

# **Composite Graphs Video Lecture**

**Not in textbook**

## **Course Learning Objectives:**

- 1) Graph absolute value, reciprocal, square root, greatest integer, polynomial, rational, piecewise defined, logarithmic, and exponential functions and use such graphs to solve applied problems and to understand the significance of attributes of the graph to such applied problems.**
- 2) Identify and articulate the significance of graphical components such as x-intercepts, horizontal asymptotes, and intervals of increase or decrease in a mathematical model/application.**

## **Weekly Learning Objectives:**

- 1) Graph composite functions using transformations.**
- 2) Graph the absolute value of a composite function.**
- 3) Graph the square root of a composite function.**
- 4) Graph the reciprocal of a composite function.**

# Composite Graphs With Transformations

## Basic Transformations:

Remember to factor out the coefficient of  $x$ , to get the right transformations. If possible, you may want to change any horizontal stretches or compressions to vertical stretches or compressions.

1)  $f(x) = 3\sqrt{4x} - 2$

2)  $f(x) = -\left(\frac{1}{2}x\right)^3 + 1$

$$3) f(x) = |3x + 9| - 2$$

$$4) f(x) = \sqrt{2x - 1} + 2$$

**Absolute Composite Graphs:**

All positive  $y$ 's stay the same; all negative  $y$ 's flip over the  $x -$  axis.

5)  $f(x) = \left| \frac{3x+1}{x-3} \right|$

### **Square Root Composite Graphs:**

Zeros stay zeros; Lose all negative  $y$  – values. If  $y > 1$ , graph gets lower.

If  $0 < y < 1$ , graph gets higher.

6)  $f(x) = \sqrt{-(x-2)^2 + 4}$

7)  $f(x) = \sqrt{\frac{x-1}{x+3}}$

$$8) f(x) = \sqrt{\sqrt{x+3} - 2}$$

$$9) f(x) = \sqrt{|3x-6| - 2}$$

### Reciprocal Composite Graphs

Vertical asymptotes wherever denominator = 0.

If  $y \rightarrow 0^+$ ,  $\frac{1}{y} \rightarrow +\infty$ .

If  $y \rightarrow 0^-$ ,  $\frac{1}{y} \rightarrow -\infty$ .

If  $y \rightarrow +\infty$ ,  $\frac{1}{y} \rightarrow 0^+$ .

If  $y \rightarrow -\infty$ ,  $\frac{1}{y} \rightarrow 0^-$ .

$$10) f(x) = \frac{1}{(x+3)^2}$$

$$11) f(x) = \frac{1}{\sqrt{5-x-1}}$$

$$12) f(x) = \frac{1}{|x+2|-3}$$