Question Number	Scheme	Marks
5 (a)	$f(x)=3x^3+ax^2-10x+b$	
	$f\left(\frac{4}{3}\right)=0 \Rightarrow 3\times\left(\frac{4}{3}\right)^3+a\left(\frac{4}{3}\right)^2-10\left(\frac{4}{3}\right)+b=0$	M1
	$\frac{64}{9}+\frac{16}{9}a-\frac{40}{3}+b=0 \Rightarrow 64+16a-120+9b=0 \quad \Rightarrow 16a+9b=56$ *	A1*
		(2)
(b)	$f(2)=b \Rightarrow 3\times(2)^3+a(2)^2-10(2)+b=b$ leading to an equation in just a	M1
	$4a=-4 \Rightarrow a=-1$	A1
	Substitutes $a='-1'$ in $-16+9b=56 \Rightarrow b=\ldots$	M1
	$\Rightarrow b=8$	A1
		(4)
(c)	$f(x)=3x^3-x^2-10x+8=(3x-4)(x^2+x-2)$	M1, A1
	$=(3x-4)(x+2)(x-1)$	A1
		(3)
		(9 marks)

Question	**Scheme**	**Marks**
6(a)	Way 1: Eqn is $(x-3)^2+(y+4)^2-9-16+k=0$	**M1**
	So radius must be 4 $\Rightarrow 25-k=16$	**M1**
	$\Rightarrow k=9$	**A1**
		(3)
	Way 2: $y=0 \Rightarrow x^2-6x+k=0$ has one solution	**M1**
	$\Rightarrow 6^2-4\times1\times k=0$	**M1**
	$\Rightarrow k=9$	**A1**
		(3)
(b)	C intersects x axis at (3,0)	**B1**
	Intersects y axis when $y^2+8y+9=0 \Rightarrow y=\ldots$ or $y=\text{"}-4\text{"}\pm\sqrt{\text{"}16\text{"}-\text{"}9\text{"}}$ Or uses base of triangle is $2\sqrt{\text{"}16\text{"}-\text{"}9\text{"}}$	**M1**
	Area $RST=\frac{1}{2}\times2\sqrt{7}\times3$	**M1**
	$=3\sqrt{7}$	**A1**
		(4)
		(7 marks)

Question Number	Scheme	Marks
3(a)	Attempts to complete the square for both variables $(x+4)^2, (y-7)^2$	M1
	Centre $(-4, 7)$	A1
	Radius = 12	A1
		(3)
(b)	Attempts $"\pm\left(12" - \sqrt{"4"^2 + "7"^2}\right)$	M1
	$12 - \sqrt{65}$	A1 ft
		(2)
		Total 5

Question	Answer	Marks	Guidance
1	Attempt to express equation in terms of $\sec\theta$ only	**M1**	or equivalent in terms of $\cos\theta$ only, using a correct identity, allow if '5' omitted.
	Obtain $6\sec^2\theta - 17\sec\theta - 14 (= 0)$	**A1**	or $14\cos^2\theta + 17\cos\theta - 6 = 0$.
	Attempt solution of 3-term quadratic equation to find one value of θ, from $\cos\theta = ...$	**M1**	
	Obtain 73.4	**A1**	or greater accuracy.
	Obtain 286.6	**A1**	or greater accuracy; and no others between 0 and 360.
		5	

Question Number	Scheme	Marks
9 (i)	$2\log_3(4x+5) - \log_3(x+3) = 2 \Rightarrow \log_3 \frac{(4x+5)^2}{(x+3)} = 2$	M1, M1
	$\Rightarrow \frac{(4x+5)^2}{(x+3)} = 9$	A1
	$\Rightarrow 16x^2 + 31x - 2 = 0$	
	$(16x-1)(x+2) = 0 \Rightarrow x = \frac{1}{16}$ only	dM1, A1
		(5)
(ii) (a)	States that $\log a + \log b = \log(ab)$ or else uses rule and proceeds from given equation $\log a + \log b = \log(a+b)$ to $\log ab = \log(a+b)$	B1
	Deduces $ab = a+b \Rightarrow ab - a = b \Rightarrow a(b-1) = b \Rightarrow a = \frac{b}{b-1}$ *	M1, A1*
(b)	States either $b > 1$ or $b \neq 1$ as a would not be defined	B1
	$b > 1$ as logs only exist for positive numbers	B1
		(5)
		(10 marks)

Question Number	Scheme	Marks
8 (i)	Substitutes a value e.g. $n=6$ into n^2+3n+1 where n^2+3n+1 is **not prime**	M1
	Correct calculation for that value e.g $n^2+3n+1=55$ And conclusion "which is not prime"	A1
		(2)
(ii)	Attempts to find n^2-2 for either odds or evens E.g Attempts $(2p+1)^2-2$ or $(2p)^2-2$	M1
	Achieves either $(2p+1)^2-2=4p^2+4p-1$ or $(2p)^2-2=4p^2-2$ and shows or gives a reason why the expression is not a multiple of 4 where required (see notes)	A1
	Attempts to find n^2-2 for both odds and evens (See above)	dM1
	Achieves both $(2p+1)^2-2=4p^2+4p-1$ and $(2p)^2-2=4p^2-2$ and shows or gives reasons why these are not multiples of 4 where required (see notes) With a conclusion that they are not multiples of 4. *	A1*
		(4)
		(6 marks)

Question Number	Scheme	Marks
6(a)	$\dfrac{3\sin\theta\cos\theta}{2\sin\theta-1}=5\tan\theta \Rightarrow \dfrac{3\sin\theta\cos\theta}{2\sin\theta-1}=5\dfrac{\sin\theta}{\underline{\cos\theta}}$	<u>M1</u>
	$\dfrac{3\sin\theta\cos\theta}{2\sin\theta-1}=5\dfrac{\sin\theta}{\cos\theta} \Rightarrow 3\sin\theta\cos^2\theta=5\sin\theta(2\sin\theta-1)$	M1
	$3\sin\theta\cos^2\theta=10\sin^2\theta-5\sin\theta \Rightarrow 3\sin\theta(1-\sin^2\theta)=10\sin^2\theta-5\sin\theta$ *	M1
	$\Rightarrow 3\sin^3\theta+10\sin^2\theta-8\sin\theta=0$	A1*
		(4)
(b)	$3\sin^3 2x+10\sin^2 2x-8\sin 2x=0 \Rightarrow \sin 2x(3\sin^2 2x+10\sin 2x-8)=0$ $(3\sin 2x-2)(\sin 2x+4)=0 \Rightarrow \sin 2x=...$	M1
	$\sin 2x=\dfrac{2}{3}$	A1
	$(x=)0.365$	A1
	$x=0$	B1
		(4)
		(8 marks)