

Exercise walk-through

Composition of Functions ■ 2.7

eXercise

You must be able to

- evaluate a **composite function** 复合函数 $(f \circ g)(x) = f(g(x))$
- apply the inner function first, then the outer

Method — Composite functions

$(f \circ g)(x) = f(g(x))$ — apply g **first**, then feed the result into f .

Method — Example

$$f(x) = x + 1, g(x) = x^2:$$

$$(f \circ g)(x) = x^2 + 1, \text{ while } (g \circ f)(x) = (x + 1)^2 \text{ — order matters.}$$

Practice 2.1 ■ 1 mark

State what $(f \circ g)(x)$ means.

Solution 2.1

Worked steps

apply g first, then f : $f(g(x))$ **B1**.

Practice 2.2 ■ 2 marks

For $f(x) = x + 2$ and $g(x) = 3x$, find $(f \circ g)(x)$.

Solution 2.2

Worked steps

$$(f \circ g)(x) = 3x + 2 \quad \text{M1} \quad \text{A1}.$$

Practice 2.3 ■ 1 mark

For the same functions, find $(g \circ f)(x)$.

Solution 2.3

Method: Composite functions

Worked steps

$$(g \circ f)(x) = (x + 2) \cdot 3 = 3x + 6 \quad \text{B1}.$$

Exam-style 3.1 ■ 1 mark

$(f \circ g)(x)$ means

A $f(x) \cdot g(x)$

B $f(g(x))$

C $g(f(x))$

D $f(x) + g(x)$

Solution 3.1

A $f(x) \cdot g(x)$

B $f(g(x))$



C $g(f(x))$

D $f(x) + g(x)$

Worked steps

B.

Exam-style 3.2 ■ 1 mark

In a composition, you apply the

- A** outer function first
- B** inner function first
- C** both at once
- D** neither

Solution 3.2

A outer function first

B inner function first 

C both at once

D neither

Worked steps

B.

Exam-style 3.3 ■ 1 mark

$$f(x) = 2x, g(x) = x - 1.$$

(a) Find $(f \circ g)(x)$.

(b) Find $(g \circ f)(x)$.

(c) Evaluate $(f \circ g)(4)$.

Solution 3.3

Worked steps

(a) $2(x - 1) = 2x - 2$ **B1**. (b) $2x - 1$ **B1**. (c) $2(4 - 1) = 6$ **B1**.