

Just In Time Quick Check
Standard of Learning (SOL) AII.7k

Strand: Functions

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The student will investigate and analyze linear, quadratic, absolute value, square root, cube root, rational, polynomial, exponential, and logarithmic function families algebraically and graphically. Key concepts include composition of functions algebraically and graphically.

Grade Level Skills:

- Determine the composition of two functions algebraically and graphically.
- Investigate and analyze characteristics and multiple representations of functions with a graphing utility.

Just in Time Quick Check

Just in Time Quick Check Teacher Notes

Supporting Resources:

- VDOE Mathematics Instructional Plans (MIPS)
 - [AII.7k - Composition of Functions](#) (Word) / [PDF Version](#)
- VDOE Algebra Readiness Formative Assessments
 - [A.7a,b,e](#) (Word) / [PDF](#)
- VDOE Algebra Readiness Remediation Plans
 - [Relations, Functions, Domain and Range](#) (Word) / [PDF](#)
- Desmos Activity
 - [Composition of Functions](#)

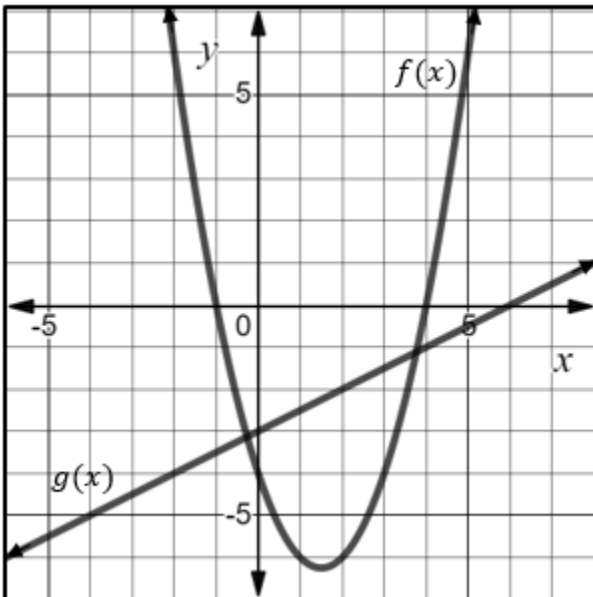
Supporting and Prerequisite SOL: [AII.6a](#), [AII.7f](#), [A.2a](#), [A.2b](#), [A.4a](#), [A.7e](#), [8.17](#)

SOL All.7k - Just in Time Quick Check

1. Given $f(x) = 3x^2 - 12$ and $g(x) = 2x + 1$. Find $g(f(x))$.

2. Given $f(x) = \frac{1}{2}x^2 + 5$ and $g(x) = \sqrt{2x - 6}$. Find $(f \circ g)(x)$.

3. Given the functions, $f(x)$ and $g(x)$, graphed below. Find $f(g(2))$.



SOL AII.7k - Just in Time Quick Check Teacher Notes

Common Errors/Misconceptions and their Possible Indications

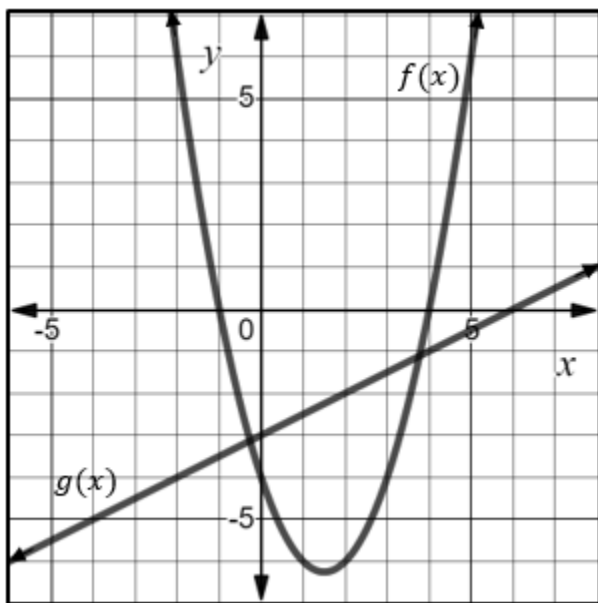
1. Given $f(x) = 3x^2 - 12$ and $g(x) = 2x + 1$. Find $g(f(x))$.

A common error that some students may make is to give $f(g(x)) = 3(2x + 1)^2 - 12 = 3(4x^2 + 4x + 1) - 12 = 12x^2 + 12x - 9$ instead of $6x^2 - 23$. This may indicate that the student does not understand that composition is not a commutative operation and thus found $f(g(x))$ instead of $g(f(x))$. The teacher may wish to have students create a mapping of the process $x \rightarrow f \rightarrow g$. This may help the students visualize the proper order of evaluating. Teachers may also wish to have the students practice evaluating functions by using a given expression as the input value in order to help students understand the notation of compositions and its application.

2. Given $f(x) = \frac{1}{2}x^2 + 5$ and $g(x) = \sqrt{2x - 6}$. Find $(f \circ g)(x)$.

A common error that some students may make is to square $g(x)$ but then only take half of the first term resulting in $x - 1$ instead of $x + 2$. This may indicate the student has not applied the coefficient of x to the entire replacement value for x . A strategy that may benefit some students is to leave an open set of parentheses where the replacement expression will be inserted. For example: $g(f(x)) = \frac{1}{2}(\quad)^2 + 5$. Using a highlighter to note $g(x)$ is the replacement expression may help students recognize the full expression will be substituted into the function. A strategy that could be used is to have the student practice with many different types of "outer" functions such as absolute value, square root, etc.

3. Given the functions, $f(x)$ and $g(x)$, graphed below. Find $f(g(2))$.



A common error that some students may make is to say $f(g(2)) = -6$ instead of $f(g(2)) = 6$. This may indicate the student has a misconception in thinking they need to evaluate the f function first then the g function. The teacher may wish to have students think about the mapping process and how the 2 is the x value of the function g . Using colored pencils or highlighters to mark the x value and find the corresponding y value may benefit some students.