

GCE Examinations  
Advanced / Advanced Subsidiary

# Core Mathematics C1

Paper C

## 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 using a valid 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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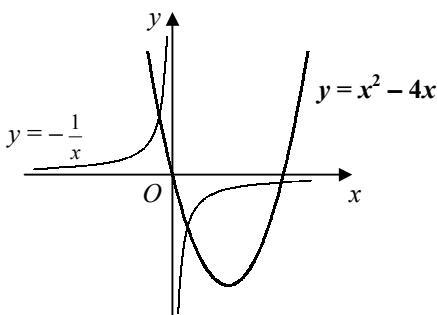
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## C1 Paper C – Marking Guide

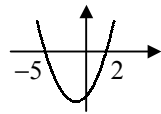
1.  $(3^2)^x = 3^{x+2}$   
 $2x = x + 2$   
 $x = 2$ 
M1  
M1  
A1 **(3)**

2.  $x - 5y = 7 \Rightarrow y = \frac{1}{5}x - \frac{7}{5} \therefore \text{grad} = \frac{1}{5}$   
 $\text{grad } m = \frac{-1}{\frac{1}{5}} = -5$   
 $\therefore y - 1 = -5(x + 4)$   
 $y = -5x - 19$ 
B1  
M1  
M1  
A1 **(4)**

3.  $\frac{EH}{AD} = \frac{EF}{AB} \therefore \frac{EH}{\sqrt{5}} = \frac{1 + \sqrt{5}}{3 - \sqrt{5}}$   
 $\frac{1 + \sqrt{5}}{3 - \sqrt{5}} = \frac{1 + \sqrt{5}}{3 - \sqrt{5}} \times \frac{3 + \sqrt{5}}{3 + \sqrt{5}} = \frac{3 + \sqrt{5} + 3\sqrt{5} + 5}{9 - 5} = 2 + \sqrt{5}$   
 $\therefore EH = \sqrt{5}(2 + \sqrt{5}) = 5 + 2\sqrt{5}$ 
M1  
M2 A1  
A1 **(5)**

4. (i) 
B2  
B2

(ii) 3 solutions B1  
 $x^2 - 4x + \frac{1}{x} = 0 \Rightarrow x^2 - 4x = -\frac{1}{x}$   
and the graphs of  $y = x^2 - 4x$  and  $y = -\frac{1}{x}$  intersect at 3 points B1 **(6)**

5. (i)  $x^2 + 3x - 10 > 0$   
 $(x + 5)(x - 2) > 0$    
 $x < -5$  or  $x > 2$ 
M1  
M1  
A1

(ii)  $3x - 2 < x + 3 \Rightarrow 2x < 5$   
 $x < \frac{5}{2}$   
both satisfied when  $x < -5$  or  $2 < x < \frac{5}{2}$ 
M1  
A1  
A1 **(6)**

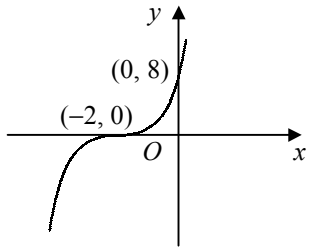
6. (i)  $b^2 - 4ac = 12^2 - (4 \times 4 \times 9) = 0$   
 $\therefore$  1 real root M1  
A1

(ii)  $4x^2 + 12x + 9 = 8$   
 $4x^2 + 12x + 1 = 0$   
 $x = \frac{-12 \pm \sqrt{144 - 16}}{8}$  M1  
 $= \frac{-12 \pm 8\sqrt{2}}{8}$  M1  
 $= -\frac{3}{2} \pm \sqrt{2}$  A2 **(6)**

7.	(i) $(x+1)^2 + (y-6)^2 = (2\sqrt{5})^2$ $(x+1)^2 + (y-6)^2 = 20$	M1 A1	
	(ii) sub. $y = 3x - 1$ into eqn of C: $(x+1)^2 + [(3x-1) - 6]^2 = 20$ $(x+1)^2 + (3x-7)^2 = 20$ $x^2 - 4x + 3 = 0$ $(x-1)(x-3) = 0$ $x = 1, 3$	M1 A1 M1 A1	
	(iii) $x = 1 \Rightarrow y = 2 \quad \therefore (1, 2), \quad x = 3 \Rightarrow y = 8 \quad \therefore (3, 8)$ $AB = \sqrt{(3-1)^2 + (8-2)^2} = \sqrt{4+36} = \sqrt{40} = \sqrt{4 \times 10} = 2\sqrt{10}$	B1 M1 A1	(9)

8.	(i) $f'(x) = -1 + 2x^{-\frac{1}{3}}$ $f''(x) = -\frac{2}{3}x^{-\frac{4}{3}}$	M1 A1 A1	
	(ii) for TP, $-1 + 2x^{-\frac{1}{3}} = 0$ $x^{\frac{1}{3}} = 2$ $x = 8 \quad \therefore (8, 6)$	M1 M1 A2	
	(iii) $f''(8) = -\frac{1}{24}, f''(x) < 0 \quad \therefore$ maximum	M1 A1	(9)

9.	(i) $\frac{dy}{dx} = 2x$ grad = 2 $\therefore y - 3 = 2(x - 1)$ $y = 2x + 1$	M1 A1 M1 A1	
	(ii) $= (x-3)^2 - 9 + 11 = (x-3)^2 + 2$	M1 A1	
	(iii) translation by 3 units in the positive $x$ -direction	B2	
	(iv) $y = 2(x-3) + 1 \quad [y = 2x - 5]$	M1 A1	(10)

10.	(i) 	B3	
	(ii) $f(x) = (x+2)(x^2 + 4x + 4)$ $f(x) = x^3 + 4x^2 + 4x + 2x^2 + 8x + 8$ $f(x) = x^3 + 6x^2 + 12x + 8$ $f'(x) = 3x^2 + 12x + 12$	M1 A1 M1 A1	
	(iii) grad = $3 - 12 + 12 = 3$ $\therefore y - 1 = 3(x + 1) \quad [y = 3x + 4]$	B1 M1 A1	
	(iv) grad $m = 3$ $\therefore 3x^2 + 12x + 12 = 3$ $x^2 + 4x + 3 = 0$ $(x+1)(x+3) = 0$ $x = -1$ (at P), $-3$ $x = -3 \quad \therefore y = -1$ $\therefore y + 1 = 3(x + 3)$ $y = 3x + 8$	M1 A1 M1 A1	(14)

Total (72)

