

Question	Scheme	Marks	AOs
4(a)	$f(x) \geq -2$	B1	1.1b
		(1)	
(b)	e.g. $gf(2) = g(3(2)^2 - 2) = g(10) = \frac{5(10) - 1}{10 - 4} = \dots$ or e.g. $gf(x) = \frac{5(3x^2 - 2) - 1}{3x^2 - 2 - 4} = \frac{5(3(2)^2 - 2) - 1}{3(2)^2 - 2 - 4} = \dots$	M1	1.1b
	$\frac{49}{6}$	A1	1.1b
		(2)	
(c)	$y = \frac{5x - 1}{x - 4} \Rightarrow y(x - 4) = 5x - 1 \Rightarrow yx - 5x = 4y - 1$ $\Rightarrow x(y - 5) = 4y - 1$	M1	1.1b
	$(g^{-1}(x) =) \frac{4x - 1}{x - 5}$ or e.g. $\frac{1 - 4x}{5 - x}$	A1	1.1b
		(2)	
Alt(c)	$y = \frac{5x - 20 + 19}{x - 4} \Rightarrow y = 5 + \frac{19}{x - 4} \Rightarrow y - 5 = \frac{19}{x - 4}$	M1	1.1b
	$(g^{-1}(x) =) 4 + \frac{19}{x - 5}$ or e.g. $4 - \frac{19}{5 - x}$	A1	1.1b
		(2)	

(5 marks)

Notes

(a)

B1: Correct range.

$f(x)$ or f or y and allow e.g. $-2 \leq y < \infty$ or $\{y \in \mathbb{R}: y \geq -2\}$ or $[-2, \infty)$.

Do not allow $-2 \leq x < \infty$, $-2 < y < \infty$

(b)

M1: A complete method to find $gf(2)$

EITHER

- substitutes $x = 2$ into f and substitutes the result into g to find a value for $gf(2)$.

OR

- attempts $gf(x)$ and substitutes $x = 2$ condoning slips. They must proceed to find a value.

$$\text{e.g. } gf(x) = \frac{5(3x^2 - 2) - 1}{3x^2 - 2 - 4} = \frac{5(3(2)^2 - 2) - 1}{3(2)^2 - 2 - 4} = \dots$$

In both approaches condone arithmetical slips and bracket errors/omissions provided the order of the functions used is correct. May be implied by awrt 8.2

A1: $\frac{49}{6}$ or exact equivalent. e.g. $8\frac{1}{6}$ or $8.1\dot{6}$ but not 8.1666 or 8.166....

isw once a correct answer is seen.

**Note: May interchange x and y at the start or work towards $x = \dots$
Ignore any attempts at the domain**

(c)

M1: Correct attempt to multiply up by $(x - 4)$, multiply out and isolate x by taking a factor of x out or equivalent work. e.g. $x(y - 5) = 4y - 1$

Condone sign slips in their rearrangement and allow invisible brackets to be implied by further work.

A1: $\frac{4x-1}{x-5}$ oe e.g. $\frac{1-4x}{5-x}$ (does not need to be simplified)

A correct answer with no incorrect working seen scores M1A1. Do not be concerned by the labelling of the function so allow once rearranged to e.g. $y = \frac{4x-1}{x-5}$ or even

$$f^{-1}(x) = \frac{4x-1}{x-5}$$

Alt(c)

M1: Writes $y = \frac{5x-1}{x-4}$ in the form $y = 5 \pm \frac{k}{x-4}$ $k \neq 0$ and rearranges to isolate y and 5 on one side of their equation.

Condone sign slips in their rearrangement and allow invisible brackets to be implied by further work.

A1: $4 + \frac{19}{x-5}$ oe e.g. $4 - \frac{19}{5-x}$ (does not need to be simplified)

A correct answer with no incorrect working seen scores M1A1. Do not be concerned by the labelling of the function so allow once rearranged to e.g. $y = 4 + \frac{19}{x-5}$ or even

$$f^{-1}(x) = 4 + \frac{19}{x-5}$$