

MHF4U_2011: Advanced Functions, Grade 12, University Preparation
Unit 2: Advanced Polynomial and Rational Functions
Activity 1: Transformation of polynomials
Formative Assignment

Complete the following questions. Contact your instructor if you need some further explanation or assistance on these concepts.

Use the conclusions from the content section to assist you in answering these questions, using a different parent function: $f(x) = x^4$

1. Graph the following functions on the same axes:
 - a. $f(x) = x^4$
 - b. $g(x) = 2(x-5)^4 + 1$
 - c. Describe, in words, the transformation on $f(x)$ that produces $g(x)$.

2. What transformation on $f(x) = x^4$ produces $g(x) = -(3x+2)^4 - 2$? Express the transformation in words, and then graph the two functions on the same axes, to verify your conclusions.

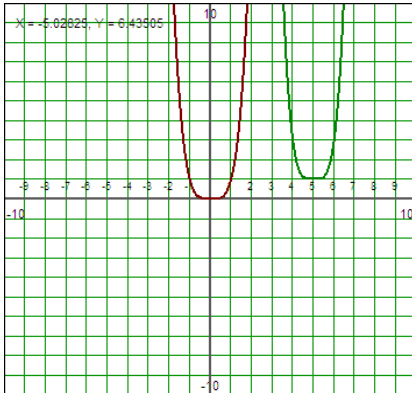
3. Given $f(x) = x^3$ and $g(x) = -2(3x+4)^3 - 3$:
 - a. Predict the shape and position of $g(x)$ relative to $f(x)$ in words.
 - b. Graph the two functions on the same axes. Are your predictions verified?

Formative Assignment - SOLUTIONS

1. Graph:

$$f(x) = x^4 - \text{red graph}$$

$$g(x) = 2(x-5)^4 + 1 - \text{green graph}$$



Description: $g(x)$ is produced by a vertical stretch of a factor of 2, a horizontal translation of 5 units to the right, and a vertical translation of 1 unit up.

2.

$$f(x) = x^4$$

$$g(x) = -(3x+2)^4 - 2$$

First, rearrange to get:

$$g(x) = -\left[3\left(x - -\frac{2}{3}\right)\right]^4 - 2$$

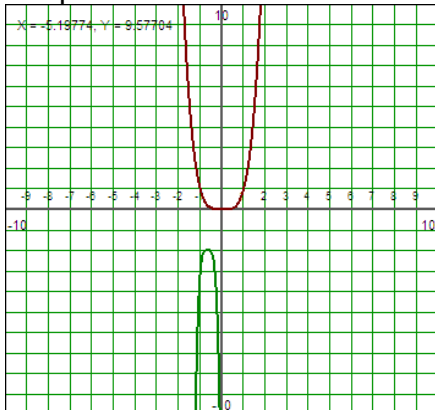
Horizontal compression by a factor of $1/3$;

Reflection in the x-axis;

Horizontal translation of $2/3$ units to the left;

Vertical translation, down 2 units.

Graph:



3.

$$f(x) = x^3$$

$$g(x) = -2(3x+4)^3 - 3$$

Rearrange $g(x)$ to get:

$$g(x) = -2 \left[3 \left(x + \frac{4}{3} \right) \right]^3 - 3$$

Transformations:

Reflection in the x-axis;

Horizontal compression by a factor of $1/3$;

Vertical stretch of a factor of 2;

Horizontal translation of $4/3$ units to the left;

Vertical translation of 3 units down.

Graph:

