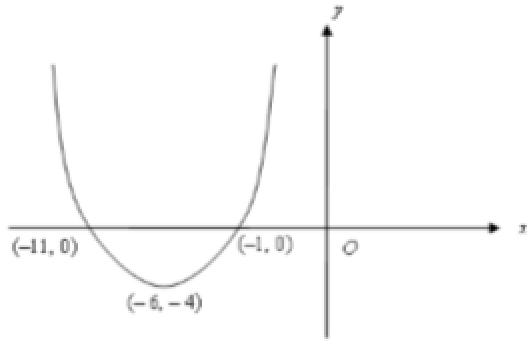
Questions taken from the WJEC SAMS Paper 1

7. (a)				
	Concave up curve and y-coordinate of minimum = – 4	B1	AO1	
	x-coordinate of minimum = – 6	B1	AO1	
	Both points of intersection with x -axis	B1	AO1	
(b)	$y = -\frac{1}{2}f(x)$	B2	AO2 AO2	
	If B2 not awarded $y = rf(x)$ with r negative	(B1) **[5]**	(AO2)	
8. (a)	A kite	B1	AO2	
(b)	A correct method for finding $TR(TS)$	M1	AO3	
	$TR(TS) = \sqrt{96}$	A1	AO3	
	Area $OTR(OTS) = \frac{1}{2}\times\sqrt{96}\times 5$	M1	AO3	(f.t. candidate's derived value for $TR(TS)$)
	Area $OTRS$ = 2 × Area $OTR(OTS)$	m1	AO3	
	Area $OTRS = 20\sqrt{6}$	A1 **[6]**	AO3	(c.a.o.)
9.	An expression for $b^2 - 4ac$ for the quadratic equation $4x^2 - 12x + m = 0$, with at least two of a, b or c correct	M1	AO1	
	$b^2 - 4ac = 12^2 - 4 \times 4 \times m$	A1	AO1	
	$b^2 - 4ac > 0$	m1	AO1	
	$(0<)\ m < 9$	A1	AO1	
	An expression for $b^2 - 4ac$ for the quadratic equation $3x^2 + mx + 7 = 0$, with at least two of a, b or c correct	(M1)		(to be awarded only if the corresponding M1 is not awarded above)
	$b^2 - 4ac = m^2 - 84$	A1	AO2	
	$m^2 < 81 \Rightarrow b^2 - 4ac < -3$	A1	AO2	
	$b^2 - 4ac < 0 \Rightarrow$ no real roots	A1 **[7]**	AO2	

10.	(a)	$(\sqrt{3}-\sqrt{2})^5 = (\sqrt{3})^5 + 5(\sqrt{3})^4(-\sqrt{2})$ $+ 10(\sqrt{3})^3(-\sqrt{2})^2 + 10(\sqrt{3})^2(-\sqrt{2})^3$ $+ 5(\sqrt{3})(-\sqrt{2})^4 + (-\sqrt{2})^5$	B2	AO1 AO1	(five or six terms correct)
		(**If B2 not awarded**, award B1 for three or four correct terms) $(\sqrt{3}-\sqrt{2})^5 = 9\sqrt{3} - 45\sqrt{2} + 60\sqrt{3} - 60\sqrt{2} + 20\sqrt{3} - 4\sqrt{2}$	B2	AO1 AO1	(six terms correct)
		(**If B2 not awarded**, award B1 for three, four or five correct terms) $(\sqrt{3}-\sqrt{2})^5 = 89\sqrt{3} - 109\sqrt{2}$	B1	AO1	(f.t. one error)
	(b)	Since $(\sqrt{3}-\sqrt{2})^5 \approx 0$, we may assume that $89\sqrt{3} \approx 109\sqrt{2}$	M1	AO3	(f.t candidate's answer to part (a) provided one coefficient is negative)
		Either: $89\sqrt{3} \times \sqrt{3} \approx 109\sqrt{2} \times \sqrt{3}$	m1	AO3	(f.t candidate's answer to part (*a*) provided one coefficient is negative)
		$\sqrt{6} \approx \dfrac{267}{109}$	A1	AO3	(c.a.o.)
		Or $89\sqrt{3} \times \sqrt{2} \approx 109\sqrt{2} \times \sqrt{2}$	(m1)	(AO3)	(f.t candidate's answer to part (*a*) provided one coefficient is negative)
		$\sqrt{6} \approx \dfrac{218}{89}$	(A1) **[8]**	(AO3)	(c.a.o.)

16.		$f'(x) = 3x^2 - 10x - 8$ Critical values $x = -\frac{2}{3}$, $x = 4$ For an increasing function, $f'(x) > 0$ For an increasing function $x < -\frac{2}{3}$ or $x > 4$ Deduct 1 mark for each of the following errors the use of non-strict inequalities the use of the word 'and' instead of the word 'or'	M1 A1 m1 A2 **[5]**	AO1 AO1 AO1 AO2 AO2	(At least one non-zero term correct) (c.a.o) (f.t. candidate's derived two critical values for x)
17.	(a)	$\frac{dy}{dx} = 3 - 2x$ An attempt to find the value of $\frac{dy}{dx}$ at $x = 2$ At $x = 2$, $\frac{dy}{dx} = -1$ Equation of tangent at B is $y - 2 = -1(x - 2)$	M1 m1 A1 A1	AO1 AO1 AO1 AO1	(At least one non-zero term correct) (c.a.o.) (f.t. candidate's value for $\frac{dy}{dx}$ at $x = 2$)
	(b)	x-coordinate of A = 3 x-coordinate of C = 4 If D is the foot of the perpendicular from B to the x-axis, area of triangle BDC = 2 Area under curve = $\int_2^3 (3x - x^2)\,dx$ $\frac{3x^2}{2} - \frac{x^3}{3}$ Area under curve = (27/2 – 9) – (6 – 8/3) Shaded area = Area of triangle BDC – Area under curve Shaded area = 5/6	B1 B1 B1 M1 A1 m1 m1 A1 **[12]**	AO1 AO1 AO1 AO3 AO3 AO3 AO3 AO3	(derived) (derived) (f.t. candidate's derived x-coordinate of C) (use of integration) (f.t. candidate's derived x-coordinate of A) (correct integration) (an attempt to substitute limits, f.t. candidate's derived x-coordinate of A) (f.t. candidate's derived x-coordinates of A and C) (c.a.o.)