12.

$$\frac{dy}{dx} = 8x^3 + 3$$

$$y = 2x^4 + 5x + c$$

$$3 = 2(-1)^4 + 3(-1) + c$$

$$3 = 2 - 3 + c$$

$$c = 4$$

$$y = 2x^4 + 3x + 4.$$

Question	Generic scheme	Illustrative scheme	Max mark
12.	•^{1} integrate one term	•^{1} eg $\dfrac{8x^4}{4}\ldots$	**4**
	•^{2} complete integration	•^{2} eg $\ldots+3x+c$	
	•^{3} substitute for x and y	•^{3} $3=\dfrac{8\times(-1)^4}{4}+3\times(-1)+c$	
	•^{4} state expression for y	•^{4} $y=2x^4+3x+4$	

Notes:

1. For candidates who omit $+c$ only •^{1} is available.
2. For candidates who differentiate either term, •^{2}, •^{3}, and •^{4} are not available.
3. Do not penalise the appearance of an integral sign and/or dx at •^{2} and •^{3}.

Commonly Observed Responses:

Candidate A – incomplete substitution	Candidate B – partial integration
$y=2x^4+3x+c$ •^{1} ✓ •^{2} ✓	$y=2x^4+3+c$ •^{1} ✓ •^{2} ✗
$y=2(-1)^4+3(-1)+c$	$3=2(-1)^4+3+c$ •^{3} ✓$_1$
$c=4$ •^{3} ∧	$c=-2$
$y=2x^4+3x+4$ •^{4} ✓$_1$	$y=2x^4+1$ •^{4} ✓$_1$

Candidate C – integrating over two lines	
$y=2x^4+3x$ •^{1} ✓ •^{2} ✗	
$y=2x^4+3x+c$	
$3=2(-1)^4+3(-1)+c$ •^{3} ✓	
$y=2x^4+3x+4$ •^{4} ✓	