FOR OCR

GCE Examinations

Advanced / Advanced Subsidiary

# Core Mathematics C1

## Paper A

## 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.


*Written by Shaun Armstrong*

# C1 Paper A – Marking Guide

**1.** $(2^2)^{y+3} = 2^3$ M1
$2y + 6 = 3$ M1
$y = -\frac{3}{2}$ A1 **(3)**

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**2.** $= \frac{2}{3\sqrt{5}+7} \times \frac{3\sqrt{5}-7}{3\sqrt{5}-7}$ M1
$= \frac{6\sqrt{5}-14}{45-49} = \frac{7}{2} - \frac{3}{2}\sqrt{5}$ M1 A1 **(3)**

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**3.** *(i)* $x^2 + (y-3)^2 - 9 - 7 = 0$ M1
$\therefore$ centre $(0, 3)$ A1

*(ii)* $x^2 + (y-3)^2 = 16$ M1
$\therefore$ radius $= 4$ A1 **(4)**

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**4.** *(i)* $= (x+3)^2 - 9 + 7$ M1
$= (x+3)^2 - 2$ A2

*(ii)* $(-3, -2)$ B2 **(5)**

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**5.** $x + y = 2 \Rightarrow \quad y = 2 - x$ M1
sub. into $3x^2 - 2x + y^2 = 2$
$3x^2 - 2x + (2-x)^2 = 2$ M1
$2x^2 - 3x + 1 = 0$ A1
$(2x-1)(x-1) = 0$ M1
$x = \frac{1}{2}, 1$ A1
$\therefore \; x = \frac{1}{2}, \; y = \frac{3}{2}$ or $x = 1, \; y = 1$ M1 A1 **(7)**

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**6.** *(i)* $3x - x^{\frac{3}{2}} = 0$
$x(3 - x^{\frac{1}{2}}) = 0$ M1
$x = 0$ (at $O$) or $x^{\frac{1}{2}} = 3$
$x = 3^2 = 9$ M1 A1

*(ii)* $\frac{dy}{dx} = 3 - \frac{3}{2}x^{\frac{1}{2}}$ M1 A1
for SP, $3 - \frac{3}{2}x^{\frac{1}{2}} = 0$ M1
$x^{\frac{1}{2}} = 2$
$x = 4$ A1
$\therefore \; (4, 4)$ A1 **(8)**

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**7.** *(i)* $= (-6)^2 - (4 \times 1 \times 12) = -12$ M1 A1

*(ii)* 0 real roots B1
$\therefore$ graph of $y = x^2 - 6x + 12$ doesn't cross the $x$-axis and coeff. of $x^2$ is positive so curve has a minimum which must be above $x$-axis
hence, $x^2 - 6x + 12$ is always positive B2

*(iii)* $x^2 - 6x + 12 = 8 - 2x$ M1
$x^2 - 4x + 4 = 0$ A1
$(x-2)^2 = 0$ M1
repeated root $\therefore$ tangent A1 **(9)**

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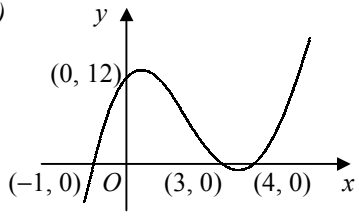
**8.** *(a)* LHS = $(x + 1)(x^2 - 7x + 12)$

$= x^3 - 7x^2 + 12x + x^2 - 7x + 12$ M1

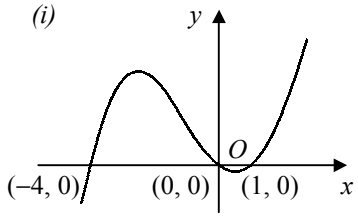
$= x^3 - 6x^2 + 5x + 12 =$ RHS A1

*(b)*

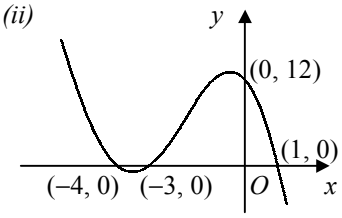



B3

*(c)* *(i)*




*(ii)*




B2 B2

**(9)**

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**9.** *(i)* $\frac{dy}{dx} = \frac{1}{2} + x^{-2}$ M1 A1

grad $= \frac{1}{2} + 2^{-2} = \frac{3}{4}$ M1 A1

*(ii)* $x = 2 \ \therefore y = \frac{7}{2}$ B1

$y - \frac{7}{2} = \frac{3}{4}(x - 2)$ M1

$4y - 14 = 3x - 6$

$3x - 4y + 8 = 0$ A1

*(iii)* at $B$, grad $= \frac{3}{4}$

$\therefore \ \frac{1}{2} + x^{-2} = \frac{3}{4}$ M1

$x^2 = 4$

$x = 2$ (at $A$), $-2$ A1

$\therefore \ B\ (-2, \frac{5}{2})$ A1 **(10)**

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**10.** *(i)* $y - 4 = 3(x + 6)$ M1

$y = 3x + 22$ A1

*(ii)* at $B$, $x = 0 \ \therefore y = 2 \ \Rightarrow \ B\ (0, 2)$ B1

at $C$, $x - 7(3x + 22) + 14 = 0$ M1

$x = -7$ A1

$\therefore \ C\ (-7, 1)$ A1

*(iii)* grad $AB = \frac{2-4}{0-(-6)} = -\frac{1}{3}$ M1 A1

grad $AC = \frac{1-4}{-7-(-6)} = 3$

grad $AB \times$ grad $AC = -\frac{1}{3} \times 3 = -1$ M1

$\therefore \ AB$ perp to $AC \ \therefore \angle BAC = 90°$ A1

*(iv)* $AB = \sqrt{(0+6)^2 + (2-4)^2} = \sqrt{36+4} = \sqrt{40} = 2\sqrt{10}$ M1 A1

$AC = \sqrt{(-7+6)^2 + (1-4)^2} = \sqrt{1+9} = \sqrt{10}$

area $= \frac{1}{2} \times 2\sqrt{10} \times \sqrt{10} = 10$ M1 A1 **(14)**

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Total **(72)**

# Performance Record – C1 Paper A

| Question no. | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Topic(s) | indices | surds | circle | compl. square | simul. eqn | SP | discrim., roots of quad. | cubic, transform. | diff., tangents | straight lines | |
| Marks | 3 | 3 | 4 | 5 | 7 | 8 | 9 | 9 | 10 | 14 | 72 |
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