

Question number	Scheme	Marks
1. (a)	Uses $f(1) = 9, \Rightarrow a + b = 2$ (o.e)	M1, A1 (2)
(b)	Uses $f(-2) = 0, \Rightarrow -8a + 4b = -28$ (o.e) $\therefore a = 3, b = -1$ (solves to find both values M1)	M1 A1 cao. (4) (6 marks)
2. (i)	Divide: $1 + 2x^{-1}$ Differentiate: $6x^2 + \frac{1}{2}x^{-\frac{1}{2}} - 2x^{-2}$	M1 A1 M1 A2 (1,0) (5)
(ii)	$\frac{x^2}{4} + \frac{x^{-1}}{-1}$ $[]^4 - []_1 = \left(4 - \frac{1}{4}\right) - \left(\frac{1}{4} - 1\right) = 4\frac{1}{2}$	M1 A1A1 M1 A1 (5) (10 marks)
3. (a)	$S = a + (a + d) + (a + 2d) + \dots + [a + (n - 1)d]$ $S = [a + (n - 1)d] + [a + (n - 2)d] + \dots + a$ Add: $2S = n[2a + (n - 1)d] \Rightarrow S = \frac{1}{2}n[2a + (n - 1)d]$	B1 M1 M1 A1 (4)
(b)	$a = 54000$ and $n = 9$ $619200 = \frac{1}{2} \times 9 \times (2 \times 54000 + 8d)$ $d = 3700$	B1 M1 A1ft A1 (4)
(c)	$a + (n - 1)d = a + 10d = 54000 + 10d = \text{£}91000$	M1 A1 (2)
(d)	$ar^{n-1} = 54000 \times 1.06^{10}$ (ft their n) $= \text{£}96700$ (or $\text{£}97000$)	M1 A1ft A1 (3) (13 marks)

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<p>4. (a)</p> <p>(b)</p>	<p>Adding: $\sin(A + B) + \sin(A - B) = 2 \sin A \cos B$</p> <p>$A + B = X$ $A - B = Y$</p> <p style="text-align: center;">$2A = X + Y$</p> <p style="text-align: center;">$A = \frac{1}{2}(X + Y), \quad B = \frac{1}{2}(X - Y)$</p> <p style="text-align: center;">$\sin X + \sin Y = 2 \sin\left(\frac{X + Y}{2}\right) \cos\left(\frac{X - Y}{2}\right)$ *</p> <p>$\sin 4\theta + \sin 2\theta = 2 \sin 3\theta \cos \theta$</p> <p>$\sin 3\theta = 0$ (or $\cos \theta = 0$)</p> <p>$\theta = 0^\circ, 60^\circ, 120^\circ, 240^\circ, 300^\circ$</p> <p>$90^\circ, 270^\circ$</p>	<p>M1</p> <p>M1</p> <p>A1</p> <p>A1 (4)</p> <p>M1</p> <p>M1</p> <p>A1 4 correct</p> <p>A1 6 correct</p> <p>A1 8 correct (5)</p> <p>(9 marks)</p>
<p>5. (a)</p> <p>(b)</p> <p>(c)</p> <p>(d)</p>	<p>$\frac{1}{2}R^2\theta = \frac{49}{2}\theta$ or $\frac{1}{2}r^2\theta = \frac{25}{2}\theta$</p> <p>$\frac{1}{2}R^2\theta - \frac{1}{2}r^2\theta = \frac{49}{2}\theta - \frac{25}{2}\theta = 12\theta$</p> <p>$12\theta = 15$ $\theta = 1.25$ *</p> <p>$R\theta = 7 \times 1.25$ (or $r\theta = 5 \times 1.25$)</p> <p>$R\theta + r\theta + 4 = 8.75 + 6.25 + 4 = 19$ m</p> <p>$\sin 0.625 = \frac{x}{5}$ $AD = 2x$ (= 5.851 m)</p> <p>$6.25 - 5.85 = 0.399$ 40 cm (M dep on previous M)</p>	<p>B1</p> <p>M1A1 (3)</p> <p>M1 A1 (2)</p> <p>B1</p> <p>M1 A1 (3)</p> <p>M1</p> <p>M1 A1 (3)</p> <p>(11 marks)</p>

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<p>6. (a)</p>	<p>EITHER expanding Using coefficients 1, 5, 10, 10, 5, 1 as necessary Using powers x^5 $2x^4$ 2^2x^3 etc as necessary Completing the method $A = 64$ $B = 160, C = 20$</p> <p>OR substituting values for x $x = \quad \rightarrow \quad A = 64$</p> <p>Forming a first equation in B and C Forming a second equation in B and C Solving to complete the method down to either $B =$ or $C =$ $B = 160, C = 20$</p> <p>(b) Candidates values of A, B, C used to form $20x^4 + 160x^2 + 64 = 349$ $4y^2 + 32y - 57 = 0$ (3 term quadratic needed) Solving for y Replacing by x^2 and completing to obtain all relevant values of x $\pm \sqrt{\frac{3}{2}}$ or AWRT ± 1.22</p>	<p>M1 M1 M1 B1 A2, 1,0 (6)</p> <p>B1 M1 M1 M1 A2, 1, 0</p> <p>M1 A1 ft M1 M1 A1 cao (5)</p> <p>(11 marks)</p>

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7. (a)	$x(x^2 - 6x + 5)$	M1
	$x(x - 1)(x - 5)$	M1 A1 (3)
(b)	1 and 5	B1 ft (1)
(c)	$\frac{dy}{dx} = 3x^2 - 12x + 5$	M1 A1
	At $x = 1$, $\frac{dy}{dx} = 3 - 12 + 5 = -4$	A1 (3)
(d)	$\int (x^3 - 6x^2 + 5x)dx = \frac{x^4}{4} - \frac{6x^3}{3} + \frac{5x^2}{2}$	M1 A1
	$[\dots]_0^1 = \frac{1}{4} - 2 + \frac{5}{2} \quad (= \frac{3}{4}) \quad R$	M1 A1ft
	Evaluating at 5: $\frac{625}{4} - 250 + \frac{125}{2} \quad (= -31\frac{1}{4})$	A1
	To find S : $-31\frac{1}{4} - \frac{3}{4} = -32$	M1
	Total Area = $32 + \frac{3}{4} = 32\frac{3}{4}$	A1 (7)
		(14 marks)