Question	Scheme	Marks	AOs
6(a)	$f(x) = (8 - x)\ln x,\ x > 0$		
	Crosses x-axis $\Rightarrow f(x) = 0 \Rightarrow (8 - x)\ln x = 0$		
	x coordinates are 1 and 8	B1	1.1b
		(1)	
(b)	Complete strategy of setting $f'(x) = 0$ and rearranges to make $x = ...$	M1	3.1a
	$\left\{ \begin{array}{ll} u = (8 - x) & v = \ln x \\ \frac{du}{dx} = -1 & \frac{dv}{dx} = \frac{1}{x} \end{array} \right\}$		
	$f'(x) = -\ln x + \frac{8-x}{x}$	M1	1.1b
		A1	1.1b
	$-\ln x + \frac{8-x}{x} = 0 \Rightarrow -\ln x + \frac{8}{x} - 1 = 0$ $\Rightarrow \frac{8}{x} = 1 + \ln x \Rightarrow x = \frac{8}{1 + \ln x}$ *	A1*	2.1
		(4)	
(c)	Evaluates both $f'(3.5)$ and $f'(3.6)$	M1	1.1b
	$f'(3.5) = 0.032951317...$ and $f'(3.6) = -0.058711623...$ Sign change and as $f'(x)$ is continuous, the x coordinate of Q lies between $x = 3.5$ and $x = 3.6$	A1	2.4
		(2)	
(d)(i)	$\{x_5 =\}$ 3.5340	B1	1.1b
(d)(ii)	$\{x_Q =\}$ 3.54 (2 dp)	B1	2.2a
		(2)	
		(9 marks)	

Question 6 Notes:	
(a)	
B1:	Either • 1 and 8 • on Figure 2, marks 1 next to *A* and 8 next to *B*
(b)	
M1:	Recognises that *Q* is a stationary point (and not a root) and applies a complete strategy of setting $f'(x)=0$ and rearranges to make $x = ...$
M1:	Applies $vu' + uv'$, where $u = 8 - x$, $v = \ln x$ **Note:** This mark can be recovered for work in part (c)
A1:	$(8-x)\ln x \rightarrow \; -\ln x + \dfrac{8-x}{x}$, or equivalent **Note:** This mark can be recovered for work in part (c)
A1*:	Correct proof with no errors seen in working.
(c)	
M1:	Evaluates both $f'(3.5)$ and $f'(3.6)$
A1:	$f'(3.5) = \text{awrt } 0.03$ and $f'(3.6) = \text{awrt } -0.06$ or $f'(3.6) = -0.05$ (truncated) **and** a correct conclusion
(d)(i)	
B1:	See scheme
(d)(ii)	
B1:	Deduces (e.g. by the use of further iterations) that the *x* coordinate of *Q* is 3.54 accurate to 2 dp **Note:** $3.5 \rightarrow 3.55119 \rightarrow 3.52845 \rightarrow 3.53848 \rightarrow 3.53404 \rightarrow 3.53600 \rightarrow 3.53514$ ($\rightarrow 3.535518...$)