

F.BF.A.1: Compositions of Functions 3

- 1 If $f(x) = 2x - 1$ and $g(x) = 3x + 5$, then $(f \circ g)(x)$ is equal to
 - 1) $5x + 4$
 - 2) $6x + 2$
 - 3) $6x + 9$
 - 4) $6x^2 + 7x - 5$

- 2 If $f(x) = 3x - 5$ and $g(x) = x - 9$, which expression is equivalent to $(f \circ g)(x)$?
 - 1) $4x - 14$
 - 2) $3x - 14$
 - 3) $3x - 32$
 - 4) $3x^2 - 32x + 45$

- 3 If $f(x) = x^2 - 5$ and $g(x) = 6x$, then $g(f(x))$ is equal to
 - 1) $6x^3 - 30x$
 - 2) $6x^2 - 30$
 - 3) $36x^2 - 5$
 - 4) $x^2 + 6x - 5$

- 4 If $f(x) = x^2$ and $g(x) = 2x + 1$, which expression is equivalent to $(f \circ g)(x)$?
 - 1) $2x^2 + 1$
 - 2) $2(x + 1)^2$
 - 3) $4x^2 + 1$
 - 4) $4x^2 + 4x + 1$

- 5 If f and g are two functions defined by $f(x) = 3x + 5$ and $g(x) = x^2 + 1$, then $g(f(x))$ is
 - 1) $x^2 + 3x + 6$
 - 2) $9x^2 + 30x + 26$
 - 3) $3x^2 + 8$
 - 4) $9x^2 + 26$

- 6 If $f(x) = 2x^2 - 3x + 1$ and $g(x) = x + 5$, what is $f(g(x))$?
 - 1) $2x^2 + 17x + 36$
 - 2) $2x^2 + 17x + 66$
 - 3) $2x^2 - 3x + 6$
 - 4) $2x^2 - 3x + 36$

- 7 If $f(x) = \frac{2}{x+3}$ and $g(x) = \frac{1}{x}$, then $(g \circ f)(x)$ is equal to
 - 1) $\frac{1+3x}{2x}$
 - 2) $\frac{2x}{1+3x}$
 - 3) $\frac{x+3}{2}$
 - 4) $\frac{x+3}{2x}$

- 8 If $f(x) = 2x^2 + 4$ and $g(x) = x - 3$, which number satisfies $f(x) = (f \circ g)(x)$?
- 1) $\frac{3}{2}$
 - 2) $\frac{3}{4}$
 - 3) 5
 - 4) 4
- 9 If $f(x) = x + 1$ and $g(x) = x^2 - 1$, the expression $(g \circ f)(x)$ equals 0 when x is equal to
- 1) 1 and -1
 - 2) 0, only
 - 3) -2 , only
 - 4) 0 and -2
- 10 If $f(x) = x^2 - x$ and $g(x) = x + 1$, determine $f(g(x))$ in simplest form.
- 11 Given: $f(x) = \sqrt{2x + 5}$ and $g(x) = 6x - 3$, find $g(f(10))$ and $(f \circ g)(x)$.
- 12 If $f(x) = x^{\frac{2}{3}}$ and $g(x) = 8x^{-\frac{1}{2}}$, find $(f \circ g)(x)$ and $(f \circ g)(27)$.
- 13 Given $f(x) = x^2$ and $g(x) = x - 3$, express $g(f(x + 2))$ as a polynomial in simplest form.
- 14 Which expression is equivalent to $(n \circ m \circ p)(x)$, given $m(x) = \sin x$, $n(x) = 3x$, and $p(x) = x^2$?
- 1) $\sin(3x)^2$
 - 2) $3 \sin x^2$
 - 3) $\sin^2(3x)$
 - 4) $3 \sin^2 x$

F.BF.A.1: Compositions of Functions 3

Answer Section

1 ANS: 3

$$2(3x + 5) - 1 = 6x + 10 - 1 = 6x + 9$$

REF: 061015b

2 ANS: 3

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

REF: 010909b

3 ANS: 2

$$6(x^2 - 5) = 6x^2 - 30$$

REF: 011109a2

4 ANS: 4

$$\begin{aligned} (f \circ g)(x) &= (2x + 1)^2 \\ &= 4x^2 + 2x + 2x + 1 \\ &= 4x^2 + 4x + 1 \end{aligned}$$

REF: 080917b

5 ANS: 2

$$f(x) = 3x + 5$$

$$\begin{aligned} g(3x + 5) &= (3x + 5)^2 + 1 \\ &= 9x^2 + 30x + 26 \end{aligned}$$

REF: 080313b

6 ANS: 1

$$f(g(x)) = 2(x + 5)^2 - 3(x + 5) + 1 = 2(x^2 + 10x + 25) - 3x - 15 + 1 = 2x^2 + 17x + 36$$

REF: 061419a2

7 ANS: 3

$$\begin{aligned} f(x) &= \frac{2}{x+3} \\ g\left(\frac{2}{x+3}\right) &= \frac{1}{\frac{2}{x+3}} = \frac{x+3}{2} \end{aligned}$$

REF: 010408b

8 ANS: 1

$$\begin{aligned}
 g(x) &= x - 3 & f(x) &= (f \circ g)(x) \\
 f(x-3) &= 2(x-3)^2 + 4 & 2x^2 + 4 &= 2x^2 - 12x + 22 \\
 &= 2(x^2 - 6x + 9) + 4 & 4 &= -12x + 22 \\
 &= 2x^2 - 12x + 22 & 12x &= 18 \\
 & & x &= \frac{3}{2}
 \end{aligned}$$

REF: 060210b

9 ANS: 4

$$\begin{aligned}
 f(x) &= x + 1 & (g \circ f)(x) &= 0 \\
 g(x+1) &= (x+1)^2 - 1 & x^2 + 2x &= 0 \\
 &= x^2 + 2x & x(x+2) &= 0 \\
 & & x &= 0 \text{ or } x = -2
 \end{aligned}$$

REF: 060417b

10 ANS:

$$(x+1)^2 - (x+1) = x^2 + 2x + 1 - x - 1 = x^2 + x$$

REF: 081530a2

11 ANS:

$$27, \sqrt{12x-1}$$

REF: 080341siii

12 ANS:

$$\begin{aligned}
 g(x) &= 8x^{\frac{1}{2}} \\
 4x^{-\frac{1}{3}}, \frac{4}{3} & \cdot f(8x^{\frac{1}{2}}) = (8x^{\frac{1}{2}})^{\frac{2}{3}} = 4x^{-\frac{1}{3}} & g(27) &= 8(27)^{-\frac{1}{2}} \\
 & & f(8(27)^{\frac{1}{2}}) &= (8(27)^{\frac{1}{2}})^{\frac{2}{3}} = 4(27)^{-\frac{1}{3}} = \frac{4}{3}
 \end{aligned}$$

REF: 010331b

13 ANS:

$$f(x+2) = (x+2)^2 = x^2 + 4x + 4 \quad g(f(x+2)) = x^2 + 4x + 4 - 3 = x^2 + 4x + 1$$

REF: 011733a2

14 ANS: 2

REF: 061216a2