Composition of Functions

$h(x) = x^2$ and $p(x) = 2x - 3$
Evaluate:

1. $(h \circ p)(2) = 1$

$p(2) = 2(2) - 3$
$p(2) = 1$
$h(2) = (1)^2$
$h(2) = 1$

2. $(p \circ h)(-3)$

$h(-3) = (-3)^2$
$h(-3) = 9$
$p(9) = 2(9) - 3$
$p(9) = 15$

3. $h(p(-1))$

$p(-1) = 2(-1) - 3$
$p(-1) = -5$
$h(-5) = (-5)^2$
$h(-5) = 25$

4. $p(h(2))$

$h(2) = (2)^2$
$h(2) = 4$
$p(4) = 2(4) - 3$
$p(4) = 5$

5. $h(p(3))$

$p(3) = 2(3) - 3 =$
$p(3) = 3$
$h(3) = (3)^2$
$h(3) = 9$

6. $(p \circ h)(1)$

$h(1) = (1)^2$
$h(1) = 1$
$p(1) = 2(1) - 3$
$p(1) = -1$

7. $(h \circ p)(x)$

$p(x) = 2x - 3$
$h(2x - 3) = (2x - 3)^2$
$(2x - 3)(2x - 3)$
$4x^2 - 6x - 6x + 9$
$4x^2 - 12x + 9$

8. $p(h(x))$

$h(x) = x^2$
$p(x^2) = 2(x^2) - 3$
$2x^2 - 3$

9. If $f(x) = \frac{1}{2}x - 3$ and $g(x) = 2x + 5$, what is the value of $(g \circ f)(4)$?

$f(4) = \frac{1}{2}(4) - 3$
$f(4) = -1$

$g(-1) = 2(-1) + 5$
$g(-1) = 3$

10. If $f(x) = x^2$ and $g(x) = 2x + 1$, which expression is equivalent to $(f \circ g)(x)$?

$g(x) = 2x + 1$
$f(2x + 1) = (2x + 1)^2$
$(2x + 1)(2x + 1)$
$4x^2 + 2x + 2x + 1$
$4x^2 + 4x + 1$

11. If $f(x) = 5x^2$ and $g(x) = \sqrt{2x}$, what is the value of $(f \circ g)(8)$

$g(8) = \sqrt{2(8)}$ $f(4) = 5(4)^2$
$g(8) = 4$ $f(4) = 80$

12. If $f(x) = x^2 + 4$ and $g(x) = 2x + 3$, find $f(g(-2))$.

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

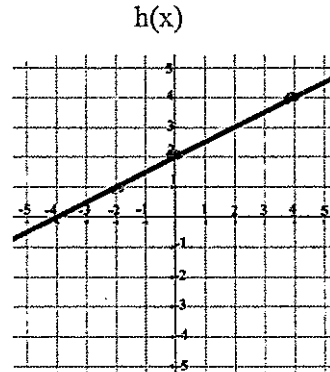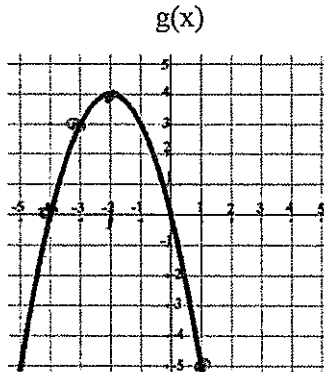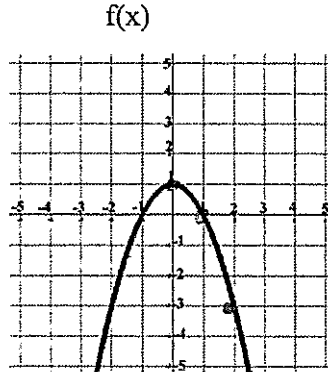13. If $f(x) = 3x - 5$ and $g(x) = x - 9$, which expression is equivalent to $(f \circ g)(x)$?

$g(x) = x - 9$
$f(x-9) = 3(x-9) - 5$
$\quad\quad 3x - 27 - 5$
$\quad\quad 3x - 32$

Use the followings graphs to answer the questions that follow:

f(x)

g(x)

h(x)

14. h(g(-2))

$g(-2) = 4$
$h(4) = 4$

15. h(g(-4))

$g(-4) = 0$
$h(0) = 2$

16. $(f \circ f)(1)$

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

17. $(f \circ h)(0)$

$h(0) = 2$
$f(2) = -3$

18. $(g \circ f)(2)$

$f(2) = -3$
$g(-3) = 3$

19. g(h(-2))

$h(-2) = 1$
$g(1) = -5$