given $y = 2Q + 13$ and $Q = 3x - 1$

Use these two equations to write an equation for y in terms of x. → this should be the only variable in the equation.

$y =$

Use Substitution by replacing Q with 3x-1 in the y= equation

$$y = 2(3x-1) + 13$$
$$= 6x - 2 + 13$$
$$y = 6x + 11$$

Given $f(x) = x^2 + 3x - 8$

What does $f(5)$ mean?

Evaluate the function f when x=5.

Replace x with 5 and simplify.

Substitute 5 for x in the function f(x) and simplify.

Given $g(x) = 3x - 16$

What does $g(x + 7)$ mean?

Evaluate the function g when x = x+7.

Replace x with x + 7 and simplify.

Substitute x + 7 for x in the function g(x) and simplify.

Given: $f(x) = 5x^2 - 7x$

Find $f(x+3)$. Simplify as much as possible.

$$= 5(\quad)^2 - 7(\quad)$$
$$= 5(x+3)^2 - 7(x+3)$$
$$= 5(x^2 + 6x + 9) - 7(x+3)$$
$$= 5x^2 + 30x + 45 - 7x - 21$$

$$5x^2 + 23x + 24$$

Given: $g(x) = \dfrac{3x - 1}{x + 5}$

Find $g(x - 8)$. Simplify as much as possible.

$$\frac{3(x-8) - 1}{(x-8) + 5} = \frac{3x - 24 - 1}{x - 3} = \boxed{\frac{3x - 25}{x - 3}}$$

Given: $h(x) = 6x + 9$

Find $h\left(\dfrac{2x - 3}{x + 1}\right)$ Simplify as much as possible.

$$6\left(\frac{2x-3}{x+1}\right) + 9$$

$$\frac{12x - 18}{x+1} + \frac{9}{1} \cdot \frac{x+1}{x+1} = \frac{(12x-18) + (9x+9)}{x+1}$$

$$\boxed{\frac{21x - 9}{x+1}}$$

Composite Materials

A "composite" is when two or more different materials are combined together.

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

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

You are substituting the function $g(x)$ into the function $f(x)$.

$f(x) = 5x - 6$ $g(x) = 4 - 3x$

substitution turns these two functions into one composite function:

$f(g(x)) \longrightarrow$ $5(4 - 3x) - 6 = 20 - 15x - 6$

because g(x) = 4-3x
you could picture this
as f(4-3x)

$$= \boxed{-15x + 14}$$

Another way to write a composite is:

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

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

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

   g is being put into f

   $f(g(x)) = \left(x+3\right)^2 - 2$

   $= x^2 + 6x + 9 - 2$

   $= \boxed{x^2 + 6x + 7}$

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

   f is being put into g

   $g(f(x)) = \left(x^2 - 2\right) + 3$

   $= x^2 - 2 + 3$

   $= \boxed{x^2 + 1}$