More Practice: Operations with Functions (including composition)

For $f(x) = x - 1$, $g(x) = x^2 + 4x + 5$, $h(x) = 2x + 3$, find

1. $f(x) + h(x)$ $(x-1)+(2x+3) = 3x+2$

2. $f(x) - g(x)$ $(x-1)-(x^2+4x+5) = -x^2-3x-6$

3. $f(x) \times h(x)$ $(x-1)(2x+3) = 2x^2+3x-2x-3 = 2x^2+x-3$

4. $f(x) \cdot g(x)$ $(x-1)(x^2+4x+5) =$

$$\begin{array}{r} x^2+4x+5 \\ x-1 \\ \hline -x^2-4x-5 \\ x^3+4x^2+5x \\ \hline \end{array}$$

x^3+3x^2+x-5

5. $\frac{h(x)}{h(x)} = 1$

6. $(f \circ g)(x) = f(g(x)) = (x^2+4x+5)-1 = x^2+4x+4$

7. $(h \circ g)(x) = h(g(x)) = 2(x^2+4x+5)+3 = 2x^2+8x+13$

8. $(g \circ h)(3) = g(h(3)) = g(9) = 9^2+4 \cdot 9+5 = 81+36+5 = 122$

$h(3) = 2(3)+3 = 9$

9. $(h \circ f)(1) = h(f(1)) = h(0) = 2(0)+3 = 3$

$f(1) = 1-1 = 0$

10. $(f \circ h \circ g)(0)$

$= f(h(g(0))) = f(h(5)) = f(13) = 13-1$

$= 12$

$g(0) = 0^2+4(0)+5 = 5$

$h(5) = 2(5)+3 = 13$