9.5 Combining Two Functions: Composition

"I can compose functions. I know a composition's main properties.
I can apply what I have learned in unfamiliar settings."

Recall: a function takes any one input over its domain,
and produces only one output in its range.

To **compose** a function means to apply the output of one function
(**inner function**) as the input of another function (**outer function**).

Let the inner function be $g(x)$ and let the outer function be $f(x)$.
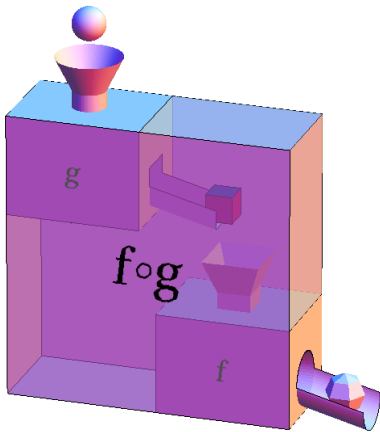
Note: **the result is still a function!**

This is stated as "the composition of f with g". It can also be stated as:

Ex. 1:
State two algebraic representations of "the composition of g with f".

Ex. 2:

Given: $f(x) = \sqrt{x-4}$ and $g(x) = 2x + 8$

Find, in its simplest form:
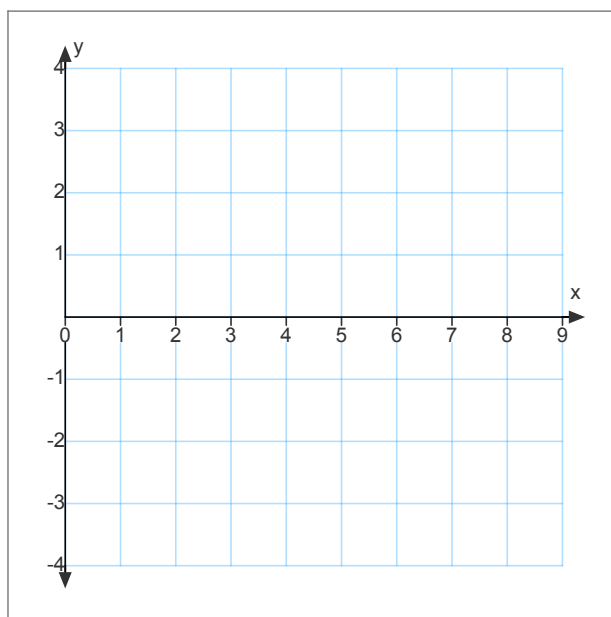
a) $f \circ g$

b) $g \circ f$

Ex. 3:

Find $g(f(-2))$, where $f(x) = 3x + 8$ and $g(x) = 2x^2 - 12$.

Ex. 4:

If $f(x) = \log(x-5)$ and $g(x) = 3x - 4$, find the domain of $f \circ g$ algebraically.
Graph $(f \circ g)(x)$.

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