Question	Scheme	Marks	AOs
10 (a)	$\mathrm{g}(5) = 2\times5^3 + 5^2 - 41\times5 - 70 = ...$	M1	1.1a
	$\mathrm{g}(5) = 0 \Rightarrow (x-5)$ is a factor, hence $\mathrm{g}(x)$ is divisible by $(x-5)$.	A1	2.4
		(2)	
(b)	$2x^3 + x^2 - 41x - 70 = (x-5)(2x^2 ... x \pm 14)$	M1	1.1b
	$= (x-5)(2x^2 + 11x + 14)$	A1	1.1b
	Attempts to factorise quadratic factor	dM1	1.1b
	$(\mathrm{g}(x)) = (x-5)(2x+7)(x+2)$	A1	1.1b
		(4)	
(c)	$\int 2x^3 + x^2 - 41x - 70\,\mathrm{d}x = \frac{1}{2}x^4 + \frac{1}{3}x^3 - \frac{41}{2}x^2 - 70x$	M1 A1	1.1b 1.1b
	Deduces the need to use $\int_{-2}^{5} \mathrm{g}(x)\mathrm{d}x$ $-\frac{1525}{3} - \frac{190}{3}$	M1	2.2a
	Area = $571\frac{2}{3}$	A1	2.1
		(4)	
			(10 marks)

Notes

(a)

M1: Attempts to calculate $\mathrm{g}(5)$ Attempted division by $(x-5)$ is M0

Look for evidence of embedded values or two correct terms of $\mathrm{g}(5) = 250 + 25 - 205 - 70 = ...$

A1: Correct calculation, reason and conclusion. It must follow M1. Accept, for example,

$\mathrm{g}(5) = 0 \Rightarrow (x-5)$ is a factor, hence divisible by $(x-5)$

$\mathrm{g}(5) = 0 \Rightarrow (x-5)$ is a factor ✓

Do not allow if candidate states

$\mathrm{f}(5) = 0 \Rightarrow (x-5)$ is a factor, hence divisible by $(x-5)$ **(It is not f)**

$\mathrm{g}(x) = 0 \Rightarrow (x-5)$ is a factor **(It is not g(x) and there is no conclusion)**

This may be seen in a preamble before finding $\mathrm{g}(5) = 0$ but in these cases there must be a minimal statement ie QED, "proved", tick etc.

(b)

M1: Attempts to find the quadratic factor by inspection (correct coefficients of first term and ± last term) or by division (correct coefficients of first term and ± second term). Allow this to be scored from division in part (a)

A1: $(2x^2 + 11x + 14)$ You may not see the $(x-5)$ which can be condoned

dM1: Correct attempt to factorise their $(2x^2 + 11x + 14)$

A1: $\left(g(x)=\right)\ (x-5)(2x+7)(x+2)$ or $\left(g(x)=\right)\ (x-5)(x+3.5)(2x+4)$

It is for the product of factors and not just a statement of the three factors
Attempts with calculators via the three roots are likely to score 0 marks. The question was "Hence" so the two M's must be awarded.

(c)

M1: For $x^n \to x^{n+1}$ for any of the terms in x for $g(x)$ so
$2x^3 \to ...x^4,\ x^2 \to ...x^3,\ -41x \to ...x^2,\ -70 \to ...x$

A1: $\int 2x^3 + x^2 - 41x - 70 \, dx = \frac{1}{2}x^4 + \frac{1}{3}x^3 - \frac{41}{2}x^2 - 70x$ which may be left unsimplified (ignore any reference to $+C$)

M1: Deduces the need to use $\int_{-2}^{5} g(x)dx$.

This may be awarded from the limits on their integral (either way round) or from embedded values which can be subtracted either way round.

A1: For clear work showing all algebraic steps leading to area = $571\frac{2}{3}$ oe

So allow $\int_{-2}^{5} 2x^3 + x^2 - 41x - 70 \, dx = \left[\frac{1}{2}x^4 + \frac{1}{3}x^3 - \frac{41}{2}x^2 - 70x\right]_{-2}^{5} = -\frac{1715}{3} \Rightarrow$ area $= \frac{1715}{3}$ for 4 marks

Condone spurious notation, as long as the algebraic steps are correct. If they find $\int_{-2}^{5} g(x)dx$ then withhold the final mark if they just write a positive value to this integral since $\int_{-2}^{5} g(x)dx = -\frac{1715}{3}$

Note $\int_{-2}^{5} 2x^3 + x^2 - 41x - 70 \, dx \Rightarrow \frac{1715}{3}$ with no algebraic integration seen scores M0A0M1A0