

$$\#1 \quad f(a) = 2a + 2$$
$$g(a) = -2a^2 - 4$$

$$(f \circ g)(4) = f(g(4))$$

Right to left inside \rightarrow out

Substitute 4 into equation g

$$g(4) = -2(4)^2 - 4 = -36$$

take output of first equ. and
substitute into 2nd equ.

$$f(g(4)) = f(-36) = 2(-36) + 2 = \boxed{-70}$$

$$\#2 \quad h(x) = 2x - 5 \quad g(x) = 4x - 1$$

$$(h \circ g)(-7) = h(g(-7))$$

↑
Plug
-7 into g

$$g(-7) = 4(-7) - 1 = -29$$

-29 = g(-7) plug into equ. h

$$h(g(-7)) = h(-29) = 2(-29) - 5$$

$$(h \circ g)(-7) = -63$$

$$\#4 \quad g(x) = x + 1$$

$$h(x) = -x - 3$$

$$(g \circ h)(2) = ??$$

plug 2 into
equ. h

$$h(2) = -(2) - 3 = -5$$

$$g(-5) = -5 + 1 = \boxed{-4}$$

$$\begin{array}{l} (f + g)(x) \\ (f - g)(x) \end{array} \quad (f \circ g)(x)$$

$$\#7 \quad g(n) = -3n - 1$$

$$h(n) = 4n - 1$$

find $(g \circ h)(n) = g(h(n))$

$$g(4n - 1) = -3(4n - 1) - 1$$

$$= -12n + 3 - 1$$

$$= \boxed{-12n + 2}$$

$$\#12 \quad g(x) = 2x$$

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

find $g(f(x))$

$$g(2x - 2)$$

$$g(2x - 2) = 2(2x - 2)$$
$$= \boxed{4x - 4}$$

TAKE
 $f(x)$ and
plug into
equ. of
variable

$$\#11 \quad h(n) = n^2 - 3n$$

$$g(n) = (2n+1)$$

$$\text{find } (h \circ g)(n) = h(g(n))$$

$$h(n) = n^2 - 3n$$

$$h(2n+1) = (2n+1)^2 - 3(2n+1)$$

$$= (2n+1)(2n+1) - 3(2n+1)$$

$$= 4n^2 + 2n + 2n + 1 - 6n - 3$$

$$\boxed{4n^2 - 2n - 2}$$

#Application

$$f(x) = x - 10$$

← \$10 off

$$g(x) = x - .2x$$

← 20% off

$$f(g(40)) \quad \text{and} \quad g(f(40))$$

$$\begin{aligned} g(40) &= 40 - .2(40) \\ &= 32 \end{aligned}$$

$$\begin{aligned} f(40) &= 40 - 10 \\ &= 30 \end{aligned}$$

$$\begin{aligned} f(32) &= 32 - 10 \\ &= \boxed{\$22} \end{aligned}$$

$$\begin{aligned} g(30) &= 30 - .2(30) \\ &= \$24 \end{aligned}$$