Question Number	Scheme	Marks
6 (a)	$2\cos(\theta-60°)=3\sin\theta \Rightarrow 2\cos\theta\cos 60°+2\sin\theta\sin 60°=3\sin\theta$	M1, A1
	$\Rightarrow \cos\theta=\left(3-\sqrt{3}\right)\sin\theta$ or $\Rightarrow 1+\sqrt{3}\tan\theta=3\tan\theta$	dM1
	$\Rightarrow \tan\theta=\dfrac{1}{3-\sqrt{3}}$	
	$\Rightarrow \tan\theta=\dfrac{1}{6}\left(3+\sqrt{3}\right)$ *	A1*
		(4)
(b)	Deduces that $\theta=2x-10°$	B1
	$\tan(2x\pm\alpha)=\dfrac{1}{6}\left(3+\sqrt{3}\right)\Rightarrow 2x\pm\alpha=$ awrt 38 or 218 $\Rightarrow x=...$	M1
	$x=$ awrt 24.1°, awrt 114.1°.	A1
		(3)
		(7 marks)

(a)

M1 Attempts to use $\cos(\theta-60°)=\cos\theta\cos 60°\pm\sin\theta\sin 60°$ within the given equation

Condone the omission of a 2 on the second term and a slip on the 3 of $3\sin\theta$

A1 Correct equation in $\sin\theta$ and $\cos\theta$

dM1 Dependent on the first M1. Uses $\cos 60°=\dfrac{1}{2}, \sin 60°=\dfrac{\sqrt{3}}{2}$ AND attempts one of:

- Dividing all 3 terms by $\cos\theta$ or $\sin\theta$ to set up an equation in just $\tan\theta$; or
- Collecting terms in $\sin\theta$ to form an equation of the form $P\sin\theta\pm Q\cos\theta=0$ o.e.

A1* Correctly proceeds to given answer showing all necessary steps: **see the steps set out in the main scheme above**. It is not necessary to see the rationalising of the denominator. Withhold this mark for invisible brackets or for use of the wrong variable, e.g. x, or a missing variable, at any stage within the body of the solution.

(b) **Notes**

- **Correct answers from no working score B0 M0 A0**
- **This is a "hence" question, so starting from scratch also scores B0 M0 A0**

B1 Deduces that $\theta=2x-10°$

M1 Attempts correct method from $\tan(2x\pm\alpha)=\dfrac{1}{6}\left(3+\sqrt{3}\right)\Rightarrow x=....$

Look for the correct order of operations, i.e. arctan, then add or subtract α, then divide by 2.

As a minimum look for $\tan(2x\pm\alpha)=\dfrac{1}{6}\left(3+\sqrt{3}\right)\Rightarrow 2x\pm\alpha=$ awrt 38 or 218 $\Rightarrow x=...$

If $\tan(2x\pm\alpha)$ is expanded to $\dfrac{\tan 2x\pm\tan\alpha}{1\mp\tan 2x\tan\alpha}$ then $\tan 2x$ must be made the subject using the correct order of operations before arctan and division by 2.

Calculations must be in degrees.

A1 $x=$ awrt 24.1°, awrt 114.1° and no others in the range.

Question Number	Scheme	Marks
7 (a)	$\left(\frac{11}{3}, -4\right)$	B1 B1 **(2)**
(b)	Attempts $3x-11-4=8$ and $-3x+11-4=8$ $x=-\frac{1}{3}, \frac{23}{3}$	M1, dM1 A1 **(3)**
(c)	$m \geq 3, \quad m=-\frac{12}{11}, \quad m<-3$	M1, A1, A1 **(3)**
(d)	$a=-4, \ b=\frac{4}{3}$	B1ft, B1ft **(2)**
		(10 marks)

Note: Check working near to the question text or written on the diagram.

(a)

B1 For one correct coordinate

B1 For $\left(\frac{11}{3}, -4\right)$. Allow missing brackets, or $x=\frac{11}{3}, y=-4$. Accept equivalent fractions for $\frac{11}{3}$

(b)

M1 For a full attempt at either $3x-11-4=8$ or $-3x+11-4=8$. Must lead to a value for x.

dM1 Dependent on the first M1. For a full attempt at both $3x-11-4=8$ and $-3x+11-4=8$ leading to values for x.

A1 $x=-\frac{1}{3}, \frac{23}{3}$ only. If one of these has clearly been selected as a final answer and the other rejected, withhold this mark.

Alt

M1 Reaches $|3x-11|=12$, squares both sides and solves a quadratic equation. Must lead to a value for x.

dM1 Reaches two values for x following a valid method for solving their quadratic equation.

A1 $x=-\frac{1}{3}, \frac{23}{3}$. If one of these has clearly been selected as a final answer and the other rejected, withhold this mark.

(c)

M1 Finds any of the three critical values for m. This need not be presented as an inequality.

A1 Two of $m \geq 3, \quad m=-\frac{12}{11}, \quad m<-3$. Do not give this mark if there are contradictions, e.g. $m=-\frac{12}{11}, m>-\frac{12}{11}$ unless the correct answer is clearly indicated. Accept set notation.

A1 All three of $m \geq 3, \quad m=-\frac{12}{11}, \quad m<-3$ with no contradictions (see above). Accept set notation.

(d) **Note: If *a*=… and *b*=… are not stated, they could be embedded in $y=af\left(x-b\right)$. The stated values take precedence.**