1. a) $1 + 24x + 264x^2 + 1760x^3 + 7920x^4$ B4

b) $x = 0.01$ OR SIGHT OF 0.01 B1

$1 + "24"(0.01) + "264"(0.01)^2 + "1760"(0.01)^3 + "7920"(0.01)^4$ M1

1.2682392 c.a.o A1

c) 0.0000026 o.e B1

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2. $(-k)^2 - 4(-k) + 12 = 3[k^2 - 4k + 12]$

M1 FOR EITHER SIDE
M1 FOR ALL CORRECT INC EQUATION

$2k^2 - 16k + 24$ OR $k^2 - 8k + 12$ M1

$(k-2)(k-6)$ M1

$k = \begin{matrix} 2 \\ 6 \end{matrix}$ A1 BOTH

---

3. a) $3^x = 450$ M1

USES LOGS ON EQUATION M1

SIGHT OF $x \log 3$ B1

$x = \dfrac{\log 450}{\log 3}$ OR A.W.R.T 5.56 A1

b) $\log_2\left(\dfrac{7y-1}{y-1}\right)$ B1

SIGHT OF 2^3 OR $3\log 2$ B1

$\dfrac{7y-1}{y-1} = 8$ A1

SOLVES EQUATION M1

$y = 7$ c.a.o A1

4. a) $\frac{"x"}{\sin 60} = \frac{6}{\sin 45}$ M1

$(x =)\ 7.35\ldots$ A1

b) $\frac{1}{2} \times 6 \times 7.35\ldots$ M1

$21.3\ldots$ A1

c) $\frac{1}{2} \times 6 \times h = "21.3"$ M1

$h \simeq 7.10\ldots$ A1

d) USE OF COSINE RULE WITH $"7.35\ldots", 6$ & $\theta = 105$ M1

$10.6\ldots$ A1

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5. a) $(x-2)^2 + (y-5)^2 = \sqrt{10}^2$ B1 B1

EXPANDS CORRECTLY TO ANSWER A1 ← dep on both marks

b) SOLVES SIMULTANEOUS EQUATIONS BY SUBSTITUTION M1

$x^2 - 2x - 3$ OR $y^2 - 12y + 32$ A1

EITHER $x = \begin{cases} 3 \\ 8 \end{cases}$ AND/OR $y = \begin{cases} 8 \\ 4 \end{cases}$ A1 A1

c) ATTEMPT AT PQ f.t. $\sqrt{(4-8)^2 + (-1-3)^2}$ M1

SIGHT OF $4\sqrt{2}$ A1

USE OF PYTHAGORAS $x^2 + (2\sqrt{2})^2 = (\sqrt{10})^2$ M1

SOLVES TO $\sqrt{2}$ A1

ALTERNATIVE

- ATTEMPTS MIDPOINT OF PQ AS $(1, 6)$ M1 A1
- ATTEMPT AT $|PQ|$ f.t. $\sqrt{(6-5)^2 + (1-2)^2}$ M1
- CONVINCINGLY GIVES ANSWER AS $\sqrt{2}$ A1

6. a) $A(0,2)$ B1

$B(\pi,-4)$ B1

b) $3\cos x - 1 = 0$ M1

$\cos x = \frac{1}{3}$ A1

$x = 1.23^c$ OR $(1.23, 0)$ A1

$x = 5.05$ OR $(5.05, 0)$ A1

---

7. a) $250 \times 0.9^2 = 202.5$ SEEN IN FULL A1

b) 250×0.9^{12} M1

A.W.R.T 60.71 A1

c) $250 \times 0.9 + 250 \times 0.9^2 + 250 \times 0.9^3 + \cdots + 250 \times 0.9^{11} + 250 \times 0.9^{12}$ M1

$\frac{225 \cdot (1 - 0.9^{12})}{1 - 0.9}$ OR $\frac{0.9(1 - 0.9^{12})}{1 - 0.9}$

M1 FOR STRUCTURE
M1 FOR $a = 225$ OR 0.9
M1 FOR $r = 0.9$

A.W.R.T 1615 A1

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8. a) $\frac{1}{2} r^2\theta \times h = 1000$ OR $\frac{1}{2} r^2 \times 2 \times h = 1000$ M1

$r^2 h = 1000$ A1

ATTEMPT TO FIND SURFACE AREA (ALLOW 1 MINOR ERROR) M1

USE OF $l = r\theta$ TO FIND CURVED FACE B1

SUBS $h = \frac{1000}{r^2}$ O.E & OBTAINS CORRECT ANSWER A1 (A.G)

b) $4r - 4000r^{-2}$ M1

SOLVED FOR ZERO M1

ATTEMPT AT EQUATION M1

$r = 10$ A1

$h = 10$ A1

SIGHT OF $4 + 8000r^{-3}$ B1

SUB INTO 2ND DERIVATIVE, > 0 $\therefore$ MIN A1

9.

IMPLIES $A(2,4)$, $B(6,4)$, $C(0,16)$ } ANY TWO OF THESE... B1 B1

(MAY SHOW ONLY $x=2$ $x=6$ & $y=16$)

$\int (x-4)^2 \, dx$ M1

$\frac{1}{3}x^3 - 4x^2 + 16x$ OR $\frac{1}{3}(x-4)^3$ M1

$[\ldots]^2 - [\ldots]^0$ M1

$\frac{56}{3}$ A1

ATTEMPTS A CORRECT APPROACH INC TRIANGLES, RECTANGLE, TRAPEZIUM ETC M1

GIVES FINAL ANSWER AS $\frac{76}{3}$ O.E A1