Question number		Scheme		Marks	
1.	(a)	$f(1) = 0$, $2 - 1 + p + 6 = 0$ so $p = -7$		M1 A1	(2)
	(b)	$f(-\frac{1}{2}) = -\frac{1}{4} - \frac{1}{4} + \frac{7}{2} + 6 = 9$		M1 A1	(2)
					(4 marks)
2.	(a)	$\int (3 + 4x^3 - \frac{2}{x^2})\,dx = 3x + x^4 + \frac{2}{x} + c$		M1 A2(1, 0)	
					(3)
	(b)	$\int_1^2 (3 + 4x^3 - \frac{2}{x^2})\,dx = \left[3x + x^4 + \frac{2}{x}\right]_1^2$			
		$= (6 + 16 + 1) - (3 + 1 + 2)$		M1	
		$= 17$		A1	(2)
					(5 marks)
3.	(a)	Arc $BD = r\theta = 0.4 \times 6 = 2.4$		B1	(1)
	(b)	Cosine Rule: $AB^2 = 6^2 + 12^2 - 2 \times 6 \times 12 \times \cos(0.4^c) = 47.36\ldots$		M1 A1	
		$\therefore AB = 6.88\ldots\ldots$		A1	(3)
	(c)	Perimeter = 6 + 6.88 + 2.4 = 15.3 (cm) (3 sig. figs)		B1ft	(1)
					(5 marks)
4.		$\log_3 x^2 - \log_3 (x - 2) = 2$	Use of $\log x^n$ rule	M1	
		$\log_3\left(\frac{x^2}{x-2}\right) = 2$	Use of $\log a - \log b$ rule	M1	
		$\frac{x^2}{x-2} = 3^2$	Getting out of logs	M1	
		$x^2 - 9x + 18 = 0$	Correct 3TQ = 0	A1	
		$(x - 6)(x - 3) = 0$	Attempt to solve 3TQ	M1	
		$x = 3, 6$	Both	A1	
					(6 marks)

Question number	Scheme	Marks
5. (a)	$ar = 9$ $ar^4 = 1.125$	M1
	Dividing gives $r^3 = \frac{1.125}{9} = \frac{1}{8}$	M1
	So $r = \frac{1}{2}$	A1 (3)
(b)	Using $ar = 9$, $a = \frac{9}{\frac{1}{2}} = 18$	M1, A1 (2)
(c)	$S_\infty = \frac{a}{1-r} = \frac{18}{1-\frac{1}{2}} = 36$	M1 A1 (2)
		(7 marks)
6. (a)	$(x-3)^2 + (y+2)^2$ $(= 9 + 4 + 12)$ Attempt to complete the square	M1
	$\therefore$ Centre is at $(3, -2)$	A1 (2)
(b)	$(\ldots)^2 + (\ldots)^2 = 12 + 4 + 9 = 25 = 5^2$ ft their centre	M1
	$\therefore$ Radius = 5	A1 (2)
(c)	$PQ = 10$ means PQ is a diameter and so angle PRQ is 90^o	M1
	Pythagoras' Theorem gives $QR^2 = 10^2 - 3^2 = 91$	M1
	So $QR = 9.54\ldots = 9.5$ (1 d.p.)	A1 (3)
		(7 marks)
7. (a)	$\frac{n(n-1)}{2!}k^2 = \frac{n(n-1)(n-2)}{3!}k^3$ One coefficient (no $\binom{n}{r}$)	M1
	A correct equation, no cancelling	A1
	e.g. $3k^2 = (n-2)k^3$ Cancel at least $n(n-1)$	M1
	$3 = (n-2)k$ **(*)**	A1 cso (4)
(b)	$A = nk = 4$	B1
	$3 = 4 - 2k$	M1
	So $k = \frac{1}{2}$, and $n = 8$	A1, A1 (4)
		(8 marks)

Question number		Scheme		Marks	
8.	(a)	$x - 20° = 115.9°\ldots$	Any solution (awrt 116° or 244°)	B1	
		Or 244.08°...	360° – candidate's first answer	M1	
			+ 20° at correct stage	M1	
		$x = 136°, 264°$		A1	(4)
	(b)	$3\dfrac{\sin\theta}{\cos\theta} = 2\cos\theta$	Use of $\tan\theta = \dfrac{\sin\theta}{\cos\theta}$	M1	
		$3\sin\theta = 2\cos^2\theta = 2(1-\sin^2\theta)$	Use of $\cos^2\theta = 1 - \sin^2\theta$	M1	
		$2\sin^2\theta + 3\sin\theta - 2 = 0$	3 term quadratic in sin = 0	A1	
		$(2\sin\theta - 1)(\sin\theta + 2) = 0$	Attempt to solve	M1	
		$\sin\theta = -2$ (No solution) $\sin\theta = \frac{1}{2}$	At least $\frac{1}{2}$	A1	
		So $\theta = 30°, 150°$	Both	A1	(6)
					(10 marks)
9.	(a)	Surface Area = $2\pi rh + \pi r^2$		B1	
		$h = \dfrac{250 - \pi r^2}{2\pi r}$	Attempt $h =$	M1	
		$V = \pi r^2 h = \pi r^2 \times \dfrac{(250 - \pi r^2)}{2\pi r}$	$V =$ and sub for h	M1	
		$V = 125r - \dfrac{\pi r^3}{2}$ **(*)**		A1 c.s.o.	(4)
	(b)	$\dfrac{dV}{dr} = 125 - \dfrac{3\pi}{2}r^2$		M1	
		$\dfrac{dV}{dr} = 0 \Rightarrow r^2 = \dfrac{250}{3\pi}$ so $r = \sqrt{\dfrac{250}{3\pi}} = 5.15...$		M1 A1	(3)
	(c)	$\dfrac{d^2V}{dr^2} = -3\pi r$		M1	
		When $r = 5.15...$ this is < 0, therefore a maximum		A1	(2)
	(d)	Max V is $125(5.15..) - \dfrac{\pi(5.15..)^3}{2}$		M1	
		i.e. Maximum volume is 429.19…= 429 (cm^3)		A1	(2)
					(11 marks)

Question number	Scheme	Marks
10. (a)	$y = 9 - 8 - \dfrac{2}{\sqrt{4}} = 0 \therefore b = 4$ **(*)**	B1 c.s.o. (1)
(b)	$\dfrac{dy}{dx} = -2 + x^{-\frac{3}{2}}$	M1
	When $x = 1$ gradient $= -2 + 1 = -1$	A1
	So equation of the tangent is $y - 5 = -1\,(x - 1)$	M1
	i.e. $y + x = 6$ **(*)**	A1 c.s.o. (4)
(c)	Let $y = 0$ and $x = 6$ so D is (6, 0)	B1 (1)
(d)	Area of triangle $= \frac{1}{2} \times 5 \times 5 = 12.5$	B1
	$\int_1^4 (9 - 2x - 2x^{-\frac{1}{2}})\,dx = \left[9x - x^2 - 2\dfrac{x^{\frac{1}{2}}}{\frac{1}{2}}\right]_1^4$ Ignore limits	M1 A1
	$= (36 - 16 - 4 \times 2) - (9 - 1 - 4)$ Use of limits	M1
	$= 12 - 4$	
	$= 8$	A1
	So shaded area is $12.5 - 8 = 4.5$	A1 (6)
		(12 marks)

C2 Mock Paper SPECIFICATION and ASSESSMENT OBJECTIVES

Qn	Specification	AO1	AO2	AO3	AO4	AO5	Total
1	1	2	2				**4**
2	7.1	2	3				**5**
3	4.4, 4.2	1	1		1	2	**5**
4	5.2	3	3				**6**
5	3.1	3	4				**7**
6	2.1, 2.2	3	2	1		1	**7**
7	3.2	4	4				**8**
8	4.3 4.4, 4.5	5	3		2		**10**
9	6	2	2	4	2	1	**11**
10	7.2 +C1	5	5			2	**12**
	Totals	**30**	**29**	**5**	**5**	**6**	**75**