Question	Scheme	Marks
5	$3\tan(\theta+43°)=2\cos(\theta+43°)\Rightarrow 3\dfrac{\sin(\theta+43°)}{\cos(\theta+43°)}=2\cos(\theta+43°)$ $\Rightarrow 3\sin(\theta+43°)=2\cos^2(\theta+43°)$	**M1**
	$\Rightarrow 3\sin(\theta+43°)=2\left(1-\sin^2(\theta+43°)\right)$	**M1**
	$\Rightarrow 2\sin^2(\theta+43°)+3\sin(\theta+43°)-2=0$ $\Rightarrow \left(2\sin(\theta+43°)-1\right)\left(\sin(\theta+43°)+2\right)=0\Rightarrow \sin(\theta+43°)=...$	**M1**
	$\sin(\theta+43°)=\dfrac{1}{2}$	**A1**
	$\theta=\arcsin"\dfrac{1}{2}"-43°$	**M1**
	$\theta=-13°,\ 107°$	**A1**
		(6)
		(6 marks)

Notes:

M1: Uses $\tan..=\dfrac{\sin..}{\cos..}$ and multiplies through to form an equation of the form $A\sin...=B\cos^2...$

Condone poor notation e.g.:

$3\tan(\theta+43°)=2\cos(\theta+43°)\Rightarrow 3\dfrac{\sin}{\cos}(\theta+43°)=2\cos(\theta+43°)$

$\Rightarrow 3\sin(\theta+43°)=2\cos^2(\theta+43°)$ (with or without brackets)

M1: Applies Pythagorean identity to obtain a 3 term quadratic equation in sin.

Allow use of $\cos^2...=\pm1\pm\sin^2...$

M1: Solves a 3 term quadratic in $\sin(\theta+43°)$ by any valid means.

This may be implied by at least one correct root for their quadratic.

Allow if they have $\sin(\theta+43°)=x$ or another variable or e.g. sin α where $\alpha=\theta+43°$

A1: Correct value of $\sin(\theta+43°)$. If $\sin(\theta+43°)=x$ is used, it must be clear they mean $\sin(\theta+43°)$ but this may be implied if they have e.g. sin α = ½ where $\alpha=\theta+43°$

If $x=\dfrac{1}{2}$ is left as a final answer it is A0.

M1: Correct method for solving $\sin(\theta+43°)=k, |k|<1$, look for use of inverse sine followed by **subtraction** of 43 from $\sin^{-1}(\text{their } k)$. Implied by one correct solution for their *k*

Do **not** allow mixing of degrees and radians for this mark.

A1: Correct solutions and no others in the range.

Question	Scheme	Marks
6(a)	$u_n = ar^{n-1} \Rightarrow ar + ar^2 = 6$ and $ar^3 = 8$	**M1**
	$\Rightarrow \dfrac{ar + ar^2}{ar^3} = \dfrac{6}{8} \Rightarrow 1 + r = \dfrac{3}{4}r^2$	**M1**
	$\Rightarrow 3r^2 - 4r - 4 = 0$*	**A1***
		(3)
(a) Way 2	$u_4 = 8 \Rightarrow u_3 = \dfrac{8}{r},\ u_2 = \dfrac{8}{r^2}$	**M1**
	$\dfrac{8}{r} + \dfrac{8}{r^2} = 6$	**M1**
	$\Rightarrow 3r^2 - 4r - 4 = 0$*	**A1***
		(3)
(b)	$r = -\dfrac{2}{3}$	**B1**
	$ar^3 = 8 \Rightarrow a = \dfrac{8}{\left(-\dfrac{2}{3}\right)^3} = \ldots$	**M1**
	$u_1 = -27$	**A1ft**
		(3)
(c)	$S_\infty = \dfrac{-27}{1 - \left(-\dfrac{2}{3}\right)} = \ldots$	**M1**
	$= -\dfrac{81}{5}$	**A1**
		(2)
		(8 marks)

Notes:

(a) **<u>Ignore labelling and mark (a), (b) and (c) together</u>**

M1: Uses the correct *n*-th term formula for a GP to set up two equations in *a* and *r*

May also be in terms of u_1 and *r* or u_2 and *r* or u_3 and *r* e.g.

$u_1 r + u_1 r^2 = 6,\ u_1 r^3 = 8$ or $u_2 + u_2 r = 6,\ u_2 r^2 = 8$ or $\dfrac{u_3}{r} + u_3 = 6,\ ru_3 = 8$

Must be using the correct term formula so e.g. $ar^2 + ar^3 = 6$ and $ar^4 = 8$ is M0

Alternatively may use the correct sum formula for the first equation, $a\dfrac{1-r^3}{1-r} - a = 6$ oe.

M1: Attempts to solve their two equations to get an equation in *r*. Look for an attempt to divide the two equations, or an attempt to find *a* in terms of *r* from one and substitute into the other.

Allow slips but the algebra should essentially be correct so do not allow use of e.g. $ar^3 = (ar)^3$