Question	Scheme	Marks	AOs
5	Let a point Q have x coordinate $2+h$. So $y_Q = 4(2+h)^2 - 5(2+h)$	B1	1.1b
	$\{P(2,6),\ Q(2+h,\ 4(2+h)^2 - 5(2+h))\}$		
	Gradient $PQ = \dfrac{4(2+h)^2 - 5(2+h) - 6}{2+h-2}$	M1	2.1
		A1	1.1b
	$= \dfrac{4(4+4h+h^2) - 5(2+h) - 6}{2+h-2}$		
	$= \dfrac{16+16h+4h^2 - 10 - 5h - 6}{2+h-2}$		
	$= \dfrac{4h^2 + 11h}{h}$		
	$= 4h + 11$	M1	1.1b
	$\dfrac{\mathrm{d}y}{\mathrm{d}x} = \lim_{h \to 0} (4h+11) = 11$	A1	2.2a
		(5)	
5 Alt 1	Gradient of chord $= \dfrac{4(x+h)^2 - 5(x+h) - (4x^2 - 5x)}{x+h-x}$	B1	1.1b
		M1	2.1
		A1	1.1b
	$= \dfrac{4(x^2+2xh+h^2) - 5(x+h) - (4x^2 - 5x)}{x+h-x}$		
	$= \dfrac{4x^2 + 8xh + 4h^2 - 5x - 5h - 4x^2 + 5x}{x+h-x}$		
	$= \dfrac{8xh + 4h^2 - 5h}{h}$		
	$= 8x + 4h - 5$	M1	1.1b
	$\dfrac{\mathrm{d}y}{\mathrm{d}x} = \lim_{h \to 0} (8x+4h-5) = 8x - 5$ and so, at P, $\dfrac{\mathrm{d}y}{\mathrm{d}x} = 8(2) - 5 = 11$	A1	2.2a
		(5)	
			(5 marks)

Question 5 Notes:

B1:	Writes down the y coordinate of a point close to P E.g. For a point Q with x coordinate $2+h$, $\{y_Q\} = 4(2+h)^2 - 5(2+h)$
M1:	Begins the proof by attempting to write the gradient of the chord PQ in terms of h
A1:	Correct expression for the gradient of the chord PQ in terms of h
M1:	Correct process to obtain the gradient of the chord PQ as $\alpha h + \beta;\ \alpha, \beta \neq 0$
A1:	Correctly shows that the gradient of PQ is $4h+11$ and applies a limiting argument to deduce that at the point $\boldsymbol{P}$ on $y = 4x^2 - 5x$, $\frac{dy}{dx} = 11$ E.g. $\lim_{h \to 0} (4h+11) = 11$ **Note:** δx can be used in place of h
Alt 1	
B1:	$4(x+h)^2 - 5(x+h)$, seen or implied
M1:	Begins the proof by attempting to write the gradient of the chord in terms of x and h
A1:	Correct expression for the gradient of the chord in terms of x and h
M1:	Correct process to obtain the gradient of the chord as $\alpha x + \beta h + \gamma;\ \alpha, \beta, \gamma \neq 0$
A1:	Correctly shows that the gradient of the chord is $8x+4h-5$ and applies a limiting argument to deduce that when $y = 4x^2 - 5x$, $\frac{dy}{dx} = 8x - 5$. E.g. $\lim_{h \to 0} (8x+4h-5) = 8x-5$ Finally, deduces that at the point P, $\frac{dy}{dx} = 11$ **Note:** For Alt 1, δx can be used in place of h