1. IMPLIES OR USES GAP OF 0.25 A1

stbns 1 $\frac{2}{3}$ $2-\sqrt{2}$ $4-2\sqrt{3}$ $\frac{1}{2}$

(0.5858) (0.5359)

ALLOW ONE ERROR BUT MUST HAVE 5 ANSWERS M1

$\frac{0.25}{2}\left[\text{"1"} + \text{"}\tfrac{2}{3}\text{"} + 2\left(\tfrac{2}{3} + \text{"}2-\sqrt{2}\text{"} + \text{"}4-2\sqrt{3}\text{"}\right)\right]$

M1 M1

0.635 A1 (C.a.o)

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2 $162 = 32 \times r^4$ M1

$r^4 = \frac{81}{64}$ o.e M1

$r = \frac{3}{2}$ A1

stbns 72 AS FINAL ANSWER A1

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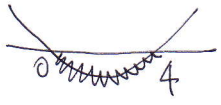
3. $\left(\frac{dy}{dx} =\right) 3x - 12x$ M1

$3x^2 - 12x < 0$ M1

stbns 0 & 4 BOTH A1



OR SIMILAR METHOD M1

$0 < x < 4$ (ALLOW $\leq$) A1 dep

4. a) $70^2 = 37^2 + 37^2 - 2\times37\times37\cos\theta$ M1

$2738\cos\theta = -262$ OR $\cos\theta = -\frac{1081}{1369} \approx -0.7896..$ A1

Shows 2.481^c as final answer A1 dep

ALTERNATIVE $\sin\frac{1}{2}\theta = \frac{35}{37}$ M1

$\frac{1}{2}\theta = 1.24049$ A1

$\theta = 2\times1.24044 = 2.481^c$ A1

b) I) 37×2.481^c M1

91.80 (a.w.r.t 91.8)

ACCEPT 92 A1

II) Use of PYTHAGORAS e.g. $x^2 + 35^2 = 37^2$ M1

OR $37^2 = 35^2$

Shows 12 A1 c.a.o

III) $\frac{1}{2}\times37^2\times2.481$ M1

1698.243.... ACCEPT 1698 A1

Shows 420 B1

GIVES FINAL ANSWER W.R.T. 1278 A1

5. $64 + 192kx + 240k^2x^2 + 160k^3x^3 + \ldots$ A1 A2 −1 eeoo

$192k = 240k^2$ M1

$k = \frac{4}{5}$ A1

$(a = 64)$ ALREADY STATED

$b = 153.6$ A1

$c = 81.92$ A1

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6. a) SUBSTITUTES $x = -2$ AND GETS ZERO CONVINCINGLY M1 A1

$(x+2)(-x^2+4)$ M1

$(x+2)(2-x)(2+x)$ OR EQUIVALENT A1

STATES $B(2,0)$ DEP ON SHOWING $(2-x)$ OR $(x-2)$ CORRECTLY A1

b) $\frac{dy}{dx} = 4 - 4x - 3x^2$ M1

SOLVES "$\frac{dy}{dx}$" $= 0$ M1

$(x+2)(3x-2)$ A1

$C\left(\frac{2}{3}, \frac{256}{27}\right)$ B1 B1

c) $\int_{-2}^{2} 8 + 4x - 2x^2 - x^3 \, dx$ M2 ONE MARK FOR $\int 8+4x-2x^2-x^3\,dx$ ONE MARK FOR LIMITS

$8x + 2x^2 - \frac{2}{3}x^3 - \frac{1}{4}x^4$ A1

$\left(16 + 8 - \frac{16}{3} - 4\right) - \left(-16 + 8 + \frac{16}{3} - 4\right)$ OR $\frac{44}{3} - \left(-\frac{20}{3}\right)$ M1

$\frac{64}{3}$ c.a.o A1

7. a) Sfons $\sqrt{(17-7)^2+(0-2)^2} = \sqrt{104}$ M1

$(x-7)^2 + (y-2)^2 = "104"$ A3

b) SUBS $x=0$ INTO THEIR EQUATION
eg $49 + (y-2)^2 = "104"$) M1

$(y-2)^2 = 55$ OR "EXPANDS" A1

Sfons $2 \pm \sqrt{55}$ A1

CONVINCINGLY CONCLUDES BY REFERRING TO P & S
OR $(2+\sqrt{55}) - (2-\sqrt{55})$) A1

c) SUBS $y=0$ INTO THEIR ~~ORIG~~ EQUATION M1

Sfons -3 & 17 A1

$\frac{1}{2} \times 20 \times (2+\sqrt{55}) + \frac{1}{2} \times 20 \times (2-\sqrt{55})$ M2 TRIANGULATES + METHOD FOR ONE TRIANGLE

$20\sqrt{55}$ A1

8.

$\log_3 t^3$ B1

$\log_3 \frac{8}{t^3}$ B1

$\frac{8}{t^3} = 27$ A1

$t^3 = \frac{8}{27}$ M1

$t = \frac{2}{3}$ A1

9. a) SUB $x=4$ e.g. $4\times4^3-4\times4^2-\frac{1}{2}\times4+2$
OR $64-64\ \ 2+2$ M1

Shows 0 & CONCLUDES A1

b) $(x-4)(x^2+bx+c)$ M1

$(x-4)(x^2-\frac{1}{2})$ A1

c) Shows

$(\cos\theta-4)(\cos^2\theta-\frac{1}{2})$ M1

$\cos\theta=\pm\sqrt{\frac{1}{2}}$ OR $\pm\frac{\sqrt{2}}{2}$ O.E A1

45, 135, 225, 315 A4