Question Number	Scheme	Marks
3(a)	$1.05 = 3p + q$ $1.65 = 5p + q$ e.g. $\Rightarrow 2p = 0.6$ or $\Rightarrow 1.05 = 3p + (1.65 - 5p)$ or $\Rightarrow 1.65 = 5p + (1.05 - 3p)$ $p = 0.3 \quad q = 0.15$	M1 A1A1
		(3)
(b)	$2.5 = "0.3"T + "0.15" \Rightarrow T =$ $T = 7.8$	M1 A1
		(2)
		(5 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 Number	Scheme	Marks
6(a)	$A = \frac{1}{2}r^2\theta \Rightarrow 40 = \frac{1}{2}r^2 \times 2.4 \Rightarrow r = ...$	M1
	$r = \sqrt{\frac{80}{2.4}} \Rightarrow r = 5.77\,(\text{m})$	A1
		(2)
(b)	States or uses that angle AOB = awrt 0.37	B1
		(1)
(c)	$\frac{1}{2} \times "5.77" \times 6.25 \times \sin "0.37" \quad (= 6.5377...)$	M1
	Full method for area of stage = $40 + 2 \times \frac{1}{2} \times 5.77 \times 6.25 \times \sin 0.37$	dM1
	$= 53.1\ \text{m}^2$	A1
		(3)
(d)	$r\theta = "5.77" \times 2.4 = (13.848)$	M1
	$x^2 = 6.25^2 + "5.77"^2 - 2 \times 6.25 \times "5.77" \cos "0.37" \qquad (x = 2.26)$	M1
	Full method for perimeter of stage = $12.5 + 2 \times "2.26" + "5.77" \times 2.4$	ddM1
	$= 30.9\ \text{m}$	A1
		(4)
		(10 marks)

Question Number	Scheme	Marks
10ai	$(n=)\ 3$	B1
ii	1080	B1
		(2)
b	(1620, −3)	B1B1
		(2)
c	e.g. $k=\frac{1}{2}\left(\frac{12}{5}-\frac{3}{5}\right)=\frac{9}{10}$	M1A1
		(2)
		(6 marks)

Question Number	Scheme	Marks
10	$y=\frac{2}{3}x^3-25x-\frac{56}{x}+\frac{194}{3}$	
(a)	$\frac{dy}{dx}=2x^2-25+\frac{56}{x^2}$	M1, A1
	Finds $\left.\frac{dy}{dx}\right\|_{x=2}=2\times4-25+\frac{56}{4}=-3$	dM1
	Equation of tangent $y+8="-3"(x-2)\Rightarrow y=-3x-2$ *	ddM1, A1*
		(5)
(b)	Sets $2x^2-25+\frac{56}{x^2}=-3$	M1
	$x^4-11x^2+28=0$	dM1, A1
	$(x^2-4)(x^2-7)=0\Rightarrow x^2=..$	ddM1
	$x=\sqrt{7}$ only	A1
		(5)
		(10 marks)

Question	Scheme	Marks
2(a)	$2x+2y=350$	**B1**
		(1)
(b)	E.g. $xy=7350,\ \ x\times y=7350$	**B1**
		(1)
(c)	$x(175-x)=7350$ or $(175-y)y=7350$	**M1**
	E.g. $x^2-175x+7350=0\Rightarrow(x-70)(x-105)=0\Rightarrow x=...$	**dM1**
	$x=70$ or 105	**A1**
	$(x>y\Rightarrow)x=105, y=70$	**A1**
		(4)
		(6 marks)

Question Number	Scheme	Marks
10 (a)	$P=\left(-\frac{1}{2},0\right)$	B1 **(1)**
(b)	$f(x)=(x-4)(2x+1)^2 \Rightarrow f(x)=ax^3+bx^2+cx+d$ $=4x^3-12x^2-15x-4$ oe $f'(x)=12x^2-24x-15$	M1 A1 dM1 A1 **(4)**
(c)	Attempts $f'(2.5)=12\times2.5^2-24\times2.5-15=0$ Finds y coordinate for $x=2.5$ $y=-54$	M1A1 A1 **(3)**
(d)	$a=-\frac{1}{2},(+)\,4$	B1, B1 **(2)** **(10 marks)**

Question Number	Scheme	Marks
3.(a)	Attempts to make y the subject	M1
	States $-\frac{3}{5}$ or exact equivalent	A1 (2)
(b)	Uses perpendicular gradients rule $\Rightarrow$ gradient $l_2=\frac{5}{3}$	M1
	Forms equation of l_2 using (6,-2) $y+2="\frac{5}{3}"(x-6)$	M1
	$y=\frac{5}{3}x-12$	A1 (3) **(5 marks)**
Alt1(a)	Eg Coordinates of two points on the line $(0,1.4)$ and $(1,0.8)$	
	Gradient $=\frac{0.8-1.4}{1-0}$	M1
	Gradient $=-0.6$	A1

Question Number	Scheme	Marks
9(a)	$\left(CQ^2 =\right)0.5^2+1.84^2-2\times0.5\times1.84\cos0.8$	M1
	(Radius =) $CQ=1.534\,\text{m}$	A1
		(2)
(b)	$\dfrac{\sin PCQ}{0.5}=\dfrac{\sin 0.8}{"1.534"}$ or $0.5^2="1.534"^2+1.84^2-2\times"1.534"\times1.84\cos PCQ$	M1
	$\Rightarrow \sin PCQ=\dfrac{0.5\sin0.8}{"1.534"}(=0.233....)\Rightarrow PCQ=0.236*$ or $\cos PCQ=\dfrac{"1.534"^2+1.84^2-0.5^2}{2\times"1.534"\times1.84}(=0.972...)\Rightarrow PCQ=0.236*$	A1*
		(2)
(c)	$\frac{1}{2}r^2\theta=\frac{1}{2}\times"1.534"^2\times(2\pi-0.236)$ oe e.g. $\pi"1.534"^2-\frac{1}{2}\times"1.534"^2\times0.236$ $(=7.114\ldots)$ OR $\frac{1}{2}ab\sin C=\frac{1}{2}\times0.5\times1.84\sin(0.8)$ or $\frac{1}{2}\times"1.534"\times1.84\sin(0.236)(=0.3299...)$	M1
	Attempts $\frac{1}{2}r^2\theta=\frac{1}{2}\times"1.534"^2\times(2\pi-0.236)$ **AND** $\frac{1}{2}ab\sin C=\frac{1}{2}\times0.5\times1.84\sin(0.8)$ **AND** adds	dM1
	(awrt) 7.4 (m^2)	A1
		(3)
(d)	Attempts $r\theta="1.534"\times(2\pi-0.236)(=9.276...)$	M1
	Perimeter = $"1.534"\times(2\pi-0.236)+0.5+(1.84-1.534)=10.1$ (m)	A1
		(2)
		(9 marks)

Question Number	Scheme	Marks
4. (a)	$(270°, 0)$	B1
		(1)
(b)	$(-180°, -4)$	B1, B1
		(2)
(c)(i)	100	B1
(ii)	4	B1
(iii)	7	B1
		(3)
		(6 marks)

Question Number	Scheme	Marks
1. (a)	$p^{\frac{1}{2}} = \left(\frac{1}{16}x^4\right)^{\frac{1}{2}} = \frac{1}{4}x^2$	B1 **(1)**
(b)	$(pq)^{-1} = \left(\frac{1}{16}x^4 \times \frac{40}{x^3}\right)^{-1} = \left(\frac{5}{2}x\right)^{-1} = \frac{2}{5}x^{-1}$	M1, A1 **(2)**
(c)	$pq^2 = \frac{1}{16}x^4 \times \left(\frac{40}{x^3}\right)^2 = \frac{1600}{16} \times \frac{x^4}{x^6} = 100x^{-2}$	M1, A1 **(2)** **(5 marks)**

Question Number	Scheme	Marks
3(a)	$(f(x) =) -3\cos x$ or $(f(x) =) 3\sin(x - 90°)$	M1 A1 **(2)**
(b)(i)	8	B1
(ii)	5	B1 **(2)** **(4 marks)**

Question Number	Scheme	Marks
8.	Equates $y = k(2x-1)$ and $y = x^2 + 2x + 11 \Rightarrow k(2x-1) = x^2 + 2x + 11$ $\Rightarrow x^2 + (2-2k)x + 11 + k \quad (=0)$ Attempts "$b^2 - 4ac$"$...0 \Rightarrow (2-2k)^2 - 4(11+k)...0$ and proceeds to critical values Critical values of $(k =)\ 5, -2$ No roots so $b^2 - 4ac < 0$ so choose inside region $-2 < k < 5$	M1 A1 M1 A1 M1 A1 **(6)** **(6 marks)**