

**Edexcel GCE
Core Mathematics C2
Gold Level G2
(Mark Scheme)**

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Question Number	Scheme	Marks
1. (a)	Attempt to find $f(-4)$ or $f(4)$. $(f(-4) = 2(-4)^3 - 3(-4)^2 - 39(-4) + 20)$ $(= -128 - 48 + 156 + 20) = 0$, so $(x + 4)$ is a factor.	M1 A1 (2)
(b)	$2x^3 - 3x^2 - 39x + 20 = (x + 4)(2x^2 - 11x + 5)$ $(2x - 1)(x - 5)$ oe	M1 A1 M1 A1cso (4) [6]
2. (a)	$\{x = 1.3\} \quad y = 0.8572$ (only)	B1 cao (1)
(b)	$\frac{1}{2} \times 0.1 \dots\dots\dots$ $\{0.7071 + 0.9487 + 2(0.7591 + 0.8090 + "0.8572" + 0.9037)\}$... $\{0.7071 + 0.9487 + 2(0.7591 + 0.8090 + "0.8572" + 0.9037)\}$ $\{0.05(8.3138)\} = 0.41569 = \text{awrt } 0.416$	B1 M1 A1ft A1 (4) [5]
3. (a)	$\left(\frac{dy}{dx} =\right) 2x - \frac{1}{2}kx^{\frac{1}{2}}$	M1 A1 (2)
(b)	Substituting $x = 4$ into their $\frac{dy}{dx}$ and 'compare with zero' $8 - \frac{k}{4} < 0 \quad k > 32 \quad (\text{or } 32 < k)$	M1 A1 (2) [4]
4. (a)	$\frac{\sin(\hat{A}CB)}{5} = \frac{\sin 0.6}{4}$ $\therefore \hat{A}CB = \arcsin(0.7058\dots)$ $= [0.7835\dots \text{ or } 2.358]$ $\hat{A}BC = \pi - 0.6 - \hat{A}CB$ $\hat{A}BC = 1.76 \text{ (*)}(3\text{sf})$	M1 M1 M1 A1 (4)
(b)	$[\hat{C}BD = \pi - 1.76 = 1.38]$ Sector area $= \frac{1}{2} \times 4^2 \times (\pi - 1.76) = [11.0 \sim 11.1]$ Area of $\triangle ABC = \frac{1}{2} \times 5 \times 4 \times \sin(1.76) = [9.8]$ Required area = awrt 20.8 or 20.9 or 21.0	M1 M1 A1 (3) [7]

Question Number	Scheme	Marks
<p>5. (a)</p>	$PQ: m_1 = \frac{10-2}{9-(-3)} (= \frac{2}{3}) \quad \text{and} \quad QR: m_2 = \frac{10-4}{9-a}$ $m_1 m_2 = -1: \frac{8}{12} \times \frac{6}{9-a} = -1 \quad a = 13 \quad (*)$	<p>M1</p> <p>M1 A1</p> <p>(3)</p>
<p>(b)</p>	<p>Centre is at (5, 3)</p> $(r^2 =) (10-3)^2 + (9-5)^2 \text{ o.e., or } (d^2 =) (13-(-3))^2 + (4-2)^2$ $(x-5)^2 + (y-3)^2 = 65 \quad \text{or } x^2 + y^2 - 10x - 6y - 31 = 0$	<p>B1</p> <p>M1 A1</p> <p>M1 A1</p> <p>(5)</p> <p>[8]</p>
<p>6. (a)</p>	$\log_3(9x) = \log_3 9 + \log_3 x$ $= 2 + a$	<p>M1</p> <p>A1</p> <p>(2)</p>
<p>(b)</p>	$\log_3\left(\frac{x^5}{81}\right) = \log_3 x^5 - \log_3 81$ $\log x^5 = 5 \log x \text{ or } \log 81 = 4 \log 3 \text{ or } \log 81 = 4$ $= 5a - 4$	<p>M1</p> <p>M1</p> <p>A1 cso</p> <p>(3)</p>
<p>(c)</p>	$\log_3(9x) + \log_3\left(\frac{x^5}{81}\right) = 3$ $\Rightarrow 2 + a + 5a - 4 = 3$ $\Rightarrow a = \frac{5}{6}$ $\Rightarrow x = 3^{\frac{5}{6}} \text{ or } \log_{10} x = a \log_{10} 3 \text{ so } x =$ $x = 2.498 \text{ or awrt}$	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>(4)</p> <p>[9]</p>

Question Number	Scheme	Marks
7. (i)	$(\alpha = 56.3099\dots)$	
	$x = \{\alpha + 40 = 96.309993\dots\} = \text{awrt } 96.3$ $x - 40^\circ = -180 + "56.3099" \dots$ or $x - 40^\circ = -\pi + "0.983" \dots$ $x = \{-180 + 56.3099\dots + 40 = -83.6901\dots\} = \text{awrt } -83.7$	B1 M1 A1 (3)
(ii)(a)	$\sin \theta \left(\frac{\sin \theta}{\cos \theta} \right) = 3 \cos \theta + 2$	M1
	$\left(\frac{1 - \cos^2 \theta}{\cos \theta} \right) = 3 \cos \theta + 2$ $1 - \cos^2 \theta = 3 \cos^2 \theta + 2 \cos \theta \Rightarrow 0 = 4 \cos^2 \theta + 2 \cos \theta - 1$ *	dM1 A1 cso (3)
(b)	$\cos \theta = \frac{-2 \pm \sqrt{4 - 4(4)(-1)}}{8}$ or $4(\cos \theta \pm \frac{1}{4})^2 \pm q \pm 1 = 0,$ or $(2 \cos \theta \pm \frac{1}{2})^2 \pm q \pm 1 = 0, q \neq 0$ so $\cos \theta = \dots$ One solution is 72° or 144° , Two solutions are 72° and 144° $\theta = \{72, 144, 216, 288\}$	M1 A1 A1 M1 A1 (5) [11]

Question Number	Scheme	Marks
<p>8. (a)</p>	<p>(Arc length =) $r\theta = r \times 1 = r$.</p> <p>(Sector area =) $\frac{1}{2}r^2\theta = \frac{1}{2}r^2 \times 1 = \frac{r^2}{2}$.</p> <p>Surface area = 2 sectors + 2 rectangles + curved face $(= r^2 + 3rh)$</p> <p>Volume = $300 = \frac{1}{2}r^2h$</p> $S = r^2 + 3 \times \frac{600}{r} = r^2 + \frac{1800}{r} \quad (*)$ <p>(b) $\frac{dS}{dr} = 2r - \frac{1800}{r^2}$ or $2r - 1800r^{-2}$ or $2r + -1800r^{-2}$</p> $\frac{dS}{dr} = 0 \Rightarrow r^3 = \dots, \quad r = \sqrt[3]{900}, \quad \text{or awrt } 9.7$ <p>(c) $\frac{d^2S}{dr^2} = \dots$ and consider sign</p> $\frac{d^2S}{dr^2} = 2 + \frac{3600}{r^3} > 0$ so point is a minimum <p>(d) $S_{\min} = (9.65\dots)^2 + \frac{1800}{9.65\dots}$ $= 279.65\dots$</p>	<p>B1</p> <p>B1</p> <p>M1</p> <p>B1</p> <p>A1cso (5)</p> <p>M1A1</p> <p>M1A1 (4)</p> <p>M1</p> <p>A1ft (2)</p> <p>M1</p> <p>A1 (2)</p> <p>[13]</p>
<p>9. (a)</p>	$2\pi rh + 2\pi r^2 = 800$ $h = \frac{400 - \pi r^2}{\pi r}, \quad V = \pi r^2 \left(\frac{400 - \pi r^2}{\pi r} \right) = 400r - \pi r^3 \quad (*)$ <p>(b) $\frac{dV}{dr} = 400 - 3\pi r^2$</p> $400 - 3\pi r^2 = 0 \quad r^2 = \dots, \quad r = \sqrt{\frac{400}{3\pi}} \quad (= 6.5 \text{ (2 s.f.)})$ $V = 400r - \pi r^3 = 1737 = \frac{800}{3} \sqrt{\frac{400}{3\pi}} \text{ (cm}^3\text{)}$ <p>(c) $\frac{d^2V}{dr^2} = -6\pi r$, Negative, \therefore maximum</p>	<p>B1</p> <p>M1 M1 A1 (4)</p> <p>M1 A1</p> <p>M1 A1</p> <p>M1 A1 (6)</p> <p>M1 A1 (2)</p> <p>[12]</p>

Statistics for C2 Practice Paper Gold Level G2

Qu	Max score	Modal score	Mean %	Mean score for students achieving grade:							
				ALL	A*	A	B	C	D	E	U
1	6		78	4.68		5.70	5.43	5.10	4.60	3.77	1.98
2	5		89	4.47	5.00	4.85	4.74	4.40	4.14	3.86	2.38
3	4		64	2.54	3.55	3.16	2.75	2.57	2.40	2.18	1.55
4	7		57	3.99		5.90	4.33	3.32	2.20	1.61	0.73
5	8		51	4.09		6.53	4.31	3.21	1.97	1.26	0.54
6	9		80	7.19	8.78	8.60	7.29	6.34	6.29	4.25	3.05
7	11		49	5.42	10.48	9.15	7.08	5.48	4.07	2.66	0.99
8	13		45	5.91		11.21	7.78	5.05	2.82	1.37	0.31
9	12		51	6.13		10.18	6.65	4.37	2.76	1.73	0.56
	75		59	44.42		65.28	50.36	39.84	31.25	22.69	12.09