Question	Answer	Marks	Guidance
8(a)	At least two correct terms from: $t+4.5$ $t+10.5$ $t+28.5$ soi	**B1**	condone *a* for *t*
	$r=\dfrac{t+10.5}{t+4.5}$ or $r=\dfrac{t+28.5}{t+10.5}$ or $r^2=\dfrac{t+28.5}{t+4.5}$ oe	**M1**	**FT** *their* distinct terms of the form $t + 1.5k$ where *k* is a positive integer
	$\dfrac{t+10.5}{t+4.5}=\dfrac{t+28.5}{t+10.5}$ oe	**A1**	or $(t+4.5)\times\dfrac{t+28.5}{t+10.5}=t+10.5$ oe
	Clears algebraic fractions and expands e.g. $t^2+21t+110.25=t^2+33t+128.25$	**A1**	must be seen
	–1.5 oe nfww	**A1**	and no other values **dep** on all previous marks awarded
	Alternative method		
	At least two correct terms from: $t+4.5$ $t+10.5$ $t+28.5$ soi	**(B1)**	
	One correct equation in *a* and *r* e.g. $a - 4.5 = ar - 10.5$ or $ar - 10.5 = ar^2 - 28.5$ or $a - 4.5 = ar^2 - 28.5$ oe	**(M1)**	**FT** *their* distinct terms of the form $t + 1.5k$ where *k* is a positive integer
	Correct equation in *r* e.g. $\dfrac{6}{r-1}=\dfrac{18}{r(r-1)}$ OR $\dfrac{18}{r^2-r}-4.5=\dfrac{18r}{r^2-r}-10.5$	**(A1)**	OR correct equation in *a* e.g. $a+24=a\left(\dfrac{a+6}{a}\right)^2$
	$[6r=18]\,r=3$ OR $18-4.5(r^2-r)=18r-10.5(r^2-r)$ **and** e.g. $t=\dfrac{18r}{r^2-r}-10.5$ or $a = 3$	**(A1)**	must be seen OR $a^2+24a=a^2+12a+36$ and $a = 3$
	–1.5 oe nfww	**(A1)**	and no other values **dep** on all previous marks awarded
8(b)	3 nfww	**2**	and no other values **M1** for $\dfrac{their(-1.5)+their10.5}{their(-1.5)+their4.5}$ oe or for $\dfrac{their\ a+their10.5-their4.5}{their\ a}$ oe or for $\dfrac{their28.5-their10.5}{their(-1.5)+their10.5}+1$ oe **FT** *their t* providing *their t* ≠ 0 or *their a* providing *their a* ≠ 0 or 1

Question	Answer	Marks	Guidance
9(a)	$-\frac{5}{2}$ oe	**B1**	
9(b)	$f \in \mathbb{R}$ oe	**B1**	
9(c)	$\ln\left(2\left(x^2+1\right)+5\right)$ $[=4]$ oe, soi	**B1**	
	$2\left(x^2+1\right)+5=e^4$ or *their* $(2x^2 + 7) = e^4$	**M1**	
	$x=\pm\sqrt{\frac{e^4-7}{2}}$ or exact equivalent	**A1**	
	Alternative method		
	Solves $\ln(2x+5)=4$ to find $x=\frac{e^4-5}{2}$ and states $g(x)=\frac{e^4-5}{2}$ OR finds $f^{-1}(x)=\frac{e^x-5}{2}$ and states $g(x)=\frac{e^4-5}{2}$	**(2)**	**M1** for solving $f(x)=4$ to find $x = k$ and states $g(x)=k$, where k is a constant OR for stating $g(x)=f^{-1}(4)$
	$x^2+1=\frac{e^4-5}{2}\rightarrow\ x=\pm\sqrt{\frac{e^4-5}{2}-1}$ or exact equivalent	**(A1)**	