Question	Scheme	Marks	AOs
5	$3x - 2y = k$ intersects $y = 2x^2 - 5$ at two distinct points		
	Eliminate y and forms quadratic equation = 0 or quadratic expression $\{= 0\}$	M1	3.1a
	$\{3x - 2(2x^2 - 5) = k \Rightarrow\} \; -4x^2 + 3x + 10 - k = 0$	A1	1.1b
	$\{"b^2 - 4ac" > 0 \Rightarrow\} \; 3^2 - 4(-4)(10 - k) > 0$	dM1	2.1
	$9 + 16(10 - k) > 0 \Rightarrow 169 - 16k > 0$		
	Critical value obtained of $\frac{169}{16}$	B1	1.1b
	$k < \frac{169}{16}$ o.e.	A1	1.1b
		(5)	
5 Alt 1	Eliminate y and forms quadratic equation = 0 or quadratic expression $\{= 0\}$	M1	3.1a
	$y = 2\left(\frac{1}{3}(k + 2y)\right)^2 - 5 \Rightarrow y = \frac{2}{9}(k^2 + 4ky + 4y^2) - 5$		
	$8y^2 + (8k - 9)y + 2k^2 - 45 = 0$	A1	1.1b
	$\{"b^2 - 4ac" > 0 \Rightarrow\} \; (8k - 9)^2 - 4(8)(2k^2 - 45) > 0$	dM1	2.1
	$64k^2 - 144k + 81 - 64k^2 + 1440 > 0 \Rightarrow -144k + 1521 > 0$		
	Critical value obtained of $\frac{169}{16}$	B1	1.1b
	$k < \frac{169}{16}$ o.e.	A1	1.1b
		(5)	
5 Alt 2	$\frac{dy}{dx} = 4x,\; m_l = \frac{3}{2} \Rightarrow 4x = \frac{3}{2} \Rightarrow x = \frac{3}{8}$. So $y = 2\left(\frac{3}{8}\right)^2 - 5 = -\frac{151}{32}$	M1 A1	3.1a 1.1b
	$k = 3\left(\frac{3}{8}\right) - 2\left(-\frac{151}{32}\right) \Rightarrow k = \ldots$	dM1	2.1
	Critical value obtained of $\frac{169}{16}$	B1	1.1b
	$k < \frac{169}{16}$ o.e.	A1	1.1b
		(5)	
		(5 marks)	

Question 5 Notes:	
M1:	Complete strategy of eliminating x or y and manipulating the resulting equation to form a quadratic equation = 0 or a quadratic expression $\{=0\}$
A1:	Correct algebra leading to either • $-4x^2 + 3x + 10 - k = 0$ or $4x^2 - 3x - 10 + k = 0$ or a one-sided quadratic of either $-4x^2 + 3x + 10 - k$ or $4x^2 - 3x - 10 + k$ • $8y^2 + (8k-9)y + 2k^2 - 45 = 0$ or a one-sided quadratic of e.g. $8y^2 + (8k-9)y + 2k^2 - 45$
dM1:	Depends on the previous M mark. Interprets $3x - 2y = k$ intersecting $y = 2x^2 - 5$ at two distinct points by applying $"b^2 - 4ac" > 0$ to their quadratic equation or one-sided quadratic.
B1:	See scheme
A1:	Correct answer, e.g. • $k < \frac{169}{16}$ • $\left\{k : k < \frac{169}{16}\right\}$
Alt 2	
M1:	Complete strategy of using differentiation to find the values of x and y where $3x - 2y = k$ is a tangent to $y = 2x^2 - 5$
A1:	Correct algebra leading to $x = \frac{3}{8},\ y = -\frac{151}{32}$
dM1:	Depends on the previous M mark. Full method of substituting their $x = \frac{3}{8},\ y = -\frac{151}{32}$ into l and attempting to find the value for k.
B1:	See scheme
A1:	Deduces correct answer, e.g. • $k < \frac{169}{16}$ • $\left\{k : k < \frac{169}{16}\right\}$