

Question			Answer	Marks	AO	Guidance
12	(a)		$f(x) = k(x+1)(x-2)$	M1	3.1a	Uses product of linear terms in an equation. Condone $k=1$ used
			When $x = 0$, $f(x) = -4$ so $k = 2$	B1	1.1a	Allow if $2x^2$ or $k = 2$ seen
			So $f(x) = 2x^2 - 2x - 4$	A1	1.1	Correct expanded expression
			Alternative method			
			$(-1, 0) \quad 0 = a - b + c$ $(2, 0) \quad 0 = 4a + 2b + c$ $c = -4$ $a = 2, b = -2$ gives $f(x) = 2x^2 - 2x - 4$	M1 B1 A1		Setting up simultaneous equations for at least a and b Allow for correct constant term or explicit value for c Correct expanded expression
				[3]		
12	(b)		$y = \int (2x^2 - 2x - 4) dx$	M1	3.1a	Attempt to integrate their $f(x)$
			$y = \frac{2}{3}x^3 - x^2 - 4x + c$	A1FT	1.1	FT their $f(x)$. Condone missing $+c$ and missing $y =$
			When $x = 0$, $y = 8$	M1	1.1a	Uses $(0, 8)$ to evaluate c May be implied by correct constant term
			So $y = \frac{2}{3}x^3 - x^2 - 4x + 8$	A1	1.1	cao $y =$ must be seen
				[4]		
12	(c)		$\frac{dy}{dx} = 0$ when $x = -1, 2$	M1	1.1a	Sets $f(x)$ or the derivative of their y to zero and attempts to solve
			$x = -1 \Rightarrow y = \frac{31}{3}$, so $(-1, \frac{31}{3})$	A1	1.1	cao
			and $x = 2 \Rightarrow y = \frac{4}{3}$, so $(2, \frac{4}{3})$	A1	1.1	cao
				[3]		