given $5x + 4y = 12$ and $y = 2x - 3$

Use substitution to write an equation with only the variable x. Then simplify.

$5x + 4(2x - 3) = 12$

$5x + 8x - 12 = 12$

$13x - 12 = 12$

Composite Materials

A "composite" is when two or more different materials are combined together to create one new material.

Composite Functions: When two functions are combined into one function.

f(g(x)) is read as "f of g of x"

Just as f(2) tells you to substitute 2 into the function f

f(g(x)) tells you to

Substitute the function **g(x)** into the function **f(x)**.

Given these two functions: $f(x)=5x^2 - 2x + 12$ $g(x) = 2x - 3$

substitution turns these two functions into one composite function:

$f(g(x)) \longrightarrow 5(2x - 3)^2 - 2(2x - 3) + 12$

$5(4x^2 - 12x + 9) - 2(2x - 3) + 12$

$20x^2 - 60x + 45 - 4x + 6 + 12$

$f(g(x)) = 20x^2 - 64x + 63$

Given these two functions: $f(x) = 3x^2 - 7$ and $g(x) = 2x+4$

1. Find f(3)

$f(3) = 3(3)^2 - 7$

$= 3(9) - 7$

$= 27 - 7$

$= 20$

2. Find g(3)

$g(3) = 2(3) + 4$

$= 6 + 4$

$= 10$

Given these two functions: $f(x) = 3x^2 - 7$ and $g(x) = 2x+4$

a. Find f(g(3))

$g(3) = 2(3)+4$
$= 10$

$f(10) = 3(10)^2-7$
$= 3(100)-7$
$= 300-7 = 293$

b. find g(f(3))

$f(3)=3(3)^2-7$
$f(3)=20$
$g(20)=2(20)+4$
$g(20)=44$

Given this function: $g(w) = 2w^2 - 7w$

Find g(g(g(2))).

Find g(g(g(2))). First find g(2)

$g(2) = 2(2)^2-7(2) = 8-14 = -6$

$g(g(-6))$ Next find g(-6)

$g(-6) = 2(-6)^2-7(-6)$
$72+42 = 114$

$g(114)$ Finally, find g(114)

$2(114)^2-7(114) = 25,194$

Another way to write a composite is:

$f(g(x)) \rightarrow \boxed{(f \circ g)(x)}$

Use these two functions:
f(x) = x + 5 g(x) = 3x - 2

1. Find g(f(-1))

$f(-1) = -1+5 = 4$
$g(4) = 3(4)-2 = 10$

2. Find $(g \circ f)(5)$

$g(f(5))$
$f(5) = 5+5 = 10$
$g(10) = 3(10)-2$
$= 28$

Use these two functions:
f(x) = x + 4 g(x) = $3x^2$- 2

1. Find f(6a)

$= (6a)+4$
$= 6a+4$

2. Find g(m - 1)

$= 3(m-1)^2-2$
$= 3(m^2-2m+1)-2$
$= 3m^2-6m+3-2$
$= 3m^2-6m+1$

Use these two functions:

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

1. Find f(g(x))

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

$= (3x^2-2) + 4$

$= 3x^2 + 2$

2. Find $(g \circ f)(x)$

$= g(f(x))$

$= g(x+4)$

$= 3(x+4)^2 - 2$

$= 3(x^2+8x+16) - 2$

$= 3x^2+24x+48-2$

$= 3x^2+24x+46$

Use these two functions:

$f(x) = 2x + 1$ $\quad g(x) = \frac{5x}{6x-8}$

1. Find f(g(x)). Simplify.

$f\left(\frac{5x}{6x-8}\right) = 2\left(\frac{5x}{6x-8}\right) + 1$

$= \frac{10x}{6x-8} + 1$

$= \frac{5x}{3x-4} + 1$

$= \frac{5x}{3x-4} + \frac{3x-4}{3x-4} = \frac{8x-4}{3x-4}$

Use these two functions:

$f(x) = 2x + 1$ $\quad g(x) = \frac{5x}{6x-8}$

2. Find g(f(x)). Simplify.

$g(2x+1) = \frac{5(2x+1)}{6(2x+1)-8} = \frac{10x+5}{12x+6-8}$

$= \frac{10x+5}{12x-2}$