(5) $h(x) = 2x^3 - 7$

$y = 2x^3 - 7$

$y + 7 = 2x^3$

$\frac{y+7}{2} = x^3$

$x = \sqrt[3]{\frac{y+7}{2}}$

$h^{-1}(y) = \sqrt[3]{\frac{y+7}{2}}$

$h^{-1}(x) = \sqrt[3]{\frac{x+7}{2}}$

Question	Generic scheme	Illustrative scheme	Max mark
5.	**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 $2\left(h^{-1}(x)\right)^3-7=x$	
	•3 state inverse function	•3 $h^{-1}(x)=\sqrt[3]{\dfrac{x+7}{2}}$	
	Method 2	**Method 2**	
	•1 write as $y=h(x)$ and start to rearrange	•1 $y=h(x)\Rightarrow x=h^{-1}(y)$ $y+7=2x^3$	
	•2 express x in terms of y	•2 $x=\sqrt[3]{\dfrac{y+7}{2}}$	
	•3 state inverse function	•3 $h^{-1}(y)=\sqrt[3]{\dfrac{y+7}{2}}$ $\Rightarrow h^{-1}(x)=\sqrt[3]{\dfrac{x+7}{2}}$	

Notes:

1. In method 1, accept $2\left(h^{-1}(x)\right)^3-7=x$ for •1 and •2.
2. In method 2, accept '$y+7=2x^3$' without reference to $y=h(x)\Rightarrow x=h^{-1}(y)$ at •1.
3. In method 2, accept $h^{-1}(x)=\sqrt[3]{\dfrac{x+7}{2}}$ 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.

   For example $h^{-1}(y)=\sqrt[3]{\dfrac{y+7}{2}}$.
6. $y=\sqrt[3]{\dfrac{x+7}{2}}$ does not gain •3.
7. $h^{-1}(x)=\sqrt[3]{\dfrac{x+7}{2}}$ with no working gains 3/3.

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

Candidate A

$h(x)=2x^3-7$

$y=2x^3-7$

$x=\sqrt[3]{\dfrac{y+7}{2}}$ $\bullet^1$ ✓ $\bullet^2$ ✓

$y=\sqrt[3]{\dfrac{x+7}{2}}$ $\bullet^3$ ✗

$h^{-1}(x)=\sqrt[3]{\dfrac{x+7}{2}}$

Candidate B

$h(x)=2x^3-7$

$y=2x^3-7$

$x=2y^3-7$ $\bullet^1$ ✗

$y=\sqrt[3]{\dfrac{x+7}{2}}$ $\bullet^2$ $✓_1$

$h^{-1}(x)=\sqrt[3]{\dfrac{x+7}{2}}$ $\bullet^3$ $✓_1$

Candidate C

$x=2h(x)^3-7$ $\bullet^1$ ✗

$h(x)=\sqrt[3]{\dfrac{x+7}{2}}$ $\bullet^2$ $✓_1$

$h^{-1}(x)=\sqrt[3]{\dfrac{x+7}{2}}$ $\bullet^3$ $✓_1$

Candidate D - Method 1

$h\left(h^{-1}(x)\right)=2\left(h^{-1}(x)\right)^3-7$ $\bullet^2$ ✓

$x=2\left(h^{-1}(x)\right)^3-7$ $\bullet^1$ ✓

$h^{-1}(x)=\sqrt[3]{\dfrac{x+7}{2}}$ $\bullet^3$ ✓

Candidate E

$x\to x^3\to 2x^3\to 2x^3-7=h(x)$

$\times 2\to -7$

$\therefore +7\to \div 2$ $\bullet^1$ ✓

$\sqrt[3]{\dfrac{x+7}{2}}$ $\bullet^2$ ✓

$h^{-1}(x)=\sqrt[3]{\dfrac{x+7}{2}}$ $\bullet^3$ ✓

Candidate F - BEWARE of incorrect notation

$h'(x)=$ $\bullet^3$ ✗