Question Number	Scheme	Marks
5 (i)	States $x = 2$	B1
	$\sqrt{3}\sec x + 2 = 0 \Rightarrow \cos x = -\dfrac{\sqrt{3}}{2} \Rightarrow x = ...$	M1
	$x = \dfrac{5\pi}{6}$	A1
		(3)
(ii)	Attempts to use $\cos 2\theta = 1 - 2\sin^2\theta$	M1
	$6\sin^2\theta + 10\sin\theta - 3 = 0$	A1
	$\sin\theta = \dfrac{-5 \pm \sqrt{43}}{6} \left(= -1.926..., 0.2595...\right) \Rightarrow \theta = \arcsin(...)$	M1
	$\theta = 15.0°, 165°$	A1
		(4)
		(7 marks)

Notes

(i)

B1 States $x = 2$. May be seen anywhere in (i) and don't be concerned where it comes from.

M1 For a correct process to solve $\sqrt{3}\sec x + 2 = 0$ E.g. $\sec x = \dfrac{1}{\cos x} \Rightarrow \cos x = -\dfrac{\sqrt{3}}{2} \Rightarrow x = ...$ Allow slips in rearranging but must attempt to solve $\cos x = k, |k| < 1$ or $\sec x = k, |k| > 1$ Degree value ($150°$) following a correct equation implies the M mark. Note some may use $\sec^2 x = 1 + \tan^2 x$ and form a quadratic in tan *x*. These will need a correct identity, correct method to solve a quadratic (which may be by calculator) and attempt to solve $\tan x = k,\ k \neq 0$

A1 $x = \dfrac{5\pi}{6}$ and no other extra solutions in the range. Accept awrt 2.62 (and isw).

Note that $\sqrt{3}\sec x + 2 = 0 \rightarrow x = \dfrac{5\pi}{6}$ can score M1A1 as no incorrect work is seen, method implied.

Question required working to be shown $x = \dfrac{5\pi}{6}$ without seeing at least $\sqrt{3}\sec x + 2 = 0$ extracted first is M0A0.

(ii)

M1 Attempts to use $\cos 2\theta = \pm 1 \pm 2\sin^2\theta$ to form a quadratic equation in $\sin\theta$. If using alternative forms for the identity, must also use $\cos^2\theta = 1 - \sin^2\theta$ before gaining this mark.

A1 Correct 3 term quadratic equation $6\sin^2\theta + 10\sin\theta - 3 = 0$ or a multiple of this. Alternatively may be scored for $6\sin^2\theta + 10\sin\theta = 3$ if followed by completing the square on LHS to solve.

M1 Full attempt to find one value for θ from a quadratic in sinθ. Must involved

- correct method to solve the quadratic in sinθ (usual rules, may use calculator) to produce a value for sinθ
- use of arcsin(..) to reach the value for θ (you may need to check the values if arcsin(…) is not shown). Radian answers can imply the mark (awrt 0.263, 2.88 if correct).

May be scored from an incorrect identity as long as a quadratic is achieved. Accept arcsin expression for the M

A1 θ =awrt $15.0°, 165°$ and no other solutions in the range. Accept just $15°$ for $15.0°$ (but not awrt $15°$ if it does not round to $15.0°$)

Condone a different variable used than θ throughout.

Question Number	Scheme	Marks
6.(a)	$(2, -10)$	B1 B1 **(2)**
(b)	$\text{ff}(0) = \text{f}(-4) = ...$	M1
	= 8	A1cso **(2)**
(c)	Attempts to solve $-3(x-2)-10 = 5x+10 \Rightarrow x = ...$	M1
	$x > -\frac{7}{4}$ only	A1 **(2)**
(d)	$x\left(\text{or } \lvert x\rvert\right) = \frac{16}{3}$	B1
	Attempts $3(\lvert x\rvert -2)-10 = 0 \Rightarrow \lvert x\rvert = k,\ k > 0$	
	or $3(-x-2)-10 = 0 \Rightarrow x = -k$	M1
	or $3(x-2)-10 = 0 \Rightarrow x = k \Rightarrow x = -k$	
	$x = \left(\frac{16}{3} \text{ and }\right) -\frac{16}{3}$ with no other values	A1 **(3)**
		(9 marks)

Notes

(a)

B1 For one correct coordinate

B1 For $(2, -10)$. Allow $x = ..., y = ...$ Do not accept e.g. 6/3 unless 2 has been seen/identified with this.

(b)

M1 For a full attempt at f f (0) . Can be scored for f (-4). Allow for use of their f(0) even if incorrect as long as the process is clear, e.g. f(0) = .. stated or calculated first then used. May be scored by first attempting ff(x) before substituting. This mark is for showing the correct process of composites, so may be scored if there are slips or errors with modulus if the intent is clear.

A1cso $\text{ff}(0) = 8$ only. A0 if other values given.

(c)

M1 Attempts to solve $-3(x-2)-10 = 5x+10 \Rightarrow x = ...$ Allow with equality or any inequality for the M mark.

Alternatively, rearranges to $\lvert x-2\rvert = ax+b$, squares both sides and solves the quadratic.

A1 $x > -\frac{7}{4}$ (oe) only. If another inequality or value is given and not rejected withhold this mark.

(d)

Work for (d) must be seen or referred to in (d). Do not accept for work attempted in earlier parts but not used in (d).

B1 For $x = \frac{16}{3}$. Allow when seen even from incorrect working as it could be verified. May be seen on sketch as long as referred to in (d). Allow also for $\lvert x\rvert = \frac{16}{3}$