Question Number	Scheme	Marks
7.(a)	Attempts $\frac{\sin\angle ACB}{6.5}=\frac{\sin 35}{4.7}$	M1
	$\angle ACB=$ awrt(52 or 53)° or awrt(127or128)°	A1
	$\angle ACB=127.5°$	A1
(b)	Eg $\frac{(AC)}{\sin"17.5°"}=\frac{6.5}{\sin"127.5°"}$ or $=\frac{4.7}{\sin 35°}$	M1
	$\left[\frac{(CD)}{\sin"75°"}=\frac{4.7}{\sin"127.5°"}\Rightarrow(CD)=...\Rightarrow(AC)+(CD)\right]$=awrt 8.2	A1
	Total length of wood $=8.1+6.5+4.7+4.7=$ awrt24.1	A1
		(3) **(6 marks)**
Alt1(a)	$\cos 35=\frac{AC^2+6.5^2-4.7^2}{2\times 6.5\times AC}\Rightarrow AC^2-13\cos(35)AC+20.16=0\Rightarrow AC=...$	
	$\cos\angle ACB=\frac{"AC"^2+4.7^2-6.5^2}{2\times"AC"\times 4.7}$ oe	M1

Question Number	Scheme	Marks
4.(a)	Sets $kx+2=\frac{2}{x}+3x-4$ and attempts to collect terms or multiply through by x	M1
	$(k-3)x+6-\frac{2}{x}=0\Rightarrow(k-3)x^2+6x-2=0$ *	A1*
		(2)
(b)	Attempts b^2-4ac for $(k-3)x^2+6x-2=0$	M1
	Solves $b^2-4ac=0$ for $(k-3)x^2+6x-2=0\Rightarrow 36+8(k-3)=0\Rightarrow k=...$	dM1
	$k=-\frac{3}{2}$	A1
		(3) **(5 marks)**

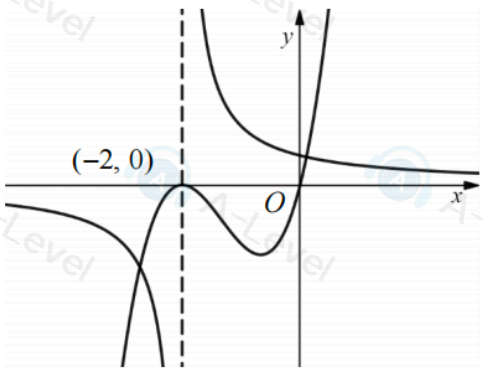
Question Number	Scheme	Marks
5a	e.g. $(\cos\theta =)\ \dfrac{5^2+(1+x)^2-x^2}{2\times5(1+x)}\ \left(=\dfrac{25+1+2x+x^2-x^2}{2\times5(1+x)}\right)$ or e.g. $x^2=5^2+(1+x)^2-2\times5(1+x)\cos\theta$ $\cos\theta=\dfrac{13+x}{5+5x}$ *	M1 A1*
		(2)
b	$\theta=$ awrt $42°$ $(42.470747\ldots.)$	B1
	Attempts to find AB, AD or AC: e.g. $\dfrac{AB}{\sin"42"}=\dfrac{5}{\sin30}\Rightarrow AB=\ldots$ or e.g. $\angle ABC=180-30-"42.5"="107.6"$ $\dfrac{\sin DBC}{1+2\sqrt{3}}=\dfrac{\sin"42.5"}{2\sqrt{3}}\Rightarrow\angle DBC="60.5",\ \angle ABD="107.6"-"60.5"="47.1"$ $\dfrac{AD}{\sin("47.1")}=\dfrac{2\sqrt{3}}{\sin30}\Rightarrow AD=\ldots$ or e.g. $\dfrac{AC}{\sin"108"}=\dfrac{5}{\sin30}\Rightarrow AC=\ldots$	M1
	$AB=6.75\ldots$ or $AD=5.07\ldots$ or $AC=9.53\ldots$	A1
	Area $=\dfrac{1}{2}\times5\times"6.75"\times\sin(180-30-"42.5")$ or $=\dfrac{1}{2}\times5\times"9.54"\times\sin("42.5")$	dM1
	$=$ awrt 16.1 (m^2)	A1
		(5)
		(7 marks)

Question Number	Scheme	Marks
8 (a)	States $y=4$	B1 (1)
(b)	States $(16,9)$ only	B1 (1)
(c)	$k\leqslant4, k=9$	B1, B1 (2)
(d) (i)	$a=6$	B1
(ii)	$y=\mathrm{f}(x-3)$	B1 (2)
		(6 marks)

Question Number	Scheme	Marks
1(a)(i)	$(2, 12)$	B1
(ii)	$(2, 15)$	B1
		(2)
(b)	k ,, 3, $k = 5$	M1 A1
		(2)
(c)	$(x =) -5$	B1
		(1)
		(5 marks)

Question Number	Scheme	Marks
6 (a)	Angle $AFB = \dfrac{\pi - 2.275}{2} = 0.433$ *	B1*
		(1)
(b)	Attempts $r\theta = 6.2 \times 2.275 = (14.105)$	M1
	Attempts $\left(x^2\right) = 6.4^2 + 6.2^2 - 2 \times 6.4 \times 6.2 \cos(0.433) = (7.36)$ or $(x = 2.71)$	M1
	Correct attempt = $2x + r\theta + 12.8 = 2 \times 2.714 + 14.105 + 12.8 = 32.3\,(\text{m})$	dM1, A1
		(4)
(c)	Attempts $\dfrac{1}{2} r^2 \theta = \dfrac{1}{2} \times 6.2^2 \times 2.275 = (43.7255)$	M1
	Attempts $\dfrac{1}{2} ab \sin C = \dfrac{1}{2} \times 6.2 \times 6.4 \times \sin 0.433 = (8.325)$	M1
	Correct attempt = $2 \times 8.325 + 43.7255 = 60.4\,(\text{m}^2)$	dM1, A1
		(4)
		(9 marks)

Question Number	Scheme	Marks
7(a)	$4\times-2\times-9=72$ $p="72"-50$	M1
	$(p=)\ 22$	A1
		(2)
(b)	$(q=)-4,\ 2,\ 4.5$	B1B1
		(2)
(c)	$f(x)=(x+4)(x-2)(2x-9)$ $f(x)=(x^2+2x-8)(2x-9)=...x^3\pm...x^2\pm...x\ (\pm...)$	M1
	$=2x^3-5x^2-34x\quad(+72)$	A1
	$(f'(x)=)\ 6x^2-10x-34$	M1A1
		(4)
(d)	$"6x^2-10x-34"=-18$ $"6x^2-10x-16"=0\Rightarrow x=...\left(-1,\ \frac{8}{3}\right)$	M1
	$-1<x<\frac{8}{3}$	dM1A1
		(3)
		Total 11

Question Number	Scheme	Marks
4a	$x=-2$	B1
		(1)
b	$x^3+4x^2+4x=x(x+2)^2$	M1A1
		(2)
c		B1B1B1
		(3)
d	2 as the graphs intersect (each other) twice (since $(x+2)(x^3+4x^2+4x)=1$ is the same as $x^3+4x^2+4x=\frac{1}{x+2}$)	B1
		(1)
		(7 marks)

Question Number	Scheme	Marks
8a	$x\left(x^3-\frac{7}{2}x-5\right)=\frac{15}{2}-5x$ $\Rightarrow 2x^4-7x^2-15=0$ *	M1 A1*
		(2)
b	$(2x^2+3)(x^2-5)=0\Rightarrow(x^2=)\ldots$ $(x=)\ \ (\pm)\sqrt{5}$	M1 B1
	$y=\frac{15}{2\times"\pm\sqrt{5}"}-5=\ldots$ or $y=\left("\pm\sqrt{5}"\right)^3-\frac{7}{2}\left("\pm\sqrt{5}"\right)-5$	M1
	$\left(-\sqrt{5},-\frac{3}{2}\sqrt{5}-5\right)\ \ \left(\sqrt{5},\frac{3}{2}\sqrt{5}-5\right)$ $PQ=\sqrt{("2\sqrt{5}")^2+("3\sqrt{5}")^2}=\ldots$	dM1
	$PQ=\sqrt{65}$	A1cao
		(5)
		(7 marks)

Question Number	Scheme	Marks
6a	$4(p-2x)=\frac{12+15p}{x+p}$ $8x^2+4px+12+15p-4p^2\ \ (=0)$	M1
	e.g. $a=8,\ b=4p,\ c=12+15p-4p^2$ $(4p)^2-4\times8\times(12+15p-4p^2)\ \ (>0)$	dM1
	$3p^2-10p-8>0$ *	A1*
		(3)
b	e.g. $(p-4)(3p+2)\ (=0)\Rightarrow 4,-\frac{2}{3}$	M1
	$p<-\frac{2}{3}$ or $p>4$	M1A1
		(3)
		(6 marks)

Question Number	Scheme	Marks
4.(a)(i)	$(90,-1)$	B1 B1
(ii)	225	B1
		(3)
(b)	One of $-1<p<0$, $p=1$	M1
	Both $-1<p<0$, $p=1$	A1
		(2)
		(5 marks)

Question	Scheme	Marks
5(a)	$\frac{1}{2}\times 6^2\times 1.3=...$	M1
	$=23.4\,(\text{m}^2)$	A1
		(2)
(b)	$12.2^2=6^2+10.8^2-2\times 6\times 10.8\cos(ABE)$	M1
	$\cos(ABE)=\frac{6^2+10.8^2-12.2^2}{2\times 6\times 10.8}\left(=\frac{19}{648}\right)$ $ABE=1.54$	A1
		(2)
(c)	Area $ABE=\frac{1}{2}\times 10.8\times 6\sin(ABE)$	M1
	Area $BCD=\frac{1}{2}\times 6\cos(\pi-1.3-"1.54")\times 6\sin(\pi-1.3-"1.54")$ or e.g. Area $BCD=\frac{1}{2}\times 6\sin(\pi-1.3-"1.54")\times\sqrt{6^2-(6\sin(\pi-1.3-"1.54"))^2}$	M1
	Total area $=60.9\text{m}^2$	A1
		(3)
		Total 7

Question Number	Scheme	Marks
4(a)	$x+y=6,\ y=6x-2x^2+1$ $\Rightarrow 6-x=6x-2x^2+1$ $\Rightarrow 2x^2-7x+5=0$ oe	M1
	$2x^2-7x+5=0\Rightarrow(2x-5)(x-1)=0$ $\Rightarrow x=\frac{5}{2},\ 1$	M1
	$x="\frac{5}{2}"\Rightarrow y=\frac{7}{2}$ or $x="1"\Rightarrow y=5$	dM1
	$(1,\ 5)$ and $(2.5,\ 3.5)$	A1
		(4)
(b)	$y\geqslant 6x-2x^2+1$ oe	M1
	$x+y\leqslant 6$ oe	
	$x\geqslant a$ where $1\leqslant a\leqslant 2.5$	A1
	$(\text{or } a\leqslant x\leqslant b \text{ where } 1\leqslant a\leqslant 2.5,\ b\geqslant 6)$	
	$y\geqslant 0$ (or $0\leqslant y\leqslant c$ where $c\geqslant 3.5$)	A1
	Allow strict or non-strict inequalities	
		(3)
		Total 7