1	(a)		$15x^2 - 2x - 6$	2	B2	for correct differentiation (B1 for 2 of $15x^2$, $-2x$, -6 correct)
	(b)	e.g. "$15x^2 - 2x - 6$" = 2 oe		4	M1	ft, for equating their dy/dx to 2
		$15x^2 - 2x - 8$ (= 0)			M1	(dep on M1) ft their three-term quadratic
		e.g. $(3x + 2)(5x - 4)$ (= 0) $x = \frac{2 \pm \sqrt{(-2)^2 - (4 \times 15 \times -8)}}{2 \times 15}$			M1	for solving their quadratic equation using any correct method - if factorising, allow brackets which expanded give 2 out of 3 terms correct (if using formula or completing the square allow one sign error and some simplification – allow as far as e.g. $\frac{2 \pm \sqrt{4 + 480}}{30}$ oe)
			$-\frac{2}{3}, \frac{4}{5}$		A1	oe, dep on M2 (allow −0.66 or better), Both values – isw any attempt to find y coordinates
						Total 6 marks

2	ai				B1	tangent drawn at P ($x = 2$)
					M1	(dep on B1) for a method to find gradient e.g. $\frac{\text{difference in } y\text{-values}}{\text{difference in } x\text{-values}}$
			−0.6	3	A1	(dep on B1) accept answers in range −0.4 to −0.7 **and** from correct figures for their line
	aii	e.g. $y = -0.6x + c$ **or** $y = mx + 3.6$ **or** $2.4 = -0.6 \times 2 + c$			M1	for start of method to find the tangent equation e.g. $y = mx + c$ where m is their gradient **or** $y = mx + c$ where c is the y-intercept for their tangent **or** for substituting a point from their tangent e.g. (2, 2.4) into $y = mx + c$ where m is their gradient
			$y = -0.6x + 3.6$	2	A1	ft their gradient from (i) and intercept of their tangent, so long as intercept / value of c is > 3
	b		3		B1	
			−1	2	B1	
						Total 7 marks

3	(b)		(−1,−15)	2	B2ft	eg accept [their $-b - 4$] for the x-coordinate or [their c] for the y-coordinate (B1 ft for one correct coordinate)

4	Line drawn at (2, 1) with a positive gradient that does not intersect the curve at any other point.		3	M1 for a tangent drawn at $x = 2$
				M1 (dep M1) for a correct method to work out the gradient of the tangent.
		1.5 to 3		A1 for 1.5 to 3 accept answers in the range 1.5 – 3 so long as a tangent at $x = 2$ has been drawn.
				Total 3 marks

5	eg $-6 = 8a + 4b - 24 + 6$ **or** $8a + 4b = 12$ oe		6	M1	for substituting $x = 2$ and $y = -6$ into the equation for **C**
	$\left(\frac{dy}{dx} =\right) 3ax^2 + 2bx - 12$ oe			M1	at least 2 terms correct
	eg $16 = 12a + 4b - 12$ **or** $12a + 4b = 28$ oe			M1ft	(dep on previous M1) follow through their $\frac{dy}{dx}$
	$a = 4$ **and** $b = -5$			M1	for $a = 4$ **and** $b = -5$
	eg "4"$\times 3^3$ + "−5"$\times 3^2 - 12 \times 3 + 6$			M1ft	correctly substituting their a, their b and $x = 3$ into the equation for **C**
		33		A1	(dep on M3) allow (3, 33)
					Total 6 marks

6			3	B1	tangent drawn at P ($x = -2$)
				M1	(dep on B1) for a method to find gradient eg $\frac{\text{difference in } y\text{-values}}{\text{difference in } x\text{-values}}$ **or** an answer in the range −0.8 to −0.2 oe
	Answer depends on tangent being drawn at P	0.5		A1	(dep on B1) oe accept answers in range 0.2 to 0.8 oe **and** from correct figures for their tangent
					Total 3 marks

7	(a)	$3x^2$ or $-2\times2x$ or $-4x$ or -9 oe		2	M1	for differentiating one term correctly
			$3x^2 - 4x - 9$		A1	for a correct expression Allow $3x^2 - 2\times2x - 9$
	(b)	$(x =)\frac{4 \pm \sqrt{(-4)^2 - (4\times3\times-9)}}{2\times3}$ **or** $3\left[\left(x - \frac{2}{3}\right)^2 - \left(\frac{2}{3}\right)^2\right] - 9 (= 0)$		4	M1	for finding the critical values for a 3-term quadratic using any correct method - if using formula or completing the square allow one sign error and some simplification – allow as far as eg $\frac{4 \pm \sqrt{16+108}}{6}$ oe **or** eg $3\left(x - \frac{2}{3}\right)^2 - 10\frac{1}{3}$ oe)
			−1.19 and 2.52		A1	for critical values of −1.19 **and** 2.52 or better (for this A1 mark allow −1.2 or −1.18 **and** 2.5 **or** $\frac{2 \pm \sqrt{31}}{3}$ oe)
			$x < -1.19$		A1	awrt −1.19
			$x > 2.52$		A1	awrt 2.52
						Total 6 marks

8	(a)		2	M1	for at least 2 of $12x^2$, $2x$, -20
		$12x^2 + 2x - 20$		A1	