



Higher Mathematics

Composite Functions – Questions

Marks are indicated in brackets after each question number

2013 Paper 1 Question 1, (2)

The functions f and g are defined by $f(x) = x^2 + 1$ and $g(x) = 3x - 4$, on the set of real numbers.

Find $g(f(x))$.

2014 Paper 2 Question 3, (2)

Functions f and g are defined on suitable domains by

$$f(x) = x(x - 1) + q \text{ and } g(x) = x + 3.$$

- (a) Find an expression for $f(g(x))$.
- (b) Hence, find the value of q such that the equation $f(g(x)) = 0$ has equal roots.

2015 Paper 1 Question 5, (2) (1)

A function g is defined on $\mathbb{R}$, the set of real numbers, by $g(x) = 6 - 2x$.

- (a) Determine an expression for $g^{-1}(x)$.
- (b) Write down an expression for $g(g^{-1}(x))$.



2015 Paper 2 Question 2, (2) (3) (2)

Functions f and g are defined on suitable domains by

$$f(x) = 10 + x \quad \text{and} \quad g(x) = (1 + x)(3 - x) + 2.$$

- (a) Find an expression for $f(g(x))$.
- (b) Express $f(g(x))$ in the form $p(x + q)^2 + r$.
- (c) Another function h is given by $h(x) = \frac{1}{f(g(x))}$.

What values of x cannot be in the domain of h ?

2016 Paper 1 Question 12, (2) (3)

The functions f and g are defined on $\mathbb{R}$, the set of real numbers by

$$f(x) = 2x^2 - 4x + 5 \quad \text{and} \quad g(x) = 3 - x.$$

- (a) Given $h(x) = f(g(x))$, show that $h(x) = 2x^2 - 8x + 11$.
- (b) Express $h(x)$ in the form $p(x + q)^2 + r$.

2017 Paper 1 Question 1, (1) (2)

Functions f and g are defined on suitable domains by $f(x) = 5x$ and $g(x) = 2 \cos x$.

- (a) Evaluate $f(g(0))$.
- (b) Find an expression for $g(f(x))$.



2018 Paper 2 Question 6, (2) (1)

Functions, f and g , are given by $f(x) = 3 + \cos x$ and $g(x) = 2x$, $x \in \mathbb{R}$.

(a) Find expressions for

- (i) $f(g(x))$ and
- (ii) $g(f(x))$.

2019 Paper 1 Question 12, (2) (1)

Functions f and g are defined by

- $f(x) = \frac{1}{\sqrt{x}}$, where $x > 0$
- $g(x) = 5 - x$, where $x \in \mathbb{R}$.

(a) Determine an expression for $f(g(x))$.

(b) State the range of values of x for which $f(g(x))$ is undefined.

2022 Paper 2 Question 5, (2) (1) (4)

Functions f and g are given by $f(x) = x^2 - 2$ and $g(x) = 3x + 5$, $x \in \mathbb{R}$.

(a) Find expressions for:

- (i) $f(g(x))$ and
- (ii) $g(f(x))$.

(b) Determine the range of values of x for which $f(g(x)) < g(f(x))$.



2023 Paper 1 Question 13, (1) (2) (1) (3)

Functions f and g are defined by:

- $f(x) = 2\sin x$, where $0 < x < \frac{\pi}{2}$
- $g(x) = 2x$, where $0 < x < \frac{\pi}{4}$

(a) (i) Evaluate $f\left(g\left(\frac{\pi}{6}\right)\right)$.

(ii) Determine an expression for $f(g(x))$.

(b) (i) Given that $f(p) = \frac{1}{3}$, determine the exact value of $\sin p$.

(ii) Hence, determine the exact value of $f(g(p))$.

2024 Paper 2 Question 8, (2) (2)

Functions f and g are defined on $\mathbb{R}$, the set of real numbers, by:

- $f(x) = 2x^2 - 18$
- $g(x) = x + 1$.

(a) Find an expression for $f(g(x))$.

(b) Find the values of x for which $\frac{1}{f(g(x))}$ is undefined.

2025 Paper 2 Question 12, (2) (2)

Functions f and g are defined on the set of real numbers by:

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

(a) Find an expression for $h(x)$, where $h(x) = f(g(x))$.

(b) Find $h'(x)$.



2026 Paper 1 Question 5, (2) (1) (1)

Functions f and g are defined on $\mathbb{R}$, the set of real numbers, by $f(x) = 2x^2 + 5$ and $g(x) = x + 3$.

(a) Find an expression for:

(i) $f(g(x))$ and

(ii) $g(f(x))$.

(b) State the range of $g(f(x))$.