Question Number	Scheme	Marks
5 (a)	$12\tan 2x + 5\cot x \sec^2 x = 0$	
	$12\times\dfrac{2t}{1-t^2} + 5\times\dfrac{1}{t}\left(1+t^2\right) = 0$	B1 M1 A1
	$12\times 2t^2 + 5\left(1+t^2\right)\left(1-t^2\right) = 0 \rightarrow 5t^4 - 24t^2 - 5 = 0$ *	A1*
		(4)
(b)	$5t^4 - 24t^2 - 5 = 0$	
	$\left(5t^2+1\right)\left(t^2-5\right) = 0$	M1
	Correct order of operations $t = (\pm)\sqrt{5} \Rightarrow x = ..$	dM1
	Two of awrt $x = 66°, 114°, 246°, 294°$	A1
	All four of awrt $x = 65.9°, 114.1°, 245.9°, 294.1°$	A1
		(4)
		8 marks

(a)

B1 Any **correct** identity used within the given equation either in terms of $\tan x$ or in terms of t

Eg: Attempts to replace either $\tan 2x = \dfrac{2\tan x}{1-\tan^2 x}$, $\cot x = \dfrac{1}{\tan x}$ or $\sec^2 x = 1 + t^2$

M1 Uses $\tan 2x = \dfrac{2\tan x}{1\pm\tan^2 x}$, $\cot x = \dfrac{1}{\tan x}$, and $\sec^2 x = \pm 1 \pm \tan^2 x$ or with $t = \tan x$ to produce an equation in terms of t or $\tan x$

A1 Correct intermediate equation in t or $\tan x$ The = 0 may be implied by later work

A1* For proceeding to the correct answer with a correct intermediate line. Must have = 0 .
There cannot be any notational or bracketing errors within the body of the solution if this mark is to be awarded. A notational error is $\tan x^2 \leftrightarrow \tan^2 x$
The intermediate line should be of a form in which the given answer could immediately follow. See main scheme for such an example; the fractional terms have been dealt with in this case.
Condone partially completed lines if the candidate is only working on one side of the equation

(b)

M1 Correct attempt to solve.

Allow an attempt to factorise $5t^4 - 24t^2 - 5 = 0 \Rightarrow \left(at^2 + b\right)\left(ct^2 + d\right) = 0$ with $ac = \pm 5, bd = \pm 5$

Alt lets $u = t^2$ and attempts to factorise $5u^2 - 24u - 5 = 0 \Rightarrow$ with usual rules.

Allow use of calculator giving $t^2 = 5$ or $\tan^2 x = 5$ (You may ignore the negative root).

It is also implied by $t = \sqrt{5}$ or $t = -\sqrt{5}$ Watch out for $\tan x = 5$ which is M0

dM1 For using the correct order of operations and finding one value of x for their $t^2 = k$ where k is a positive constant. Allow accuracy to either the nearest degree or correct to 1dp in radians.
It is dependent upon them having scored the previous M1.

A1 Any two of awrt $x = 66°, 114°, 246°, 294°$ May be implied by awrt two of 1.15, 1.99, 4.29, 5.13

A1 All four of awrt $x = 65.9°, 114.1°, 245.9°, 294.1°$ AND no extras within the range.

Question Number	Scheme	Marks
6.(a)	$(2.5, 3)$ oe	B1 B1
		(2)
(b)	Attempts one solution usually $4x-10+3=3x-2 \Rightarrow x=5$	M1 A1
	Attempts both solutions $-4x+10+3=3x-2 \Rightarrow x=\frac{15}{7}$	dM1 A1
		(4)
(c)	Attempts to solve $y=kx+2$ with $x=2.5, y=3$ or states that $k<4$	M1
	$k...\frac{2}{5}$	A1
	States $\frac{2}{5}<k<4$	A1
		(3)
		9 marks

(a)

B1 For one correct coordinate, either $x=2.5$ or $y=3$

B1 For $(2.5, 3)$. Allow $x=..., y=...$ Allow exact equivalents

If a candidate reverses these and just writes down $(3, 2.5)$ score SC 10

(b)

M1 For a correct method of finding one point of intersection. The signs of the terms must be correct

Accept $2(2x-5)+3=3x-2 \Rightarrow x=...$ oe or $-2(2x-5)+3=3x-2 \Rightarrow x=...$ oe

Note that equations such as $2(2x-5)+3=-3x+2 \Rightarrow x=...$ are incorrect and score M0

A1 For 5 or $\frac{15}{7}$ Ignore any reference to the *y* coordinate

dM1 For a correct method of finding both intersections

A1 For both values 5 and $\frac{15}{7}$ (with no extra solutions)

Ignore any reference to the *y* coordinates or $x=\frac{2}{3}$ within the body of their solution.

(c)

M1 Attempts to solve $y=kx+2$ with THEIR $x=2.5, y=3$ to find *k* or deduces that $k<4$

An equivalent is attempting to set *k* equal to the gradient between (0,2) and (2.5,3)

A1 Finds that $k=\frac{2}{5}$ is a critical value

A1 $\frac{2}{5}<k<4$