EDEXCEL CORE MATHEMATICS C2 (6664)   **MOCK PAPER MARK SCHEME**

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)	$\displaystyle\int (3 + 4x^3 - \frac{2}{x^2})\,dx = 3x + x^4 + \frac{2}{x} + c$	M1 A2(1, 0) (3)
	(b)	$\displaystyle\int_1^2 (3 + 4x^3 - \frac{2}{x^2})\,dx = \left[3x + x^4 + \frac{2}{x} \right]_1^2$	
		$\qquad\qquad = (6 + 16 + 1) - (3 + 1 + 2)$	M1
		$\qquad\qquad = 17$	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
		$\qquad\therefore AB = 6.88\ldots\ldots$	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
		$\log_3 \left(\dfrac{x^2}{x - 2} \right) = 2$ Use of $\log a - \log b$ rule	M1
		$\dfrac{x^2}{x - 2} = 3^2$ Getting out of logs	M1
		$x^2 - 9x + 18 = 0$ Correct 3TQ = 0	A1
		$(x - 6)(x - 3) = 0$ Attempt to solve 3TQ	M1
		$\qquad x = 3, 6$ Both	A1
			(6 marks)

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

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Question number		Scheme		Marks
8.	(a)	$x - 20° = 115.9°…$ 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) At least $\frac{1}{2}$ $\sin\theta = \frac{1}{2}$		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)	$\dfrac{\mathrm{d}V}{\mathrm{d}r} = 125 - \dfrac{3\pi}{2}r^2$		M1
		$\dfrac{\mathrm{d}V}{\mathrm{d}r} = 0 \Rightarrow r^2 = \dfrac{250}{3\pi}$ so $r = \sqrt{\dfrac{250}{3\pi}} = 5.15...$		M1 A1 (3)
	(c)	$\dfrac{\mathrm{d}^2V}{\mathrm{d}r^2} = -3\pi r$		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)

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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. $\qquad\qquad\qquad y + x = 6$ $\qquad\qquad$ **(*)**	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
	$\displaystyle\int_{1}^{4} (9 - 2x - 2x^{-\frac{1}{2}}) \, dx = \left[9x - x^2 - 2\dfrac{x^{\frac{1}{2}}}{\frac{1}{2}} \right]_{1}^{4}$ $\qquad$ Ignore limits	M1 A1
	$\qquad\qquad\qquad = (36 - 16 - 4 \times 2) - (9 - 1 - 4)$ $\qquad$ Use of limits	M1
	$\qquad\qquad\qquad = 12 - 4$	A1
	$\qquad\qquad\qquad = 8$	
	So shaded area is $12.5 - 8 = 4.5$	A1 (6)
		(12 marks)

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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**