$

Ex.) Reflect the following function across the x-axis:



Invariant Points:
on x-axis

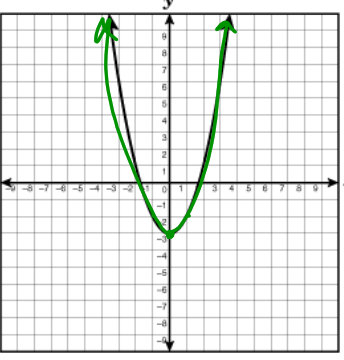


Horizontal Reflections reflect over the y-axis. Y-values remain the same and x-values switch signs. Invariant points lie on the y-axis.


$$(x, y) \longrightarrow (-x, y)$$

$$(x, f(x)) \longrightarrow (-x, f(x))$$

Ex.) Reflect the following function across the y-axis:



Invariant Points:
y-axis



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

↑ horizontal reflection

↑ vertical reflection

(5, 0)

Ex.) Given $y = (x-5)^2$:

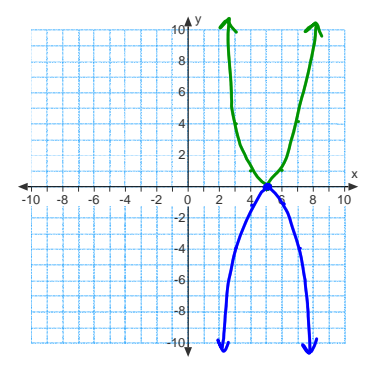
a) Write the equation, which represents $y = -f(x)$

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

b) Describe the transformation of the original image.


Vertical reflection about the x-axis

c) Sketch the graph of the transformed function.



d) State the coordinates of any invariant points.

(5, 0)



Ex.) Given $y = (x-5)^2$:

a) Write the equation, which represents

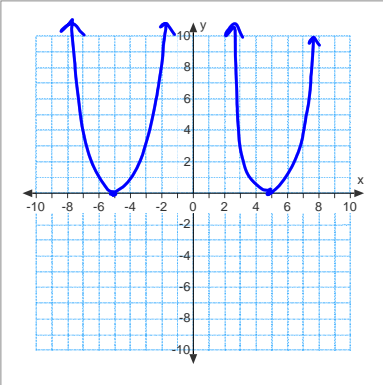
$$y = f(-x)$$

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

b) Describe the transformation of the original image.

horizontal reflection about the y-axis

c) Sketch the graph of the transformed function.




d) State the coordinates of any invariant points.

y-axis $\Rightarrow x=0$

$$y = (x-5)^2 \quad (0, 25)$$

$$y = (0-5)^2$$

$$y = 25$$



Ex.) Given $f(x) = -2x^2 + 5$, determine the new equation after the following transformations:

a) $y = -f(x)$
 VR about x-axis
 $y = -(-2x^2 + 5)$
 $y = 2x^2 - 5$

b) $y = f(-x)$
 HR about y-axis
 $y = -2(-x)^2 + 5$
 $y = -2x^2 + 5$

c) $y = -f(-x)$
 $y = -(-2(-x)^2 + 5)$
 $y = -(-2x^2 + 5)$
 $y = 2x^2 - 5$

Pg. 28 # 3, 4, 5cd, 7bd, 15ab.

