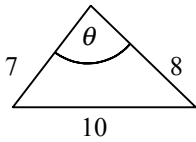


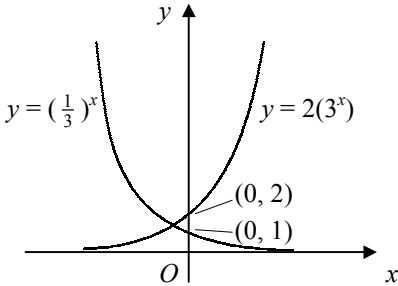
C2 Paper H – Marking Guide

1. (i) $f(-2) = -35 \quad \therefore -24 - 8 - 2k + 9 = -35$ M1
 $k = 6$ A1
- (ii) $= f\left(\frac{2}{3}\right)$ M1
 $= 3\left(\frac{8}{27}\right) - 2\left(\frac{4}{9}\right) + 6\left(\frac{2}{3}\right) + 9 = \frac{8}{9} - \frac{8}{9} + 4 + 9 = 13$ A1 (4)
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2. $x \quad 1 \quad 2 \quad 3 \quad 4$
 $4x + x^{-1} \quad 5 \quad 8\frac{1}{2} \quad 12\frac{1}{3} \quad 16\frac{1}{4}$ M1
 area $\approx \frac{1}{2} \times 1 \times [5 + 16\frac{1}{4} + 2(8\frac{1}{2} + 12\frac{1}{3})]$ B1 M1
 $= 31.5$ (3sf) A1 (4)
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3.  M1
 $10^2 = 7^2 + 8^2 - (2 \times 7 \times 8 \times \cos \theta)$ M1
 $\cos \theta = \frac{49 + 64 - 100}{112} = \frac{13}{112}$ M1
 $\theta = 83.335$ A1
 area $= \frac{1}{2} \times 7 \times 8 \times \sin 83.335$ M1
 $= 27.8 \text{ cm}^2$ (3sf) A1 (5)
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4. $2(1 - \cos^2 x) - 2 \cos x - \cos^2 x = 1$ M1
 $3 \cos^2 x + 2 \cos x - 1 = 0$ A1
 $(3 \cos x - 1)(\cos x + 1) = 0$ M1
 $\cos x = -1$ or $\frac{1}{3}$ A1
 $x = 180$ or $70.5, 360 - 70.5$ B2 M1
 $x = 70.5^\circ$ (1dp), 180° , 289.5° (1dp) A1 (8)
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5. (i) reflection in the y -axis B1
- (ii)  B3
- (iii) $\left(\frac{1}{3}\right)^x = 2(3^x)$ M1
 $1 = 2 \times (3^x)^2$ M1
 $3^{2x} = \frac{1}{2}, \quad 2x = \frac{\lg \frac{1}{2}}{\lg 3}$ M1
 $x = \frac{\lg \frac{1}{2}}{2 \lg 3} = -0.32$ A1
 $3^x = \sqrt{\frac{1}{2}} = \frac{1}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{1}{2} \sqrt{2}$ M1
 $y = 2(3^x) = 2 \times \frac{1}{2} \sqrt{2} = \sqrt{2}$ A1 (9)
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6. (i) $= [\frac{1}{3}x^3 - \frac{5}{2}x^2 + 4x]_1^4$ M1 A2
 $= (\frac{64}{3} - 40 + 16) - (\frac{1}{3} - \frac{5}{2} + 4) = -\frac{9}{2}$ M1 A1

(ii) $= \lim_{k \rightarrow -\infty} [-\frac{1}{3}x^{-3}]_k^{-1}$ M2 A1
 $= \lim_{k \rightarrow -\infty} \{\frac{1}{3} - (-\frac{1}{3k^3})\}$ M1
 $= \lim_{k \rightarrow -\infty} (\frac{1}{3} + \frac{1}{3k^3}) = \frac{1}{3}$ A1 (10)

7. (i) $r = 1.5$
 $u_4 = 1 \times (1.5)^3 = 3.375$ mm M1 A1

(ii) $w = 2 \times S_8$; GP, $a = 1, r = 1.5$ M1
 $= 2 \times \frac{1[(1.5)^8 - 1]}{1.5 - 1}$ M1
 $= 98.516 = 98.5$ mm (3sf) A1

(iii) areas form GP, $a = \pi \times 1^2 = \pi, r = (1.5)^2 = 2.25$ B2
total area $= \frac{\pi[(2.25)^{10} - 1]}{2.25 - 1} = 8354.8$ mm² M1 A1
 $= \frac{8354.8}{10^2}$ cm² = 83.5 cm² (3sf) A1 (10)

8. (i) $(1 + ax)^n = 1 + n(ax) + \frac{n(n-1)}{2}(ax)^2 + \dots$ B2
 $\therefore an = -24$ (1) and $\frac{1}{2}a^2n(n-1) = 270$ (2) M1
(1) $\Rightarrow a = \frac{-24}{n}$
sub. (2) $\frac{288}{n}(n-1) = 270$ M1
 $288n - 288 = 270n$ M1
 $18n = 288$
 $n = \frac{288}{18} = 16, a = -\frac{3}{2}$ A2

(ii) $1 - \frac{3}{2}x = 0.9985 \therefore x = 0.001$ B1
 $\therefore (0.9985)^{16} \approx 1 - 0.024 + 0.000270$ M1
 $= 0.97627$ (5dp) A1 (10)

9. (i) $y = \int (4 - 6x - 3x^2) dx$
 $y = 4x - 3x^2 - x^3 + c$ M1 A2
 $(0, 0) \therefore c = 0$ M1
 $y = 4x - 3x^2 - x^3$ A1

(ii) $4x - 3x^2 - x^3 = 0$
 $-x(x+4)(x-1) = 0$ M1
 $x = 0$ (at O), -4, 1
 $\therefore A(-4, 0), B(1, 0)$ A1

(iii) $= -\int_{-4}^0 (4x - 3x^2 - x^3) dx + \int_0^1 (4x - 3x^2 - x^3) dx$ M1
 $= -[2x^2 - x^3 - \frac{1}{4}x^4]_{-4}^0 + [2x^2 - x^3 - \frac{1}{4}x^4]_0^1$ M1 A1
 $= -[(0) - (32 + 64 - 64)] + [(2 - 1 - \frac{1}{4}) - (0)]$ M1
 $= 32 + \frac{3}{4} = 32\frac{3}{4}$ A1 (12)

Total (72)