Composition of Functions   Name _____
GADOE

Opening –

1) Find $f(g(x))$ and $g(f(x))$ for the pair of functions given and state the domain of each.

$f(x) = 2/x$, $g(x) = \sqrt{x} + 5$

2) Engage: Kelly is shopping and finds several items that are on sale at 25% off the original price. The items that she wishes to buy are a sweater originally at $43.98, a pair of jeans for $38.59, and a blouse for $31.99. She has $100 that her grandmother gave her for her birthday. The sales tax where she lives in Rome, Georgia is 7%. Does Dorothy have enough money for all three items? Explain.

3) Explore Composition of Functions – If f and g are functions, then the composite function f o g, or composition of g and f is defined by g o f = g(f(x)). We read g(f(x)) as "g of f of x."

Let $g(x) = -2x + 3$

a. Find g^{-1}

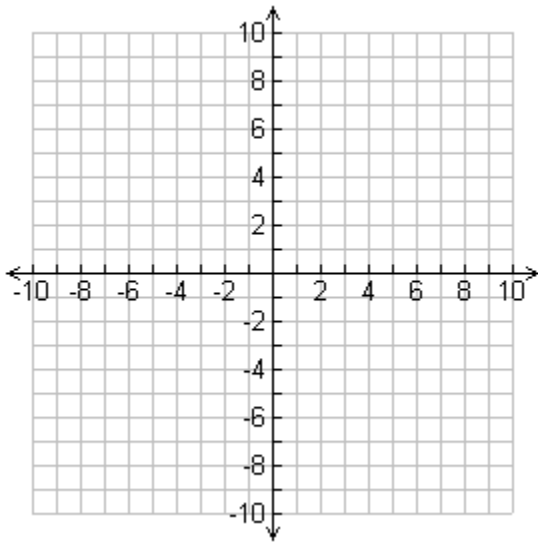b. Compute $g(g^{-1}(x))$

c. Compute $g^{-1}(g(x))$

d. What do you notice?

Algebraically Connecting Composition of Functions to Inverse Functions –

Two functions, $f(x)$ and $g(x)$ are inverse of each other if $f(g(x)) = g(f(x)) = x$.

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4) Using Desmos, graph the following function $f(x) = 3x + 1$. Sketch the graph in the space below.

a) Given the function $g(x) = 1/3\ x - 1/3$, compute $f(g(x))$ and $g(f(x))$. What can you say about the relationship between $f(x)$ and $g(x)$?

b) Using Desmos, graph $g(x)$ in the above grid provide.

c) Using a dotted line, sketch y = x on the graph above.

d) What do you notice?

Graphically Connecting Composition of Functions to Inverse Functions –

Two functions, $f(x)$ and $g(x)$ are inverse of each other if the graphs of $f(x)$ and $g(x)$ are reflections of each other across the line y = x.

Name _____

5) Evaluating a composition –

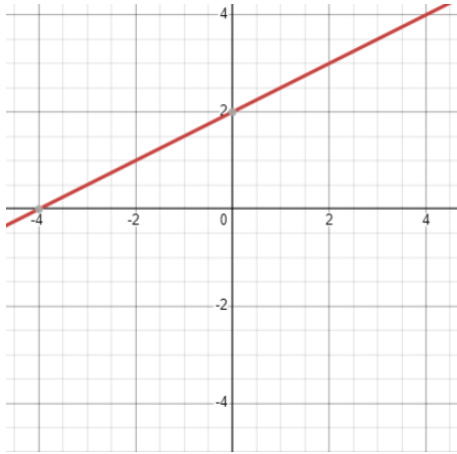The following functions are provided: $f(x) = 3x + 1$ and $g(x) = -2x + 3$

Find (f o g)(2)

Find (g(f(2))

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Formative Assessment Questions:

1. The graph of f(x) is provided in the coordinate plane. F(x) = 1/2x + 2.

Draw a new line g(x) that is the composition of the provided graph.

2. Find $(f \circ g)(x)$ and $(g \circ f)(x)$.

(a) $f(x) = \sqrt{2x}$ $\qquad\qquad$ $g(x) = \dfrac{1}{x+1}$

(b) $f(x) = 2x - 3$ $\qquad\qquad$ $g(x) = x^2 + 5$

3. Let $f(x) = x^2 + 3x + 2$ and $g(x) = x + 1$

(a) Evaluate $(f(g(2))$.

(b) Evaluate $(g \circ f)(2)$.