Solutions

Each answer shows the steps, then the **result**.

2.1

- apply g first, then f: $f(g(x))$

2.2

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

2.3

- $(g \circ f)(x) = (x + 2) \cdot 3 = 3x + 6$

2.4

- $(f \circ I)(x) = f(I(x)) = f(x)$: composing with the identity leaves f unchanged

2.5

- $g(x) = 2x - 5$ (inner) and $f(x) = x^3$ (outer), so $h(x) = f(g(x))$

3.1 B

- $f(g(x))$.

3.2 B

- inner function first.

3.3

(a)

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

(b)

- $2x - 1$

(c)

- $2(4 - 1) = 6$

3.4

(a)

- $g(2) = 1$ from the table, and $f(1) = -1$ from the graph, so $f(g(2)) = \mathbf{-1}$

(b)

- $f(3) = 1$ from the graph, and $g(1) = 5$, so $g(f(3)) = \mathbf{5}$

(c)

- $f(g(2)) = -1$ from (a); $f(2) = 0$ (midway along the segment from $(1, -1)$ to $(3, 1)$), so $g(f(2)) = g(0) = 3$
- $-1 \neq 3$, so the two composites give different outputs for the same input: composition is not commutative

3.5

(a)

- $A(r(t)) = \pi(30t)^2 = \mathbf{900\pi t^2}$
- the area, in cm^2, inside the ripple t seconds after the stone lands

(b)

- $900\pi \times 2^2 = 3600\pi \approx \mathbf{11\,300}$ cm^2