EDEXCEL CORE MATHEMATICS C2 (6664) SPECIMEN PAPER MARK SCHEME

Question number		Scheme		Marks
1.		$(2+3x)^6 = 2^6 + 6.2^5 \times 3x + \binom{6}{2} 2^4 (3x)^2$	>1 term correct	M1
		$= 64, + 576x, + 2160x^2$		B1 A1 A1
				(4 marks)
2.		$r = \sqrt{(8-3)^2 + (-8-4)^2}$, = 13	Method for r or r^2	M1 A1
		Equation: $(x-3)^2 + (y-4)^2 = 169$	ft their r	M1 A1ft
				(4 marks)
3.	(a)	$(x = 2.5)$ $y = 4.077$ $(x = 3)$ $y = 5.292$		B1 B1 (2)
	(b)	$A \approx \frac{1}{2} \times \frac{1}{2}[1.414 + 5.292 + 2(2.092 + 3.000 + 5.292)]$	For $\frac{1}{2} \times \frac{1}{2}$	B1
			ft their y values	M1 A1ft
		$= 6.261$ $= 6.26$ (2 d.p.)		A1 (4)
				(6 marks)
4.		$3(1 - \cos^2 x) = 1 + \cos x$	Use of $s^2 + c^2 = 1$	M1
		$0 = 3\cos^2 x + \cos x - 2$	3TQ in $\cos x$	M1
		$0 = (3\cos x - 2)(\cos x + 1)$	Attempt to solve	M1
		$\cos x = \frac{2}{3}$ or -1	Both	A1
		$\cos x = \frac{2}{3}$ gives $x = 48°, 312°$		B1, B1ft
		$\cos x = -1$ gives $x = 180°$		B1
				(7 marks)
5.	(a)	Arc length = $r\theta = 8 \times 0.9 = 7.2$	M1 for use of $r\theta$	M1
		Perimeter = $16 + r\theta$ = 23.2 (mm)		A1 (2)
	(b)	Area of triangle = $\frac{1}{2}.8^2.\sin(0.9) = 25.066$		M1
		Area of sector = $\frac{1}{2}.8^2.(0.9) = 28.8$		M1
		Area of segment = 28.8 – 25.066 = 3.7(33..)		A1ft
		Area of badge = triangle – segment, = 21.3 (mm^2)		M1, A1 (5)
				(7 marks)

Question number		Scheme		Marks
6.	(a)	$15000 \times (0.8)^2 = 9600$ (*)	M1 for × by 0.8	M1 A1 cso (2)
	(b)	$15000 \times (0.8)^n < 500$	Suitable equation or inequality	M1
		$n \log(0.8) < \log(\frac{1}{30})$	Take logs	M1
		n > 15.(24…)	n = is OK	A1
		So machine is replaced in 2015		A1 (4)
	(c)	a = 1000, r = 1.05, n = 16 (≥ 2 correct)		M1
		$S_{16} = \dfrac{1000(1.05^{16} - 1)}{1.05 - 1}$		M1 A1
		= 23 657.49 = £23 700 or £23 660 or £23657		A1 (4)
				(10 marks)
7.	(a)	f(–1) = –1 – 1 + 10 – 8	f(+1) or f(–1)	M1
		= 0 so (x + 1) is a factor	= 0 and comment	A1 (2)
	(b)	$x^3 - x^2 = 2(5x + 4)$	Out of logs	M1
		i.e. $x^3 - x^2 - 10x - 8 = 0$ (*)	A1 cso (4)	M1
		x = –1, –2, 4		A2(1, 0) (4)
	(c)	$\log_2 x^2 + \log_2(x - 1) = 1 + \log_2(5x + 4)$	Use of $\log x^n$	M1
		$\log_2\left(\dfrac{x^2(x-1)}{5x+4}\right) = 1$	Use of $\log a + \log b$	M1
	(d)	x = 4, since x < 0 is not valid in logs		B1, B1 (2)
				(12 marks)

EDEXCEL CORE MATHEMATICS C2 (6664) SPECIMEN PAPER MARK SCHEME

Question number	Scheme		Marks
8. (a)	$x^2 - 3x + 8 = x + 5$	Line = curve	M1
	$x^2 - 4x + 3 = 0$	3TQ = 0	M1
	$0 = (x-3)(x-1)$	Solving	M1
	A is (1, 6); B is (3, 8)		A1; A1 (5)
(b)	$\int (x^2 - 3x + 8)\,dx = \left[\frac{x^3}{3} - \frac{3x^2}{2} + 8x\right]$	Integration	M1 A2(1,0)
	Area below curve $= (9 - \frac{27}{2} + 24) - (\frac{1}{3} - \frac{3}{2} + 8) = 12\frac{2}{3}$	Use of Limits	M1
	Trapezium $= \frac{1}{2} \times 2 \times (6 + 8) = 14$		B1
	Area = Trapezium – Integral , $= 14 - 12\frac{2}{3} = 1\frac{1}{3}$		M1, A1 (7)
			(12 marks)
ALT (b)	$-x^2 + 4x - 3$	Line – curve	M1
	$\int (-x^2 + 4x - 3)\,dx = \left[-\frac{x^3}{3} + 2x^2 - 3x\right]$	Integration	M1 A2(1,0)
	Area $= \int_1^3 (...)\,dx = (-9 + 18 - 9) - (-\frac{1}{3} + 2 - 3)$	Use of limits	M1
	$= 1\frac{1}{3}$		A2 (7)

Question number	Scheme		Marks
9. (a)	$A = \frac{1}{2}(x + 1)(4 - x)^2 \sin 30°$	Use of $\frac{1}{2}ab\sin C$	M1
	$= \frac{1}{4}(x + 1)(16 - 8x + x^2)$	Attempt to multiply out.	M1
	$= \frac{1}{4}(x^3 - 7x^2 + 8x + 16)$ (*)		A1 cso (3)
(b)	$\frac{dA}{dx} = \frac{1}{4}(3x^2 - 14x + 8)$	Ignore the $\frac{1}{4}$	M1 A1
	$\frac{dA}{dx} = 0 \Rightarrow (3x - 2)(x - 4) = 0$		M1
	So $x = \frac{2}{3}$ or 4	At least $x = \frac{2}{3}$ or…	A1
	e.g. $\frac{d^2A}{dx^2} = \frac{1}{4}(6x - 14)$, when $x = \frac{2}{3}$ it is < 0, so maximum	Any full method	M1
	So $x = \frac{2}{3}$ gives maximum area (*)	Full accuracy	A1 (6)
(c)	Maximum area = $\frac{1}{4}(\frac{5}{3})(\frac{10}{3})^2 = 4.6$ or 4.63 or 4.630		B1 (1)
(d)	Cosine rule: $QR^2 = (\frac{5}{3})^2 + (\frac{10}{3})^4 - 2\times\frac{5}{3}\times(\frac{10}{3})^2\cos 30°$	M1 for QR or QR^2	M1 A1
	$= 94.159\ldots$		
	$QR = 9.7$ or 9.70 or 9.704		A1 (3)
			(13 marks)