

BE - PRECALC | WEDNESDAY 8-19-09

$$f(x) = 3x^2 + 4x - 5 \quad g(x) = 2x + 9$$

① $(f \cdot g)(x) = ?$

② $(f \cdot g)(-\frac{1}{2}) = ?$

ACT
1 min.
Barrens

If $\frac{5}{8}$
 .25 is expressed as a fraction

in lowest terms, what number will
be in the denominator?

Ans $\frac{\frac{5}{8}}{\frac{1}{4}} = \frac{5}{\cancel{8}^2} \cdot \frac{4^1}{1} = \frac{5}{2} \leftarrow \text{ANS}$

Fraction Rules: $+, - \Rightarrow$ common denominator

$\cdot \Rightarrow \frac{\text{tops} \cdot \text{tops}}{\text{bottoms} \cdot \text{bottoms}}$

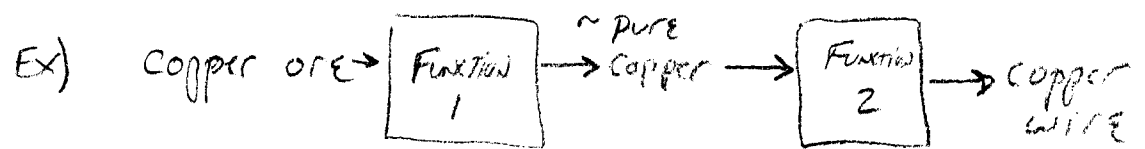
💡 Simplify and
cross-simplify
if you can

$\div \Rightarrow$ "Flip & multiply the bottom number"

Why it works: $\frac{\frac{a}{b}}{\frac{c}{d}} \cdot \frac{\frac{d}{c}}{\frac{d}{c}} = \frac{\frac{a}{b} \cdot \frac{d}{c}}{1}$

BESIDES $+$, $-$, $\cdot$, $\div$ functions — there is one more operation $\Rightarrow$ feeding the output of one function to the input of another function:

"Many step" functions like this occur often in real situations:



This "double step" process is called the composition of two functions.
(Written with a little open circle).

Ex) $x \rightarrow g(x) \longrightarrow f(x)$
 written $(f \circ g)(x)$ or $f(g(x))$
 "f composition g" or "f of g of x"

Ex) $f(x) = x^2$ $g(x) = 3x$
 $(f \circ g)(x)$ or $f(g(x)) = f(3x) = ()^2$
 $= (3x)^2$ $= (3x)^2$
 $= \boxed{9x^2}$ $= \boxed{9x^2}$

Ex) $(f \circ g)(4) = 9()^2 = 9 \cdot 16 = 144$

Ex 3
Pg 15

$$f(g(x)) \quad \text{for } f(x) = 2x^2 - 3x + 8$$

$$g(x) = 5x - 6$$

$$f(x) = 2x^2 - 3x$$

$$f(5x-6) = 2(5x-6)^2 - 3(5x-6)$$

$$= 2[(5x-6)(5x-6)] - 15x + 18 + 8$$

$$= 2[25x^2 - 30x - 30x + 36] - 15x + 18 + 8$$

$$= 2[25x^2 - 60x + 36] - 15x + 18 + 8$$

$$= 50x^2 - 120x + 72 - 15x + 18 + 8$$

$$(f \circ g)(x) = 50x^2 - 135x + 98$$

Can find $g(f(x))$ the same way - it will not be the same. The composition of functions is not commutative. $g(f(x)) \neq f(g(x))$

Homework: Pg. 18 # 15, 16, 23

⚡
Find $f(g(x))$ then
look at its domain