

GCE Examinations  
Advanced Subsidiary

# Core Mathematics C1

Paper F

## MARKING GUIDE

This guide is intended to be as helpful as possible to teachers by providing concise solutions and indicating how marks could be awarded. There are obviously alternative methods that would also gain full marks.

Method marks (M) are awarded for knowing and using a method.

Accuracy marks (A) can only be awarded when a correct method has been used.

(B) marks are independent of method marks.

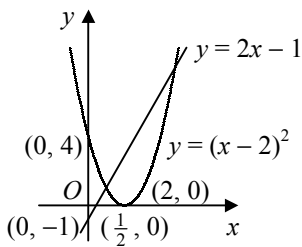
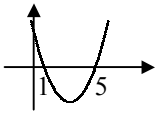


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## C1 Paper F – Marking Guide

1.	$x^4 - 5x^2 - 14 = 0, \quad (x^2 + 2)(x^2 - 7) = 0$ $x^2 = -2$ (no solutions) or 7 $x = \pm\sqrt{7}$	M1 A1 A1	<b>(3)</b>
2.	$= \frac{2}{3\sqrt{5}+7} \times \frac{3\sqrt{5}-7}{3\sqrt{5}-7} = \frac{6\sqrt{5}-14}{45-49} = \frac{7}{2} - \frac{3}{2}\sqrt{5}$	M2 A1	<b>(3)</b>
3.	<p>(a) <math>x = (\sqrt[3]{27})^2 = 3^2 = 9</math></p> <p>(b) <math>= \left(\frac{9}{4}\right)^{-\frac{1}{2}} = \sqrt{\frac{4}{9}} = \frac{2}{3}</math></p>	M1 A1 M1 A1	<b>(4)</b>
4.	<p>cubic, coeff of <math>x^3 = 1</math>, crosses <math>x</math>-axis at <math>(-1, 0)</math>, touches at <math>(3, 0)</math></p> <p><math>\therefore y = (x+1)(x-3)^2</math>  <math>= (x+1)(x^2 - 6x + 9)</math>  <math>= x^3 - 6x^2 + 9x + x^2 - 6x + 9</math>  <math>= x^3 - 5x^2 + 3x + 9</math></p> <p><math>\therefore a = -5, b = 3, c = 9</math></p>	M1 A1 M1 A2	<b>(5)</b>
5.	<p>(a) <math>y = \frac{1}{2}x^2 - \frac{3}{2}x^{-2}</math>  <math>\frac{dy}{dx} = x + 3x^{-3}</math></p> <p>(b) <math>\frac{d^2y}{dx^2} = 1 - 9x^{-4} = \frac{x^4 - 9}{x^4}</math></p>	M1 A1 M1 A1 M1 A1	<b>(6)</b>
6.	<p>(a) </p> <p>(b) <math>x^2 - 4x + 4 &gt; 2x - 1</math>  <math>x^2 - 6x + 5 &gt; 0</math>  <math>(x-1)(x-5) &gt; 0</math>  <math>x &lt; 1</math> or <math>x &gt; 5</math> </p>	B2 B3 M1 M1 A1	<b>(8)</b>
7.	<p>(a) <math>\frac{dy}{dx} = \frac{1}{2} + x^{-2}</math>  grad = <math>\frac{1}{2} + 2^{-2} = \frac{3}{4}</math></p> <p>(b) <math>x = 2 \therefore y = \frac{7}{2}</math>  <math>y - \frac{7}{2} = \frac{3}{4}(x - 2)</math>  <math>4y - 14 = 3x - 6</math>  <math>3x - 4y + 8 = 0</math></p> <p>(c) at B, grad = <math>\frac{3}{4}</math>  <math>\therefore \frac{1}{2} + x^{-2} = \frac{3}{4}</math>  <math>x^2 = 4, \quad x = 2</math> (at A), <math>-2</math>  <math>\therefore B(-2, \frac{5}{2})</math></p>	M1 A1 M1 A1 B1 M1 A1 M1 A1 A1	<b>(10)</b>

8.	(a)	$y - 3 = \frac{3}{2}(x - 5)$	M1	
		$y = \frac{3}{2}x - \frac{9}{2}$	A1	
	(b)	$3x - 4(\frac{3}{2}x - \frac{9}{2}) + 3 = 0$	M1	
		$x = 7$	A1	
		$\therefore B(7, 6)$	A1	
	(c)	$= (\frac{5+7}{2}, \frac{3+6}{2}) = (6, \frac{9}{2})$	M1 A1	
	(d)	$l_2: y = \frac{3}{4}x + \frac{3}{4} \therefore \text{grad} = \frac{3}{4}$	B1	
		$\therefore y - \frac{9}{2} = \frac{3}{4}(x - 6)$	M1	
		$y = \frac{3}{4}x$	A1	
		when $x = 0, y = 0 \therefore$ passes through origin	A1	(11)

9.	(a)	$a + 2d = 5\frac{1}{2}$ (1)	B1	
		$\frac{4}{2}(2a + 3d) = 22\frac{3}{4}$ (2)	M1 A1	
		(2) $\Rightarrow 4a + 6d = 22\frac{3}{4}$		
		(1) $\Rightarrow 3a + 6d = 16\frac{1}{2}$		
		subtracting, $a = 22\frac{3}{4} - 16\frac{1}{2} = 6\frac{1}{4}$	M1 A1	
		$d = \frac{1}{2}(5\frac{1}{2} - 6\frac{1}{4}) = -\frac{3}{8}$	M1 A1	
	(b)	$6\frac{1}{4} - \frac{3}{8}(n - 1) > 0$	M1	
		$50 - 3(n - 1) > 0$		
		$n < 17\frac{2}{3} \therefore 17$ positive terms	M1 A1	
	(c)	$= S_{17} = \frac{17}{2} [12\frac{1}{2} + (16 \times -\frac{3}{8})]$	M1	
		$= \frac{17}{2} (12\frac{1}{2} - 6) = \frac{17}{2} \times \frac{13}{2} = \frac{221}{4} = 55\frac{1}{4}$	A1	(12)

10.	(a)	grad = $8 - 2 = 6$	B1	
		$\therefore y - 1 = 6(x - 1)$	M1	
		$y = 6x - 5$	A1	
	(b)	$y = \int (8x - \frac{2}{x^3}) dx$		
		$y = 4x^2 + x^{-2} + c$	M1 A2	
		(1, 1) $\therefore 1 = 4 + 1 + c$		
		$c = -4$	M1	
		$y = 4x^2 + x^{-2} - 4$	A1	
	(c)	$4x^2 + x^{-2} - 4 = 0$		
		$4x^4 - 4x^2 + 1 = 0$	M1	
		$(2x^2 - 1)^2 = 0$	M1	
		$x^2 = \frac{1}{2}$		
		$x = \pm \frac{1}{\sqrt{2}}$	A1	
		$x = \pm \frac{1}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \pm \frac{1}{2}\sqrt{2}$	M1 A1	(13)

Total (75)

