

# Mark Scheme (Results)

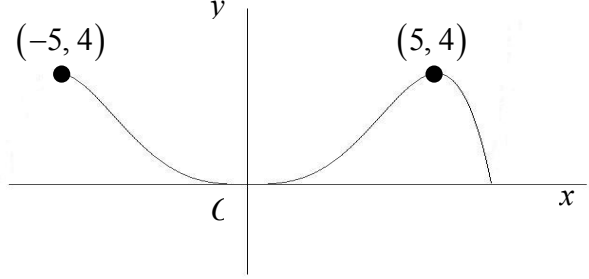
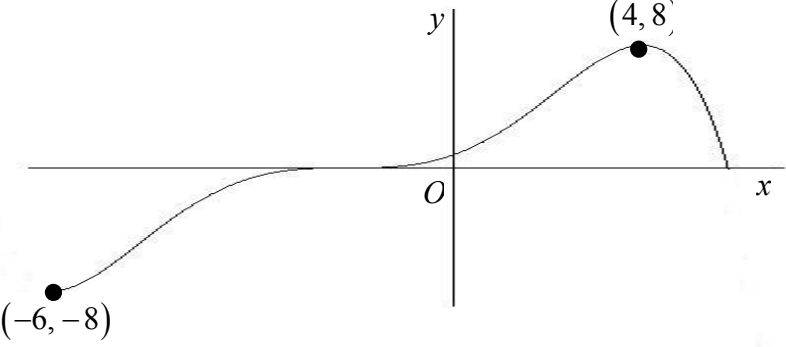
## January 2008

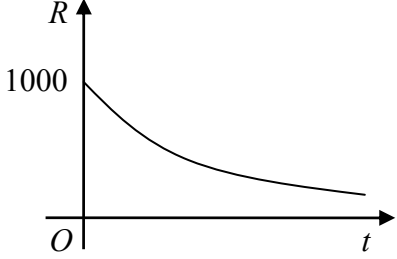
GCE

### GCE Mathematics (6665/01)



Question Number	Scheme	Marks
3.	(a) $f(2) = 0.38 \dots$ $f(3) = -0.39 \dots$ Change of sign (and continuity) $\Rightarrow$ root in $(2, 3)$ *	M1 A1 (2) cso
	(b) $x_1 = \ln 4.5 + 1 \approx 2.50408$ $x_2 \approx 2.50498$ $x_3 \approx 2.50518$	M1 A1 A1 (3)
	(c) Selecting $[2.5045, 2.5055]$ , or appropriate tighter range, and evaluating at both ends. $f(2.5045) \approx 6 \times 10^{-4}$ $f(2.5055) \approx -2 \times 10^{-4}$ Change of sign (and continuity) $\Rightarrow$ root $\in (2.5045, 2.5055)$ $\Rightarrow$ root = 2.505 to 3 dp *	M1 A1 (2) cso [7]
Note: The root, correct to 5 dp, is 2.50524		

Question Number	Scheme	Marks
4.	<p>(a)</p>  <p>(b) For the purpose of marking this paper, the graph is identical to (a)</p> <p>(c)</p>  <p>General shape – unchanged Translation to left</p>	<p>Shape (5, 4) B1 (-5, 4) B1 (3)</p> <p>Shape (5, 4) B1 (-5, 4) B1 (3)</p> <p>General shape – unchanged B1 Translation to left B1 (4, 8) B1 (-6, -8) B1 (4)</p> <p>In all parts of this question ignore any drawing outside the domains shown in the diagrams above. [10]</p>

Question Number	Scheme	Marks
5.	(a) 1000	B1 (1)
	(b) $1000e^{-5730c} = 500$ $e^{-5730c} = \frac{1}{2}$ $-5730c = \ln \frac{1}{2}$ $c = 0.000121$	M1 A1 M1 cao A1 (4)
	(c) $R = 1000e^{-22920c} = 62.5$	Accept 62-63 M1 A1 (2)
	(d) <div style="text-align: center; margin: 20px 0;">  </div>	Shape 1000 B1 B1 (2) <b>[9]</b>

Question Number	Scheme	Marks
6.	<p>(a) <math>\cos(2x+x) = \cos 2x \cos x - \sin 2x \sin x</math>  <math>= (2\cos^2 x - 1)\cos x - (2\sin x \cos x)\sin x</math>  <math>= (2\cos^2 x - 1)\cos x - 2(1 - \cos^2 x)\cos x</math> any correct expression  <math>= 4\cos^3 x - 3\cos x</math></p> <p>(b)(i) <math>\frac{\cos x}{1+\sin x} + \frac{1+\sin x}{\cos x} = \frac{\cos^2 x + (1+\sin x)^2}{(1+\sin x)\cos x}</math>  <math>= \frac{\cos^2 x + 1 + 2\sin x + \sin^2 x}{(1+\sin x)\cos x}</math>  <math>= \frac{2(1+\sin x)}{(1+\sin x)\cos x}</math>  <math>= \frac{2}{\cos x} = 2\sec x</math> *      cso</p> <p>(c) <math>\sec x = 2</math> or <math>\cos x = \frac{1}{2}</math>  <math>x = \frac{\pi}{3}, \frac{5\pi}{3}</math>      accept awrt 1.05, 5.24</p>	<p>M1 M1 A1 A1      (4)</p> <p>M1 A1 M1 A1      (4)</p> <p>M1 A1, A1      (3)</p> <p><b>[11]</b></p>
7.	<p>(a) <math>\frac{dy}{dx} = 6\cos 2x - 8\sin 2x</math>  <math>\left(\frac{dy}{dx}\right)_0 = 6</math>  <math>y - 4 = -\frac{1}{6}x</math>      or equivalent</p> <p>(b) <math>R = \sqrt{(3^2 + 4^2)} = 5</math>  <math>\tan \alpha = \frac{4}{3}, \alpha \approx 0.927</math>      awrt 0.927</p> <p>(c) <math>\sin(2x + \text{their } \alpha) = 0</math>  <math>x = -2.03, -0.46, 1.11, 2.68</math></p> <p>First A1 any correct solution; second A1 a second correct solution; third A1 all four correct and to the specified accuracy or better.  Ignore the y-coordinate.</p>	<p>M1 A1 B1 M1 A1      (5)</p> <p>M1 A1 M1 A1      (4)</p> <p>M1 A1 A1 A1      (4)</p> <p><b>[13]</b></p>

Question Number	Scheme	Marks
8.	(a) $x = 1 - 2y^3 \Rightarrow y = \left(\frac{1-x}{2}\right)^{\frac{1}{3}}$ or $\sqrt[3]{\frac{1-x}{2}}$ $f^{-1} : x \mapsto \left(\frac{1-x}{2}\right)^{\frac{1}{3}}$	M1 A1 (2)
	(b) $gf(x) = \frac{3}{1-2x^3} - 4$ $= \frac{3-4(1-2x^3)}{1-2x^3}$ $= \frac{8x^3-1}{1-2x^3}$ *	M1 A1 M1
	$gf : x \mapsto \frac{8x^3-1}{1-2x^3}$	cso A1 (4) Ignore domain
	(c) $8x^3 - 1 = 0$	Attempting solution of numerator = 0 M1
	$x = \frac{1}{2}$	Correct answer and no additional answers A1 (2)
	(d) $\frac{dy}{dx} = \frac{(1-2x^3) \times 24x^2 + (8x^3-1) \times 6x^2}{(1-2x^3)^2}$ $= \frac{18x^2}{(1-2x^3)^2}$	M1 A1 A1
	Solving their numerator = 0 and substituting to find y.	M1
	$x = 0, y = -1$	A1 (5) [13]