1. $117°$ SEEN B1

243 SEEN <u>OR</u> -117 SEEN B1

$92°$ OR $218°$ SEEN B1

$46°, 226°, 109°, 289°$ A3

2 SHOWS OR IMPLIES A <u>GAP</u> OF 0.4 B1

SHOWS 1, 1.0756, 1.1802, 1.3015, 1.4340, 1.5748

(AT <u>LEAST</u> 2 d.p)

$\frac{0.4}{2}\left["1"+"1.5748"+2\left("1.0756"+"1.1802"+"1.3015"+"1.4340"\right)\right]$

M1 CORRECT STRUCTURE

M1 ALL CORRECT (ft)

a.w.r.t 2.5 A1

3. a) $|OA|$ OR $|OB| = 10$ B1

$|AB| = \sqrt{8}$ B1

$"\sqrt{8}^2 = 10^2 + 10^2 - 2\times10\times10\cos\theta"$ OR SIMILAR M1

$\cos\theta = 0.96$ o.e

<u>AND</u> SHOWS 0.2838^c A1

<u>ALTERNATIVE</u>

$\tan"\phi" = \frac{6}{8}$ M1

SIGHT OF 0.6435... A1

$\frac{\pi}{2} - 2\times0.6435...$ M1

SIGHT OF 0.2838^c A1 } dep

b) $|OA|$ OR $|OB| = 10$ (MAY APPEAR IN (a)) B1 ← THIS MARK CAN BE EARNED TWICE ONLY IF <u>ALL 4 MARKS</u> HAVE BEEN EARNED IN PART (a) USING THE COSINE RULE METHOD

$\frac{1}{2}\times10^2\times0.2838^c$ M1

a.w.r.t 14.2 A1

4. a) $\log_a 4 + \log_a 25$ B1

$2\log 5$ B1

$p + 2q$ A1

dep on at least out of these marks

b) $\log_a 2 - \log_a 5$ B1

$\log_a 4^{\frac{1}{2}}$ OR $2 \times \frac{1}{2}\log 4$ B1

$\frac{1}{2}p - q$ A1

dep on at least one of these marks

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5. $\binom{5}{0}(2)^5(kx)^0$ OR 2^5 + $\binom{5}{1}(2)^4(kx)^1$ OR $\frac{5}{1}\times 2^4 \times kx$ + $\binom{5}{2}(2)^3(kx)^2$ OR $\frac{5\times4}{2!}\times 2^3 \times k^2x^2$ ← OR SIMILAR B3

$32 + 80kx + 80k^2x^2$ A1 (All correct)

SIGHT OF $\underline{\underline{-160}}$ OR DECENT ATTEMPT TO MULTIPLY OUT B1

"$80k^2 - 160k = 240$"

$k^2 - 2k - 3 = 0$ OR M1

$(k-3)(k+1)$ A1

$k = 3, -1$ A1 both

6. a) $(x-6)^2 + (y-3)^2 = 36$ A3

b) ATTEMPT TO FIND $|PQ|$ M1

SIGHT OF $\sqrt{85}$ A1

USES PYTHAGORAS, "$6^2 + |QR|^2 = 85$". M1

$|QR| = 7$ A1

Allow 4 marks if 7 is stated with correct Justification
that (12,10) IS DIRECTLY ABOVE (12,3)

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7. a) $\dfrac{y}{\frac{4}{5}} = \dfrac{x}{\frac{8}{17}}$ M1

ELIMINATES DENOMINATORS

e.g $\frac{8}{17}y = \frac{4}{5}x$ OR $\frac{5y}{4} = \frac{17x}{8}$ M1

ELIMINATES DENOMINATORS AGAIN

e.g. $8y = \frac{68}{5}x$ OR $40y = 68x$ M1

show $y = 1.7$ A1 dep

b) $\frac{1}{2}xy \times \frac{84}{85} = 21$ M1

$xy = 42.5$ o.e M1

$x(1.7x) = 42.5$ M1

$x = 5$ A1

$y = 8.5$ A1 ft

8. a) I) SIGHT OF $\underline{r=3}$ MUST MENTION $r=3$ OR COMMON RATIO $= 3$

3^{n-1}

II) $\dfrac{1(1-3^n)}{1-3}$ M2 ONE FOR SUMMATION OF G.P ONE FOR <u>ALL</u> CORRECT

SIMPLIFIES TO $\frac{1}{2}(3^n-1)$ OR $-\frac{1}{2}(1-3^n)$ OR $\dfrac{3^n-1}{2}$ OR SIMILAR A1

b) $\frac{1}{2}(3^n-1) = 1093$ M1

SIGHT OF 7 M1 dep

729 FLOWERS A1 dep

c) SIGHT OF 2187 B1

IMPLIES $n=8$ A1 dep

3280 A1 dep

9. a) $(-3)^3 + (-3)^2 - (-3) + 15$ OR $-27 + 9 + 3 + 15$ M1

SHOWS ZERO + CONCLUSION A1

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

SOLVES "THEIR $f'(x)$" $= 0$ B1

$(3x-1)(x+1)$ A1

$(-1, 16)$ A1

$\left(\frac{1}{3}, \frac{400}{27}\right)$ A1

c) INDICATES CURVE CROSSES AT $x = -3$ B1

$\frac{1}{2} \times 1 \times 16 = 8$ B1

$\int_{-3}^{-1} x^3 + x^2 - x + 15 \, dx$ M1 M1 (ONE MARK FOR LIMITS)

$\frac{1}{4}x^4 + \frac{1}{3}x^3 - \frac{1}{2}x^2 + 15x$ M1

$\left(-\frac{187}{12}\right) - \left(-\frac{153}{4}\right)$ OR EVIDENCE OF METHOD M1

$\frac{68}{3}$ A1

"$8 + \frac{68}{3}$" OR $\frac{92}{3}$ A1

OR $30\frac{2}{3}$