Question	Scheme	Marks
4(a)	$x^2+kx-9=-3x^2-5x+k \Rightarrow 4x^2+kx+5x-9-k(=0)$	M1
	$b^2-4ac=0 \Rightarrow (k+5)^2-4\times4(-9-k)=0$	M1
	$k^2+26k+169=0$*	A1*
		(3)
(b)	$k^2+26k+169=0 \Rightarrow k=-13$	B1
	$k=-13 \Rightarrow 4x^2-8x+4=0 \Rightarrow x=...$	M1
	$(1,-21)$	A1
		(3)
		Total 6

Question Number	Scheme	Marks
3a	$\frac{8-\sqrt{15}}{2\sqrt{3}+\sqrt{5}}\times\frac{2\sqrt{3}-\sqrt{5}}{2\sqrt{3}-\sqrt{5}}=\frac{16\sqrt{3}-8\sqrt{5}-2\sqrt{45}+\sqrt{75}}{12-5}$	M1
	e.g. $\frac{21\sqrt{3}-14\sqrt{5}}{7}$	dM1
	$3\sqrt{3}-2\sqrt{5}$	A1
		(3)
b	$\left(x+5\sqrt{3}\right)\sqrt{5}=40-2x\sqrt{3} \Rightarrow x\sqrt{5}+2x\sqrt{3}=40-5\sqrt{15}$	M1
	$(x=)\ \frac{40-5\sqrt{15}}{2\sqrt{3}+\sqrt{5}}$	A1
	$(x=)\ 15\sqrt{3}-10\sqrt{5}$	A1ft
		(3)
		(6 marks)

Question	Scheme	Marks
10(a)(i)	Equation is $y=\frac{1}{2}(x+2)$	B1
		(1)
(ii)	l_1 intersect parabola $\Rightarrow -\frac{1}{4}(x+2)(x-b)=\frac{1}{2}(x+2)\Rightarrow x=...$	M1
	$x=b-2$	A1
	$y=\frac{1}{2}b$	A1
		(3)
(b)	l_2 passes through $(b, 0)$ and has gradient -2 $\Rightarrow y=...$	M1
	$y-0=-2(x-b)$	A1
		(2)
(c)	So equation is $y-"\frac{1}{2}b"="-2"(x-"b-2")$	M1
	$y-\frac{1}{2}b=-2x+2b-4\Rightarrow y=-2x+\frac{5}{2}b-4$ *	A1*
		(2)
(d)	$y=-2x+2b=-2x+\frac{5}{2}b-4\Rightarrow 2b=\frac{5}{2}b-4\Rightarrow b=...$ or $y=-2x+\frac{5}{2}b-4,\ x=b,\ y=0\Rightarrow 0=-2b+\frac{5}{2}b-4\Rightarrow b=...$ or $-\frac{1}{4}(x+2)(x-b)=-2(x-b)\Rightarrow x=...(6)\Rightarrow b-2=6\Rightarrow b=...$	M1
	$b=8$	A1
		(2)
		(10 marks)

Question Number	Scheme	Marks
11a	$2(x\pm...)^2$	B1
	$...(x\pm 3)^2...$	M1
	$2(x-3)^2-4$	A1
		(3)
b	$(3, -4)$	B1ft
		(1)
c	$m=\frac{28--4}{-1-3}$ $(=-8)$	M1
	$y-28=-8(x+1)$	dM1
	$y=-8x+20$	A1
		(3)
d	$y\leqslant "-8x+20"$ and $y\geqslant 2x^2-12x+14$ (or $y\geqslant "2(x-3)^2-4"$)	B1ftB1ft
	$y\leqslant -8x+20$ $y\geqslant 2x^2-12x+14$ $y\geqslant 0,\ x\geqslant 0$	B1cso
		(3)
		(10 marks)

Question Number	Scheme	Marks
5(a)	$9^x = p^2,\quad 3^{x+2} = 9p \quad \text{or} \quad 3^{x-1} = \frac{p}{3}$	B1
	$3\times 9^x + 3^{x+2} = 1 + 3^{x-1} \Rightarrow 3p^2 + 3^2 \times p = 1 + \frac{p}{3^1}$	M1
	$9p^2 + 26p - 3 = 0$ via $3p^2 + 9p = 1 + \frac{p}{3}$ *	A1*
		(3)
(b)	$9p^2 + 26p - 3 = 0 \Rightarrow (9p-1)(p+3) = 0$	M1
	$3^x = \frac{1}{9}$	A1 M1 in EPEN
	$x = -2$	A1
		(3)
		(6 marks)

Question Number	Scheme	Marks
5a	e.g. $(\cos\theta =)\ \frac{5^2 + (1+x)^2 - x^2}{2\times 5(1+x)}\ \left(= \frac{25+1+2x+x^2-x^2}{2\times 5(1+x)}\right)$ or e.g. $x^2 = 5^2 + (1+x)^2 - 2\times 5(1+x)\cos\theta$ $\cos\theta = \frac{13+x}{5+5x}$ *	M1 A1*
		(2)
b	$\theta = \text{awrt } 42°\quad (42.470747\ldots.)$ --- Attempts to find AB, AD or AC: e.g. $\frac{AB}{\sin"42"} = \frac{5}{\sin 30} \Rightarrow AB = \ldots$ or e.g. $\angle ABC = 180 - 30 - "42.5" = "107.6"$ $\frac{\sin DBC}{1+2\sqrt{3}} = \frac{\sin"42.5"}{2\sqrt{3}} \Rightarrow \angle DBC = "60.5",\ \angle ABD = "107.6" - "60.5" = "47.1"$ $\frac{AD}{\sin("47.1")} = \frac{2\sqrt{3}}{\sin 30} \Rightarrow AD = \ldots$ or e.g. $\frac{AC}{\sin"108"} = \frac{5}{\sin 30} \Rightarrow AC = \ldots$ --- $AB = 6.75\ldots$ or $AD = 5.07\ldots$ or $AC = 9.53\ldots$ Area $= \frac{1}{2}\times 5\times "6.75"\times \sin(180 - 30 - "42.5")$ or $= \frac{1}{2}\times 5\times "9.54"\times \sin("42.5")$ $= \text{awrt } 16.1\ (\text{m}^2)$	B1 M1 A1 dM1 A1
		(5)
		(7 marks)

Question	Scheme	Marks
3(a)	$\frac{1}{2}\times 3^2\times\alpha = 7.2 \Rightarrow \alpha = \ldots$ or $\frac{1}{2}\times 3^2\times 1.6 = 7.2 \Rightarrow \alpha = 1.6$ $\alpha = 1.6$*	M1 A1*
		(2)
(b)(i)	Angle $COA = \frac{1}{2}(2\pi - 1.6)(= 2.34\ldots)$ $(\approx 134°)$	M1
	Area $COA = \frac{1}{2}\times 5\times 3\sin("2.34")$ $(= 5.38\ldots)$	M1
	Total Area $= 2\times\frac{1}{2}\times 5\times 3\sin("2.34") + 7.2$	dM1
	$= 18$ (cm^2) Awrt 18 (cm^2) (Ans = 17.96)	A1
(ii)	Arc $AB = 3\times 1.6 (= 4.8)$	B1
	$(AC^2 =)\ 5^2 + 3^2 - 2\times 5\times 3\cos("2.34")$	M1
	Total perimeter $= 2\times\sqrt{5^2 + 3^2 - 2\times 5\times 3\cos("2.34")} + 3\times 1.6$	dM1
	$=$ Awrt 19.6 (cm)	A1
		(8)
Alt (b)(i)	$AB = 2\times 3\sin 0.8$	M1
	$ON = 3\cos 0.8$	M1
	Total Area $= \frac{1}{2}(5 + ON)\times AB + 7.2 - \frac{1}{2}\times 3\cos 0.8\times 2\times 3\sin 0.8$	dM1
	$= 18$ (cm^2) Awrt 18 (cm^2) (Ans = 17.96)	A1
		(10 marks)