Question Number	Scheme	Marks
7 (a)	$8\tan\theta = 3\cos\theta$	
	Uses $\tan\theta = \dfrac{\sin\theta}{\cos\theta} \rightarrow$ $\quad 8\dfrac{\sin\theta}{\cos\theta} = 3\cos\theta$	M1
	$8\sin\theta = 3\cos^2\theta$ oe	
	Uses $\cos^2\theta = 1-\sin^2\theta \rightarrow$ $\quad 8\sin\theta = 3\left(1-\sin^2\theta\right)$	M1
	$3\sin^2\theta + 8\sin\theta - 3 = 0$ *	A1 *
		(3)
(b)	$(3\sin 2x - 1)(\sin 2x + 3) = 0$	M1
	Critical value(s) of $\dfrac{1}{3}, (-3)$	A1
	Correct method to find x from their $\sin 2x = \dfrac{1}{3}$	dM1
	$x =$ awrt $9.74°, 80.26°$	A1
		(4)
		(7 marks)

(a)

M1 Uses $\tan\theta = \dfrac{\sin\theta}{\cos\theta}$ (oe) in $8\tan\theta = 3\cos\theta$. Condone slips in coefficients.

M1 Multiplies by $\cos\theta$ and uses $\cos^2\theta = 1-\sin^2\theta$ (oe) to produce an equation in just $\sin\theta$

A1* Proceeds to $3\sin^2\theta + 8\sin\theta - 3 = 0$ with no arithmetical or notational errors.
No mixed variables within the lines of the "proof"
An example of a notational error is $\cos\theta^2$ for $\cos^2\theta$ (Note that this would not lose the M1)

(b)

M1 Attempts to find the critical values of the given quadratic. Implied by correct values given if no working shown. Allow if just $\dfrac{1}{3}$ is given.

A1 Critical value of $\dfrac{1}{3}$ and no incorrect second value. The -3 need not be stated. Accept awrt 0.333 for $\dfrac{1}{3}$

dM1 A correct method to find one value of x from their $\sin 2x = \dfrac{1}{3}$

It requires both arcsin and $\div 2$ and may be implied by one answer to one decimal place rounded or truncated eg awrt 9.7 or awrt 80.3 (or for 2sf radian answer awrt 0.17, or awrt 1.4)

A1 $x =$ awrt $9.74°, 80.26°$. A0 if extra solutions are given in the range but ignore solutions outside.

Note that M1A0M1A1 is possible if correct answers come from a critical value of $\dfrac{1}{3}$ if a second incorrect C.V. was also found but does not lead to extra solutions in the range.

Question Number	Scheme	Marks
8 .(i)	States $(S=)\quad a+\quad (a+d)\quad +.....\{a+(n-2)d\}+\{a+(n-1)d\}$	B1
	$(S=)\{a+(n-1)d\}+\{a+(n-2)d\}+.....(a+d)\quad +a$ and adds	M1
	$2S=n\{2a+(n-1)d\}\Rightarrow S=\frac{n}{2}\{2a+(n-1)d\}$ *	A1*
		(3)
(ii)	(a) $u_5=22$	B1
	(b) $\sum_{n=1}^{59}u_n=(5+10+15+...)+(-3+3-3+...)$	
	$=\frac{59}{2}\{10+58\times5\}+(-3)=8850-3=8847$	M1 B1 A1
		(4)
		(7 marks)

(i)

B1 Writes down an expression for S in a minimum of 3 in a and d terms including the first and last terms.
Eg. States that $S=a+(a+d)+(a+2d)+.....+a+(n-2)d+a+(n-1)d$

$S=a+(a+d)+...+l$ scores B1 only if $l=a+(n-1)d$ is later identified as only two terms in a and d.

M1 Attempts to reverse their sum and add terms. Must include at least two pairs of matching terms to be enough to establish the pattern (allow if second sum misses last terms).

A1* Correctly achieves the given result including the intermediate line $2S=n\{2a+(n-1)d\}$ There must be no errors and at least 3 terms should have been shown for the sum and its reverse.

If $S=a_1+a_2+...+a_n$ is used allow the B and final A only if $a_m=a+(m-1)d$ (oe) is clearly identified in the working, or other clear reasoning why each term gives $2a+(n-1)d$, but the M may be gained.

If commas used instead of + in the summation, eg $S=a,(a+d)...,a+(n-2)d,a+(n-1)d$ the score B0 as no correct sum, but allow M1A1 if the sum is implied by working and all else is correct.

If you see other attempts you feel are worthy of credit then consult your team leader.

(ii) (a)

B1 22

(ii) (b)

M1 Attempts to use the sum of an AP with $n=59,a=5,d=5$ Also allow $\frac{n}{2}(a+l)=\frac{59}{2}(5+59\times5)$

B1 For $\sum_{n=1}^{59}3\times(-1)^n=-3$

A1 8847

Listing terms can score 3/3 as it is a correct method and can be marked per main scheme.

Answers with no incorrect working can score 3/3 If the correct answer appears from incorrect working then apply SC M0B1A0.