(12) $f(x) = 12\sqrt[3]{x}$

$= 12x^{\frac{1}{3}}$

$f'(x) = 4x^{-2/3}$

$f'(a) = 1$

so $4a^{-2/3} = 1$

$a^{-2/3} = \frac{1}{4}$

$a^{2/3} = 4$

$\sqrt[3]{a^2} = 4$

$a^2 = 4^3 = 64$

$a = \sqrt{64} = 8$

Question	Generic scheme	Illustrative scheme	Max mark
12.	$\bullet^1$ write in differentiable form $\bullet^2$ differentiate $\bullet^3$ solve for $a^{-\frac{2}{3}}$ or $a^{\frac{2}{3}}$ $\bullet^4$ solve for a	$\bullet^1$ $12x^{\frac{1}{3}}$ stated or implied by $\bullet^2$ $\bullet^2$ $12\times\frac{1}{3}\times x^{-\frac{2}{3}}$ $\bullet^3$ $a^{-\frac{2}{3}}=\frac{1}{4}$ or $a^{\frac{2}{3}}=4$ $\bullet^4$ $a=8$	**4**

Notes:

1. $\bullet^2$ is only available for differentiating a term with a fractional index.
2. Where candidates attempt to integrate or make no attempt to differentiate, only $\bullet^1$ is available.
3. Accept $x^{-\frac{2}{3}}=\frac{1}{4}$ or $x^{\frac{2}{3}}=4$ at $\bullet^3$. See Candidates A and B.
4. $\bullet^4$ is only available where the expression at $\bullet^2$ is of the form $kx^{-\frac{m}{n}}$ where $m\neq 1$.
5. Do not penalise the inclusion of -8 at $\bullet^4$.

Commonly Observed Responses:

Candidate A - working in terms of x throughout

...	$\bullet^1$ ✓ $\bullet^2$ ✓
$x^{-\frac{2}{3}}=\frac{1}{4}$	$\bullet^3$ ✓
$x=8$	$\bullet^4$ ✗

Candidate B

...	$\bullet^1$ ✓ $\bullet^2$ ✓
$x^{-\frac{2}{3}}=\frac{1}{4}$	$\bullet^3$ ✓
$(x=8)$	
$a=8$	$\bullet^4$ ✓

Candidate C

$f(x)=12x^{\frac{3}{2}}$	$\bullet^1$ ✗
$f'(x)=18x^{\frac{1}{2}}$	$\bullet^2$ ✓$_1$
$a^{\frac{1}{2}}=\frac{1}{18}$	$\bullet^3$ ✓$_1$
$a=\frac{1}{324}$	$\bullet^4$ ✓$_2$

Candidate D - partly differentiated

$f(x)=12x^{\frac{1}{3}}$	$\bullet^1$ ✓
$f'(x)=12\times\frac{1}{3}x^{\frac{4}{3}}$	$\bullet^2$ ✗
$1=4a^{\frac{4}{3}}$	
$\frac{1}{4}=a^{\frac{4}{3}}$	$\bullet^3$ ✓$_1$
$a=\frac{1}{\sqrt{8}}$	$\bullet^4$ ✓$_2$