

## Notes for 2.6 Graphing Techniques (pp. 253 – 263)

Name:
Date:
Instructor:

Topics: Symmetry about the x-axis, y-axis and origin;  
Translations

\* The video spends a lot of time graphing all the symmetric functions and the individual translations. You will need to be able to describe these with words and graph the final result, with key points labeled.

### I. Reflection About an Axis or the Origin (pp.255 – 257)

A. The graph of  $y = -f(x)$  is the same as the graph of  $y = f(x)$  when it is reflected about the **x-axis**. This can be verified by the substitution of  $-y$  into the original function and simplified to the original function.

\* When checking for **x-axis** symmetry, substitute  $-y$ .

B. The graph of  $y = f(-x)$  is the same as the graph of  $y = f(x)$  when it is reflected about the **y-axis**. This can be verified by the substitution of  $-x$  into the original function and is simplified to the original function.

\* When checking for **y-axis** symmetry, substitute  $-x$ .

C. The graph of an equation with respect to the **origin** can be verified by substituting  $-x$  and  $-y$  into the original equation and is simplified to the original function.

\*When checking for **origin** symmetry, substitute  $-x$  and  $-y$ .

### II. Translations Summary (p. 263)

Equation	Translation
$y = f(x) + c$	Shifts graph <b>up</b> $c$ units
$y = f(x) - c$	Shifts graph <b>down</b> $c$ units
$y = f(x - c)$	Shifts graph <b>to the right</b> $c$ units
$y = f(x + c)$	Shifts graph <b>to the left</b> $c$ units
$y = -f(x)$	Reflects graph across the <b>x-axis</b>
$y = a \cdot f(x)$	When $a > 0$ , then the graph is <b>stretched</b> by a factor of $a$
$y = a \cdot f(x)$	When $a < 0$ (fraction), then the graph is <b>shrunk</b> by a factor of $a$

Ex.  $f(x) = -2(x+3)^2 - 4$  Describe the translations.

Ans. The basic graph of  $f(x) = x^2$  has been

- Reflected across the x-axis (negative)
- Stretched by a factor of 2
- Shifted to the left 3 units
- Shifted down 4 units

Assignment:

pp. 264 – 267 #1, 3, 15, 17, describe translations for 33 – 45 odd