Question Number	Scheme	Marks
7.(a)	Attempts $\frac{dy}{dx} = 4x$ at $x = 2$	M1
	At $x = 2$ gradient of tangent = 8	A1 **(2)**
(b)	$\left(y_Q =\right)\ 2(2+h)^2 + 5$	B1
	Gradient $PQ = \frac{\text{their } y_Q - 13}{2+h-2}$	M1
	$\left(= \frac{8h + 2h^2}{h}\right) = 8 + 2h$	A1 **(3)**
(c)	States as $h \to 0$ Gradient $PQ \to 8$ = Gradient of tangent	B1 **(1)**
		(6 marks)

(a)

M1 Attempts to find the value of $\frac{dy}{dx} = ax, \quad a > 0$ at $x = 2$

A1 For 8. No need to state this is the gradient.

(b)

B1 $\left(y_Q =\right)\ 2(2+h)^2 + 5$

M1 Attempts $\pm\frac{y_Q - y_P}{x_Q - x_P}$ condoning slips, but must be a genuine attempt at y_Q

A1 Gradient is $8 + 2h$ (with no errors seen)

(c)

B1 States as $h \to 0$ Gradient $PQ \to 8$ = Gradient of tangent (oe)

There should be reference to "limit" or "as h tends to 0" (words or symbols) and linked to part (a) (so same gradient, or showing the answers agree). But be generous with the explanation beyond these constraints.

Question Number	Scheme	Marks
8	$x-6x^{\frac{1}{2}}+4=0$ $x^{\frac{1}{2}}=3\pm\sqrt{5}$ oe $x=\left(3\pm\sqrt{5}\right)^2 \Rightarrow x=14\pm6\sqrt{5}$	 M1 A1 M1 A1 A1 **(5 marks)**

M1 For attempting to solve an equation of the form $y^2-6y+4=0$ by completing the square or quadratic formula to reach at least one solution. There must be some working shown for this mark to be awarded, accept as a minimum identifying $y=x^{\frac{1}{2}}$ and writing the quadratic in y before solutions.

A1 $\left(x^{\frac{1}{2}}\right)=3\pm\sqrt{5}$ Both required (though one may be later rejected) but need not be simplified, so accept $\frac{6\pm2\sqrt{5}}{2}$

M1 For attempting to square a solution of the form $p\pm q\sqrt{r}$ with 2 (out of 4) correct terms (may be implied by correct answers for their terms, but must have seen at least one solution for $x^{\frac{1}{2}}$)

A1 $x=14+6\sqrt{5}$ **or** $x=14-6\sqrt{5}$ as an answer Accept equivalents for this mark.

A1 $x=14+6\sqrt{5}$ **and** $x=14-6\sqrt{5}$ as answers, must be simplified.

Special Case: For candidates who show no initial working and write $x^{\frac{1}{2}}=3\pm\sqrt{5}$ as their first step, M0A0M1A1A1 is possible if they go on to achieve correct answers

Question Number	Scheme	Marks
8 Alt	$x+4=6x^{\frac{1}{2}}$ $\left(x+4\right)^2=36x$ $x^2-28x+16=0 \Rightarrow (x-14)^2=180 \Rightarrow x=14\pm\sqrt{180} \Rightarrow x=14\pm6\sqrt{5}$	 M1 A1 M1 A1 A1 **(5)**

M1 Isolates the square root term and squares both sides.

A1 Correct squared expression, $\left(x+4\right)^2$ need not be expanded (as in scheme).

M1 Expands and solves the quadratic in x Note that candidates who square term by term will score no marks.

A1A1 As main scheme. Note for the final A both solutions must be fully simplified.