BE-PRECALC | WEDNESDAY 8-19-09

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

① $(f \cdot g)(x) = ?$

② $(f \cdot g)(-\frac{1}{2}) = ?$

ACT 1 min. Barrens

If $\dfrac{\frac{5}{8}}{.25}$ is expressed as a fraction in lowest terms, what number will be in the denominator?

(ANS) $\dfrac{\frac{5}{8}}{\frac{1}{4}} = \dfrac{5}{\cancel{8}_{2}} \cdot \dfrac{4^{1}}{1} = \dfrac{5}{2}$ ← ANS

FRACTION RULES: +, − ⇒ COMMON DENOMINATOR

• ⇒ $\dfrac{\text{tops} \cdot \text{tops}}{\text{bottoms} \cdot \text{bottoms}}$ Simplify and cross-simplify if you can

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÷ ⇒ "flip & multiply the bottom number"

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

HOMEWORK REVIEW — Pg. 17 # 11–14.

Besides +, −, ·, ÷ functions — there is one more operation ⇒ feeding the output of one function to the input of another function.

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

Ex) copper ore → [Function 1] → ~pure copper → [Function 2] → copper wire

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

Ex) $x \longrightarrow g(x) \longrightarrow f(x)$

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

"f composition g" or "f of g of x"

Ex) $f(x) = x^2$ $\quad g(x) = 3x$

$(f \circ g)(x)$ <u>OR</u> $f(g(x)) = f(3x) = (\ )^2$

$= (3x)^2$ $\quad = (3x)^2$

$= \boxed{9x^2}$ $\quad = \boxed{9x^2}$

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

Ex 3 Pg 15 $f(g(x))$ 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