Question	Scheme	Marks	AOs
9 (a)	$(-180°,-3)$	B1	1.1b
		(1)	
(b)	(i) $(-720°,-3)$	B1ft	2.2a
	(ii) $(-144°,-3)$	B1 ft	2.2a
		(2)	
(c)	Attempts to use both $\tan\theta=\dfrac{\sin\theta}{\cos\theta}$, $\sin^2\theta+\cos^2\theta=1$ and solves a quadratic equation in $\sin\theta$ to find at least one value of θ	M1	3.1a
	$3\cos\theta=8\tan\theta\Rightarrow 3\cos^2\theta=8\sin\theta$	B1	1.1b
	$3\sin^2\theta+8\sin\theta-3=0$ $(3\sin\theta-1)(\sin\theta+3)=0$	M1	1.1b
	$\sin\theta=\dfrac{1}{3}$	A1	2.2a
	awrt $520.5°$ only	A1	2.1
		(5)	
			(8 marks)

(a)

B1: Deduces that $P(-180°,-3)$ or $c=-180^{(\circ)}, d=-3$

(b)(i)

B1ft: Deduces that $P'(-720°,-3)$ Follow through on their $(c,d)\rightarrow(4c,d)$ where d is negative

(b)(ii)

B1ft: Deduces that $P'(-144°,-3)$ Follow through on their $(c,d)\rightarrow(c+36°,d)$ where d is negative

(c)

M1: An overall problem solving mark, condoning slips, for an attempt to

- use $\tan\theta=\dfrac{\sin\theta}{\cos\theta}$,
- use $\pm\sin^2\theta\pm\cos^2\theta=\pm1$
- find at least one value of θ from a quadratic equation in $\sin\theta$

B1: Uses the correct identity and multiplies across to give $3\cos\theta=8\tan\theta\Rightarrow 3\cos^2\theta=8\sin\theta$ oe

M1: Uses the correct identity $\sin^2\theta+\cos^2\theta=1$ to form a 3TQ in $\sin\theta$ which they attempt to solve using an appropriate method. It is OK to use a calculator to solve this

A1: $\sin\theta=\dfrac{1}{3}$ Accept sight of $\dfrac{1}{3}$. Ignore any reference to the other root even if it is "used"

A1: Full method with all identities correct leading to the answer of awrt $520.5°$ and no other values.