Question	Scheme	Marks	AOs
3(a)	$h = 0.3$	B1	1.1a
	$A \approx \frac{0.3}{2}\{1.811 + 2.944 + 2(2.342 + 2.718 + 2.941 + 3.011)\}$	M1	1.1b
	$= 4.02$	A1	1.1b
		(3)	
(b)	**Underestimate** and a relevant justification e.g. • {top of} trapezia lie below the curve • Area of trapezia < area under curve • An appropriate diagram which gives reference to the lost area • Curve is concave • The gradient of the curve is {continually} decreasing	B1	3.2b
		(1)	
(c)	$\int_{-0.6}^{0.9}\left(8 - 2\mathrm{f}(x)\right)\,\mathrm{d}x = \ldots - 2 \times "4.02"$	M1	1.1b
	$\int_{-0.6}^{0.9}\left(8 - 2\mathrm{f}(x)\right)\,\mathrm{d}x = 8 \times 1.5 - \ldots$	M1	3.1a
	$\int_{-0.6}^{0.9}\left(8 - 2\mathrm{f}(x)\right)\,\mathrm{d}x = 8 \times 1.5 - 2 \times "4.02" = 3.96$	A1ft	2.2a
		(3)	
			(7 marks)

Notes

(a)

B1: States or uses $h = 0.3$

M1: Correct attempt at the trapezium rule. Must be an attempt at the correct structure e.g. $\frac{h}{2}\{y_{-0.6} + y_{0.3} + 2(y_0 + y_{0.3} + y_{0.6} + y_{0.9})\}$ with brackets as shown unless they are implied by subsequent work

A1: For awrt 4.02

(b)

B1: see main scheme

(c)

M1: For multiplying their answer to part (a) by ±2

M1: For a correct strategy for the "8" part of the integral. May see e.g. 8×1.5 or $8 \times (0.9 + 0.6)$ or $\int_{-0.6}^{0.9} 8\,\mathrm{d}x = [8x]_{-0.6}^{0.9} = 8 \times 0.9 - 8 \times (-0.6)$

A1ft: For awrt 3.96 (or 3.97 if full accuracy used from (a)) or follow through $12 - 2 \times$ their answer to part (a)