

## C2 Paper F – Marking Guide

1.	GP: $a = 10, r = 2$ $S_{12} = \frac{10(2^{12}-1)}{2-1}$ $= 40\,950$	B2 M1 A1	(4)
2.	(i) $\angle BAC = 180 - (107 + 31) = 42$ $\frac{BC}{\sin 42} = \frac{12.6}{\sin 31}$ $BC = \frac{12.6 \sin 42}{\sin 31} = 16.4 \text{ cm (3sf)}$  (ii) $= \frac{1}{2} \times 12.6 \times 16.37 \times \sin 107 = 98.6 \text{ cm}^2 \text{ (3sf)}$	B1 M1 A1 M1 A1	(5)
3.	$f(x) = \int (4x^{\frac{1}{3}} - 5) dx$ $f(x) = 3x^{\frac{4}{3}} - 5x + c$ (8, 7) $\therefore 7 = 3(\sqrt[3]{8})^4 - 40 + c$ $7 = 48 - 40 + c$ $c = -1$ $f(x) = 3x^{\frac{4}{3}} - 5x - 1$	M1 A2 M1 A1 A1	(6)
4.	$1 - \cos^2 \theta = 4 \cos \theta$ $\cos^2 \theta + 4 \cos \theta - 1 = 0$ $\cos \theta = \frac{-4 \pm \sqrt{16+4}}{2}$ $\cos \theta = -2 - \sqrt{5}$ (no solutions) or $-2 + \sqrt{5}$ $\theta = 76.3, 360 - 76.3$ $\theta = 76.3^\circ, 283.7^\circ$ (1dp)	M1 A1 M1 A1 B1 M1 A1	(7)
5.	(i) $= 3 - \log_8 8^{\frac{2}{3}}$ $= 3 - \frac{2}{3} = \frac{7}{3}$  (ii) $(2^2)^x - 3(2 \times 2^x) = 0$ $(2^x)^2 - 6(2^x) = 0$ $2^x(2^x - 6) = 0$ $2^x = 0$ (no solutions) or 6 $x = \frac{\lg 6}{\lg 2} = 2.58$ (3sf)	B1 M1 A1 A1 M1 M1 A1 M1 A1	(9)
6.	(a) $= 1 + 4x + 6x^2 + 4x^3 + x^4$  (b) (i) $= 1 + 4(\sqrt{2}) + 6(\sqrt{2})^2 + 4(\sqrt{2})^3 + (\sqrt{2})^4$ $= 1 + 4\sqrt{2} + 6(2) + 4(2\sqrt{2}) + 4$ $= 17 + 12\sqrt{2}$  (ii) $(1 - \sqrt{2})^4 = 17 - 12\sqrt{2}$ $(1 - \sqrt{2})^8 = [(1 - \sqrt{2})^4]^2 = (17 - 12\sqrt{2})^2$ $= 289 - 408\sqrt{2} + 288$ $= 577 - 408\sqrt{2}$	M1 A1 M1 M1 A1 B1 M1 M1 A1	(9)

7. (i)  $a + d = 26$   
 $a + 4d = 41$   
 subtracting,  $3d = 15$   
 $d = 5$  M1  
 M1  
 A1
- (ii)  $a = 21$  B1  
 $u_{12} = 21 + (11 \times 5) = 76$  M1 A1
- (iii)  $\frac{n}{2} [42 + 5(n - 1)] = \frac{n}{2} [-24 + 7(n - 1)]$  M1 A1  
 $n(5n + 37) = n(7n - 31)$   
 $2n(n - 34) = 0$  M1  
 $n > 0 \therefore n = 34$  A1 (10)

8. (i)  $p(-2) = 20 \therefore -16 + 4 - 2a + b = 20$  M1  
 $b = 2a + 32$  A1
- (ii)  $p(\frac{1}{2}) = 0 \therefore \frac{1}{4} + \frac{1}{4} + \frac{1}{2}a + b = 0$  M1  
 sub.  $\frac{1}{2} + \frac{1}{2}a + (2a + 32) = 0$  M1  
 $a = -13, b = 6$  A2
- (iii) 
$$\begin{array}{r}
 x^2 + x - 6 \\
 2x - 1 \overline{) 2x^3 + x^2 - 13x + 6} \\
 \underline{2x^3 - x^2} \phantom{+ 6} \\
 2x^2 - 13x \phantom{+ 6} \\
 \underline{2x^2 - x} \phantom{+ 6} \\
 -12x + 6 \\
 \underline{-12x + 6} \\
 0
 \end{array}$$
 M1 A1
- $p(x) = (2x - 1)(x^2 + x - 6)$   
 $p(x) = (2x - 1)(x + 3)(x - 2)$  M1 A1 (10)

9. (i)  $\frac{dy}{dx} = 1 - 2x$  M1  
 grad =  $1 - 2 = -1$  A1  
 grad of normal =  $\frac{-1}{-1} = 1$  M1  
 $y - 5 = 1(x - 1)$  M1  
 $y = x + 4$  A1
- (ii)  $5 + x - x^2 = x + 4$   
 $x^2 - 1 = 0$  M1  
 $x = 1$  (at P) or  $-1 \therefore Q(-1, 3)$  A1
- (iii) area =  $\int_{-1}^1 [(5 + x - x^2) - (x + 4)] dx$  M1  
 $= \int_{-1}^1 (1 - x^2) dx$   
 $= [x - \frac{1}{3}x^3]_{-1}^1$  M1 A1  
 $= (1 - \frac{1}{3}) - (-1 + \frac{1}{3}) = \frac{4}{3}$  M1 A1 (12)

Total (72)