Question Number	Scheme	Notes	Marks
2(a)	x | -0.25 | 0 | 0.25 | 0.5 | 0.75 y | 0.462 | **0.577** | 0.653 | **0.686** | 0.698 Allow awrt these values and look for the values appearing in the body of the script or within their calculation in part (b). Also allow exact value for the 0.577 e.g. $\frac{1}{\sqrt{3}}$ or $\frac{\sqrt{3}}{3}$		B1
			(1)
(b)	$h = 0.25$	Correct strip width. May be implied by $\frac{1}{8}$ or $\frac{1}{2}\times 0.25$	B1
	$A \approx \frac{1}{2}\times "0.25"\left\{0.462+0.698+2\left("0.577"+0.653+"0.686"\right)\right\}$ Correct application of the trapezium rule with their h Must be a correct application of the rule so e.g. $A \approx \frac{1}{2}\times "0.25"\times 0.462+0.698+2\left("0.577"+0.653+"0.686"\right)$ Scores M0 unless any missing brackets are implied by subsequent work. $A \approx \frac{1}{2}\times "0.25"\left\{0.462+0.698+2\left("0.577"+0.653+"0.686"\right)\right.$ Would also score M0 unless the closing bracket was implied by subsequent work Condone copying slips e.g. 0.426 instead of 0.462. Must use all the y-values. Repeated or missing y-values scores M0. Allow separate trapezia e.g. $A \approx \frac{1}{2}\times "0.25"\left(0.462+"0.577"\right)+\frac{1}{2}\times "0.25"\left("0.577"+0.653\right)+\frac{1}{2}\times "0.25"\left(0.653+"0.686"\right)+\frac{1}{2}\times "0.25"\left("0.686"+0.698\right)$ Allow use of the function e.g. $A \approx \frac{1}{2}\times 0.25\left\{\frac{2^{-0.25}}{\sqrt{5(-0.25)^2+3}}+\frac{2^{0.75}}{\sqrt{5(0.75)^2+3}}+2\left(\frac{2^{0}}{\sqrt{5(0)^2+3}}+\frac{2^{0.25}}{\sqrt{5(0.25)^2+3}}+\frac{2^{0.5}}{\sqrt{5(0.5)^2+3}}\right)\right\}$		M1
	= awrt 0.624 or $\frac{78}{125}$ oe e.g. $\frac{312}{500}$	accept awrt 0.624 or exact fraction but isw if necessary	A1
	Note that the calculator answer for the integral is 0.6265569683…		
			(3)
			Total 4

Question Number	Scheme	Notes	Marks
3(a)	$a(-4)^3-(-4)^2+b(-4)+4=-108$ Attempts to set $f(-4)=-108$ to obtain an equation in a and b. Score when you see "– 4" embedded in the equation or 2 correct terms (excluding the "+ 4") on lhs. May be implied by e.g. $-64a-16-4b+4=-108$ Condone minor slips on the lhs e.g. one sign error between terms but must use – 108		M1
	As an alternative for the first mark we will condone an attempt at long division. This requires a complete method to divide $(ax^3 - x^2 + bx + 4)$ by $(x + 4)$ to obtain a remainder in terms of a and b which is then equated to -108 For reference, the quotient is $ax^2 - (1+4a)x + 16a + b + 4$ and the remainder is $-4b - 64a - 12$		
	$-64a-16-4b+4=-108$ $\Rightarrow 16a+b=24$*	Correct equation obtained with no errors and at least one line of intermediate working if starting with e.g. $a(-4)^3-(-4)^2+b(-4)+4=-108$	A1*
			(2)
(b)	$a\left(\frac{1}{2}\right)^3-\left(\frac{1}{2}\right)^2+b\left(\frac{1}{2}\right)+4=0$ Attempts to set $f\left(\frac{1}{2}\right)=0$ to obtain an equation in a and b. Condone slips. Score when you see "$\frac{1}{2}$" embedded in the equation or 2 correct terms (excluding the "+ 4") on lhs. May be implied by e.g. $\frac{a}{8}-\frac{1}{4}+\frac{b}{2}+4=0$ The "= 0" may be implied when they attempt to solve simultaneously below		M1
	An alternative for the first mark is to attempt long division. This requires a complete method to divide $(ax^3 - x^2 + bx + 4)$ by $(2x - 1)$ to obtain a remainder in a and b which is then equated to 0 For reference, the quotient is $\frac{a}{2}x^2+\left(\frac{a}{4}-\frac{1}{2}\right)x+\left(\frac{b}{2}-\frac{1}{4}+\frac{a}{8}\right)$ and the remainder is $\frac{15}{4}+\frac{b}{2}+\frac{a}{8}$		
	$16a+b=24,\ a+4b=-30$ $\Rightarrow a=...,b=...$	Attempts to solve $16a+b=24$ simultaneously with their equation in a and b. This may be implied if values of a and b are obtained (e.g. calculator)	M1
	$a=2,\ b=-8$	Correct values	A1
			(3)
(c)	$f(x)=2x^3-x^2-8x+4$ $\Rightarrow f'(x)=6x^2-2x-8$	Correct derivative (follow through their a and b). Allow unsimplified and apply isw if necessary. Allow with the letters "a" and "b" and a "made up" "a" and "b".	B1ft
			(1)

(d)	$6x^2-2x-8=0$ $\Rightarrow (3x-4)(x+1)=0$ $\Rightarrow x=...$	Sets their f′(x) = 0 (may be implied) and solves a 3 term quadratic. Apply general guidance if necessary. You may need to check if a calculator has been used.	M1
	$x=\frac{4}{3},\ -1\Rightarrow y=...$	Uses at least one of their x values to find a value for y using their f(x) where x is from an attempt to solve f′(x) = 0. You may need to check their y values if working is not shown.	M1
	$\left(\frac{4}{3},-\frac{100}{27}\right)$ **or** $(-1,9)$ Or e.g. $x=\frac{4}{3},\ y=-\frac{100}{27}$ and $x=-1,\ y=9$ One correct point. The fractional coordinates must be exact but allow 1.3 with a dot over the 3 and 3.703 with dots over the 7 and 3. Note that it is not necessary for the points to be written as coordinates as long as the pairing is clear. **Depends on having scored both previous M marks.**		A1
	$\left(\frac{4}{3},-\frac{100}{27}\right)$ **and** $(-1,9)$ Or e.g. $x=\frac{4}{3},\ y=-\frac{100}{27}$ and $x=-1,\ y=9$ Both correct points. The fractional coordinates must be exact but allow 1.3 with a dot over the 3 and 3.703 with dots over the 7 and 3. Note that it is not necessary for the points to be written as coordinates as long as the pairing is clear. **Depends on having scored both previous M marks.**		A1
	Fully correct answers with no working scores 4/4 following a correct part (c) i.e. $\Rightarrow f'(x)=6x^2-2x-8$		
			(4)
			Total 10