Question Number	Scheme	Marks
6 (a)	Centre of circle is midpoint of $(-2,18)$ and $(14,6)$ = $(6,12)$	B1
	Attempts radius^2 or diameter^2. E.g. $D^2=(14--2)^2+(6-18)^2=400$	M1
	Radius^2 = 100	A1
	$(x-6)^2+(y-12)^2=100$	M1, A1
		(5)
(b)	Recognises equation of C_2 is $x^2+y^2=k^2$	B1
	Attempts to find one value of k or k^2 Look for $\sqrt{"6"^2+"12"^2}\pm\sqrt{"100"}$	M1
	$x^2+y^2=\left(6\sqrt{5}+10\right)^2$ or $x^2+y^2=\left(6\sqrt{5}-10\right)^2$ o.e.	A1
	$x^2+y^2=\left(6\sqrt{5}+10\right)^2$ and $x^2+y^2=\left(6\sqrt{5}-10\right)^2$ o.e.	A1
		(4)
		(9 marks)

Question Number	Scheme	Marks
6(a)	Attempts line with gradient -2 and point $(4,-1)$	
	$y+1=-2(x-4)$	M1
	$y=-2x+7$	A1
		(2)
(b)	$y=\frac{1}{2}x$ meets $y=-2x+7$ when $\frac{1}{2}x=-2x+7\Rightarrow x=\frac{14}{5}, y=\frac{7}{5}$ oe	M1 A1
	Attempts $r^2=\left(4-"\frac{14}{5}"\right)^2+\left(-1-"\frac{7}{5}"\right)^2=\frac{36}{5}$ oe	dM1 A1
	$(x-4)^2+(y+1)^2=\frac{36}{5}$ oe	A1
		(5)
		(7 marks)

Question Number	Scheme	Marks
2.(a)	Attempts $(x\pm2)^2+(y\pm5)^2\ldots..=0$	M1
	(i) Centre $(-2,5)$	A1
	(ii) Radius $\sqrt{50}$ or $5\sqrt{2}$	B1
		(3)
(b)	Gradient of radius = $\frac{(5)-4}{(-2)-5}=-\frac{1}{7}$ which needs to be in simplest form	B1ft
	Uses $m_2=-\frac{1}{m_1}$ to find gradient of tangent	M1
	Equation of tangent $y-4="7"(x-5)\Rightarrow y=7x-31$	M1 A1
		(4)
		(7 marks)

Question Number	Scheme	Marks
2(a)	Midpoint of $(-2,5)$ and $(4,15)$ is $\left(\frac{-2+4}{2},\frac{5+15}{2}\right)=(1,10)$	B1
	Attempts radius ^{2} or diameter ^{2}: e.g. $D^2=(4--2)^2+(15-5)^2=136$	M1
	Radius^2 = 34	A1
	$(x-1)^2+(y-10)^2=34$	M1, A1
		(5)
(b)	$\left(1,10-\sqrt{34}\right)$	B1 , dB1
		(2)
		(7 marks)

Question Number	Scheme	Marks
6(a)	$(x\pm3)^2+(y\pm7)^2\pm\ldots=\ldots$	M1
	Centre = $(3,7)$	A1
		(2)
(b)	Attempts $(\pm3)^2+(\pm7)^2\pm32$	M1
	Radius = $3\sqrt{10}$	A1
		(2)
(c)	Uses radius $<3\Rightarrow 9+49-k<9$ $k>49$ or uses radius $>0\Rightarrow 9+49-k>0$ $k<58$	M1 A1
	Uses radius $<3\Rightarrow 9+49-k<9$ and uses radius >0 $\Rightarrow 9+49-k>0$	dM1
	$49<k<58$ oe (see notes)	A1
		(4)
		(8 marks)

Question Number	Scheme	Marks
3a(i)	$r=\sqrt{(8-2)^2+(-3-5)^2}=10$	M1A1
(ii)	$(x-2)^2+(y-5)^2=100$	A1ft
		(3)
b	Gradient between centre and $P=-\frac{4}{3}$	B1
	Perpendicular gradient $=\frac{3}{4}$	M1
	$y+3=\frac{3}{4}(x-8)$	M1
	$3x-4y-36=0$	A1
		(4)
		(7 marks)

Question Number	Scheme	Marks
7 (i)	States or uses $\tan x=\frac{\sin x}{\cos x}$	M1
	$3\sin x\tan x=11+\cos x\Rightarrow 3\sin^2 x=11\cos x+\cos^2 x$	
	$\Rightarrow 3\left(1-\cos^2 x\right)=11\cos x+\cos^2 x\Rightarrow 4\cos^2 x+11\cos x-3=0$	dM1, A1
	$\Rightarrow\left(4\cos x-1\right)\left(\cos x+3\right)=0\Rightarrow\cos x=\frac{1}{4}\Rightarrow x=1.318, 4.965$	dM1 A1
		(5)
(ii)	$\cos\theta=\frac{1}{3}\Rightarrow\sin^2\theta=1-\frac{1}{3^2}\Rightarrow\tan\theta=\frac{\sin\theta}{\cos\theta}=\frac{\sqrt{1-\frac{1}{3^2}}}{\frac{1}{3}}$	M1
	$\Rightarrow\tan\theta=2\sqrt{2}$	A1
		(2)
		Total 7