1. a) $a = 6$, $b = -1$, $c = -2$ c.a.o B1 B1 B1

b) $(3x-2)(2x+1)$ M1

$x = 1, -\frac{1}{2}, \frac{2}{3}$ A2 −1 eeoo

2. a) $(4, -3)$ B1 B1

b) ATTEMPTS $(x-4)^2 - 16$ OR $(y+3)^2 - 9$ M1

RADIUS $= 5$ c.a.o A1

c) $5^2 + "x^2" = 10^2$ M1

$|AC| = 5\sqrt{3}$ A1 dep

3. $\sin x - \cos x = 2\cos x$ M1

$\sin x = 3\cos x$ M1

$\tan x = 3$ A1

$71.57\ldots$ A1

$251.57\ldots$ A1

4. $\left(\frac{dy}{dx} = \right) 3x^2 - \quad + 12$ B1

$\left(\frac{d^2y}{dx^2} = \right) = 6x - 12$ B1

SETS THEIR "$\frac{dy}{dx}$" $= 0$ M1

$(x-2)^2 = 0$ A1

$x = 2 \cdot y = 3$ A1 A1

$\left.\frac{d^2y}{dx^2}\right|_{x=2} = 0$ M1

CONCLUDES THAT IT IS A POINT OF INFLEXION (REGARDLESS) A1

5. CORRECT STRUCTURE E.g $\frac{\text{THICKNESS}}{2}\left[\text{FIRST} + \text{LAST} + 2\times\text{REST}\right]$ M1

B1

$$\frac{3}{2}\left[3.85 + 0 + 2(5.20 + 5.50 + 5.20 + 3.85 + 3)\right]$$ M1

awrt 74 A1

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6. a) $\log 5^{2x-1} = \log 4^{300}$ M1

$(2x-1)\log 5$ OR $300\log 4$ M1

A.W.R.T 130 A1

b) $2^{y+1} \times 2^{y} = 10$ O.E. M1

$2^{2y+1} = 10$ M1

$\log 2^{2y+1} = \log 10$ O.E M1

$(2y+1)\log 2 = \log 10$ M1

$y = 1.16\ldots$ A1

ALTERNATIVE FOR (b)

$\log\left(2^{y+1}\right) = \log\left(\frac{10}{2^y}\right)$ M1

$(y+1)\log 2 = \log 10 - \log 2^y$ M1 M1

$(2y+1)\log 2 = \log 10$ M1

$y = 1.16\ldots$ A1

7. a) $20^2 = 12^2 + 12^2 - 2 \times 12 \times 12 \cos\theta$ M1

$288\cos\theta = -112$ o.e. M1

Shows 1.97 SUBJECT TO SHOWING $\cos\theta = -\frac{7}{18}$ O.E A1

ALTERNATIVE

$\sin\phi = \frac{10}{12}$ O.E M1

$\phi = 0.9851...$ M1

$\theta = 2 \times 0.9851$ A1

b) $\frac{1}{2} \times 17^2 \times 1.97$ M1

$\frac{1}{2} \times 12 \times 12 \times \sin 1.46$ M1

284.697... OR 66.332 A1

A.W.R.T 218 OR 219 A1

c) $2\pi - 1.97$ OR 4.31 B1

USES $L = r\theta$ e.g. $12 \times$ "4.31" $= 51.7$

12×1.97

13.1×1.97 M1

$15 \times$ "4.31" $= 65.943$

"51.72" $\div 0.82$ OR "65.943" $\div 0.82$ M1

63 OR 80 A1

17 c.a.o A1 dep

ACCEPT $\frac{\text{"65.943"} - \text{"51.72"}}{0.82}$ AS ALTERNATIVE APPROACH FOR THE LAST THREE MARKS

8. $a + ar + ar^2 = 33500$ OR $\frac{a(r^3-1)}{r-1} = 33500$ M1

$1 + r + r^2 = \frac{67}{4}$ M1

$4r^2 + 4r - 63 = 0$ A1

FACTORIZES OR USES QUADRATIC FORMULA ETC M1

$r = \frac{7}{2}$, $-\frac{9}{2}$ A1

$2000 \times \left(\frac{7}{2}\right)^2$ OR 24500 A1

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9. $(x-5)(x-1)$ M1

IMPLIES $A(1,0)$ $B(5,0)$ A1 dep

$\int_5^7 x^2 - 6x + 5 \, dx$ M1 M1 (ONE MARK THE LIMITS)

$\frac{1}{3}x^3 - 3x^2 + 5x$ M1

$\left(\frac{343}{3} - 147 + 35\right) - \left(\frac{125}{3} - 75 + 25\right)$ OR $\frac{7}{3} - \left(-\frac{25}{3}\right)$ M1

$\frac{1}{2} \times 6 \times 12$ OR 36 B1

"36" $- \frac{32}{3}$ OR $\frac{76}{3}$ A1

10. ATTEMPTS BINOMIAL EXPANSION (ALLOW 1 SMALL ERROR) M1

nax , $\frac{1}{2}n(n-1)a^2x^2$, $\frac{1}{6}n(n-1)(n-2)a^3x^3$ A1

SIMPLIFIES TWO OUT THREE OF THESE TERMS

$na = -30$ OR $\frac{1}{2}n(n-1)a^2 = 405$ M1

ATTEMPTS SOLUTION OF THE ABOVE EQUATIONS M1

$n = 10$ A1

$a = -3$ A1

$\frac{1}{6} \times 10 \times 9 \times 8 \times (-3)^2$ M1

$b = -3240$ A1

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11. $A = 5$ B1

$B = 40$ B1

$C = 5$ B1

$D = 50$ B1