Algebra 2 6.1 $f(x) =$ $h(x) =$

Find the sum, difference, product, and quotient of functions*

Find the composition of functions $f(h(x))$

$(f \circ h)(x)$

$(h \circ f)(x)$ $(h \circ h)(x)$

$= h(f(x))$

*a little bit in Algebra 1

function

sum $+$

difference $-$

product $\cdot$

quotient $\div$

Is it ever ok to divide by zero? $\times \not\in$

composition

Whiteboards

ReadingMath

Composition of Functions
The composition of f and g, denoted by $f \circ g$ or $f[g(x)]$, is read *f of g*.

StudyTip

Composition Be careful not to confuse a composition $f[g(x)]$ with multiplication of functions $(f \cdot g)(x)$.

$(f \circ g)(x)$

−1500
r=rebate d=discount −12%

Real-World Example 4 Use Composition of Functions

PT

88%

SHOPPING A new car dealer is discounting all new cars by 12%. At the same time, the manufacturer is offering a $1500 rebate on all new cars. Mr. Navarro is buying a car that is priced $24,500. Will the final price be lower if the discount is applied before the rebate or if the rebate is applied before the discount?

Real-World Link
Adjusted for inflation, the average price of a new car declined from $23,014 in 1995 to $22,013 in 2005.

$(r \circ d)(\ ) \quad 24500(\ )(.88) \xrightarrow{d} 21560 \xrightarrow{r} (21560)-1560$

discount first

$= \$20,060$

$(d \circ r)(\ ) \quad 24500(\ )-1500) \xrightarrow{23,000} (23,000).88 \xrightarrow{d} \$20,240$

GuidedPractice

4. SHOPPING Sounds-to-Go offers both an in-store $35 rebate and a 15% discount on a digital audio player that normally sells for $300. Which provides the better price: taking the discount before the rebate or taking the discount after the rebate?

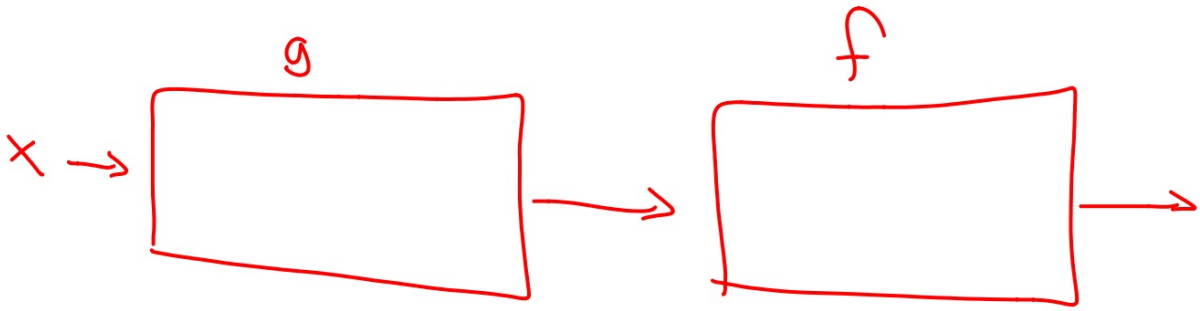
$300 - 15\% - 35 = \$220$
$.85$

$300 - 35 - 15\% = \$225.25$
$.85$

Composition of functions: can be written more than one way

$f(g(x))$ or $(f \circ g)(x)$

What to do first?



f(g(x)) g(f(x)) what to do first?

3B. $f(x) = x^2 + 2$ and $g(x) = x - 6$

$x-6$
$x-6$
$-6x+36$
x^2 $-6x$

$(f \circ g)x$

$f(g(x))$

$x \rightarrow$ $(x)-6$ (g) $\xrightarrow{x-6}$ $(x-6)^2+2$ (f) $\rightarrow$ $x^2-12x+38$

$(g \circ f)x$

$g(f(x))$

$x \rightarrow$ $(x)^2+2$ (f) $\xrightarrow{x^2+2}$ $(x^2+2)-6$ (g) $\rightarrow x^2-4$

3B. $f(x) = x^2 + 2$ and $g(x) = x - 6$

g(f(x))

Label which one is which!

Find $[f \circ g](3)$ and $[g \circ f](x)$, if they exist. State the domain and range for each composed function.

27 $f(x) = 2x$
$g(x) = x + 5$

28. $f(x) = -3x$
$g(x) = -x + 8$

29. $f(x) = x + 5$
$g(x) = 3x - 7$

$(f \circ g)(x)$ $x \to$ $(x)+5$ $\to$ $2(x+5)$ $\to 2x+10$

g f

D: ARN

R: ARN

$2 \cdot 3 + 10 = 16$