3. $h = 4 + \frac{1}{3}x$

$y = 4 + \frac{1}{3}x$

$y - 4 = \frac{1}{3}x$

$3y - 12 = x$

$3x - 12 = y$

$h^{-1}(x) = 3x - 12$

Question	Generic scheme	Illustrative scheme	Max mark
3.	**Method 1**	**Method 1**	**3**
	•1 equate composite function to x	•1 $h\left(h^{-1}(x)\right)=x$	
	•2 write $h\left(h^{-1}(x)\right)$ in terms of $h^{-1}(x)$	•2 $4+\frac{1}{3}h^{-1}(x)=x$	
	•3 state inverse function	•3 $h^{-1}(x)=3(x-4)$	
	Method 2	**Method 2**	
	•1 write as $y=h(x)$ and start to rearrange	•1 $y=h(x)\Rightarrow x=h^{-1}(y)$ $y-4=\frac{1}{3}x$ or $3y=12+x$	
	•2 express x in terms of y	•2 $x=3(y-4)$	
	•3 state inverse function	•3 $h^{-1}(y)=3(y-4)$ $\Rightarrow h^{-1}(x)=3(x-4)$	

Notes:

1. In Method 1, accept $4+\frac{1}{3}h^{-1}(x)=x$ for •1 and •2.
2. In Method 2, accept '$y-4=\frac{1}{3}x$' without reference to $y=h(x)\Rightarrow x=h^{-1}(y)$ at •1.
3. In Method 2, accept $h^{-1}(x)=3(x-4)$ without reference to $h^{-1}(y)$ at •3.
4. In Method 2, beware of candidates with working where each line is not mathematically equivalent. See Candidates A and B for example.
5. At •3 stage, accept h^{-1} written in terms of any dummy variable eg $h^{-1}(y)=3(y-4)$.
6. $y=3(x-4)$ does not gain •3.
7. $h^{-1}(x)=3(x-4)$ with no working gains 3/3.

Question	Generic scheme	Illustrative scheme	Max mark
3.	(continued)		
Commonly Observed Responses:			

Candidate A

$h(x)=4+\frac{1}{3}x$

$y=4+\frac{1}{3}x$

$x=3(y-4)$ •1 ✓ •2 ✓

$y=3(x-4)$ •3 ✗

$h^{-1}(x)=3(x-4)$

Candidate B

$h(x)=4+\frac{1}{3}x$

$y=4+\frac{1}{3}x$

$x=4+\frac{1}{3}y$ •1 ✗

$y=3(x-4)$ •2 ✓ 1

$h^{-1}(x)=3(x-4)$ •3 ✓ 1

Candidate C - BEWARE

$h'=\ldots$ •3 ✗

Candidate D

$x \to x\div 3 \to x\div 3+4=h(x)$

$\div 3 \to +4$

$\therefore -4 \to \times 3$ •1 ✓

$3(x-4)$ •2 ✓

$h^{-1}(x)=3(x-4)$ •3 ✓