

Q	Marking instructions	AO	Marks	Typical solution
11(a)	Obtains $x^3 + 2x^2 - 8x$	1.1b	B1	$x^3 + 2x^2 - 8x$
	Subtotal		1	

Q	Marking instructions	AO	Marks	Typical solution
11(b)	Integrates their answer to (a) with at least one term correct	1.1a	M1	$\int_{-4}^2 x(x-2)(x+4) dx$ $= \int_{-4}^2 x^3 + 2x^2 - 8x dx$ $= \left[\frac{x^4}{4} + \frac{2x^3}{3} - 4x^2 \right]_{-4}^2$ $= \left(\frac{(2)^4}{4} + \frac{2(2)^3}{3} - 4(2)^2 \right)$ $- \left(\frac{(-4)^4}{4} + \frac{2(-4)^3}{3} - 4(-4)^2 \right)$ $= \left(-\frac{20}{3} \right) - \left(-\frac{128}{3} \right)$ $= 36$
	Completes integration correctly FT their answer to (a) provided it is a three-term cubic expression	1.1b	A1F	
	Substitutes limits explicitly into their integrated function and subtracts in the correct order	1.1a	M1	
	Completes reasoned argument to show that $\int_{-4}^2 x(x-2)(x+4) dx = 36$ AG Must see a correct expression with all powers evaluated prior to obtaining 36	2.1	R1	
	Subtotal		4	

Q	Marking instructions	AO	Marks	Typical solution
11(c)(i)	Explains that part of the area is above and part is below the x -axis Or Explains that any part below the axis will give a negative value when using integration Do not accept comments that reference negative area	2.3	E1	The area is above and below the axis, so cannot be evaluated as a single integral
	Subtotal		1	

Q	Marking instructions	AO	Marks	Typical solution
11(c)(ii)	Adds their $\pm \frac{128}{3}$ + their $\pm \frac{20}{3}$ to obtain an answer not equal to 36 OE could be in integral form	2.2a	M1	$\frac{128}{3} + \frac{20}{3} = \frac{148}{3}$
	Obtains $\frac{148}{3}$ OE CAO	1.1b	A1	
	Subtotal		2	

	Question 11 Total		8	
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