Q	Marking Instructions	AO	Marks	Typical Solution
9(a)	Finds a difference between 2 terms	AO3.1a	M1	$3e^{p} - 5 = 5 - 3e^{-p}$ (*) $3e^{p} - 10 + 3e^{-p} = 0$
	Forms an equation using two differences	AO3.1a	M1	$3e^{2p} - 10e^{p} + 3 = 0$ $e^{p} = \frac{1}{3},\ 3$
	Forms a quadratic equation in e^{p}	AO1.1a	M1	$p = \ln\frac{1}{3},\ \ln 3$
	Obtains a correct quadratic equation	AO1.1b	A1	**ALT to (*)** $2(5 - 3e^{-p}) = 3e^{p} - 3e^{-p}$ **Or**
	Obtains 2 correct solutions for e^{p} from 'their' quadratic FT only applies if previous mark has been awarded	AO1.1b	A1F	$2(3e^{-p} - 5) = 3e^{p} - 3e^{-p}$
	Obtains final answers in an exact form FT applies if previous mark has been awarded	AO2.2a	A1F	

Q	Marking Instructions	AO	Marks	Typical Solution
9 (b)	Finds a ratio between two consecutive terms (no requirement to use a and r)	AO3.1a	M1	Assume it is possible that $3e^{-q}$, 5 and $3e^{q}$ are three consecutive terms of a geometric sequence
	Compares two ratios (could be ratios of successive terms, no requirement to use a and r)	AO3.1a	M1	$a = 3e^{-q}$, $ar = 5$, $ar^2 = 3e^{q}$ $\frac{ar}{a} = \frac{5}{3e^{-q}} \Rightarrow r = \frac{5e^{q}}{3}$ $\frac{ar^2}{ar} = \frac{3e^{q}}{5} \Rightarrow r = \frac{3e^{q}}{5}$
	Identifies a contradiction	AO2.1	R1	$\frac{5}{3e^{-q}} = \frac{3e^{q}}{5} \Rightarrow 25 = 9$
	Draws a conclusion about k	AO2.4	R1	This is a contradiction therefore $3e^{-q}$, 5 and $3e^{q}$ cannot form three consecutive terms of a geometric sequence.
	Total		**10**	