

1. a) MIDPOINT  $(-3, 1)$  B1 B1

ATTEMPTS TO FIND  $|BC|$ ,  $|AC|$  OR  $|AB|$  M1

GIVES  $r=5$  A1

b) " $(x+3)^2 + (y-1)^2 = 25$ " B1

SUBS  $x=0$  M1

SOLVES & SIMPLIFIES QUADRATIC M1

$a = \begin{matrix} 5 \\ -3 \end{matrix}$  BOTH A1

2.  $f'(x) = 1 - 25x^{-2}$  B1 B1 (ONE MARK FOR ATTEMPTING DIFFERENTIATION)

$f''(x) = \frac{50}{x^3}$  B1

" $1 - 25x^{-2} = 0$ " M1 ~~ft~~

SOLVES EQUATION M1

$x = \pm 5$  A1

GIVES FIVE WORDS AS  $(5, 20)$   $(-5, 0)$  A1

SUBS INTO  $\frac{50}{x^3}$  M1

CONCLUDES  $(5, 20)$  IS MIN &  $(-5, 0)$  IS MAX A1

3. a)  $ar^2 = 4$  OR  $ar^5 = 6.912$  B1

SOLVS BY DIVISION OR SUBSTITUTION M1

$r = 1.2 = \frac{6}{5}$  A1 c.u.o

$a = \frac{25}{9}$  A1 c.a.o

b) " $\frac{25(1.2^{10} - 1)}{1.2 - 1}$ " OR SIMILAR M1

72.1... A1

4.  $\int x^3 - 4x \, dx$  BI

$\int_0^2$  BI

$\int_2^{\sqrt{8}}$  BI

$\frac{1}{4}x^4 - 2x^2$  MI

$(4-8) - (0)$  OR  $(16-16) - (4-8)$  MI

OBTAINS -4 & 4 AI (both) ← dgp

STATS OR INPUT BOTH AREAS ARE 4 EI

5.

$2r + r\theta = 33$  BI BI (ONT MARK FOR  $r\theta$ )

$\frac{1}{2}r^2\theta = 67.5$  BI

ATTEMPT SOLUTION BY SUBSTITUTION MI

$2r^2 - 33r + 135$  OR  $15\theta^2 - 61\theta + 60$  AI

$(2r-15)(r-9)$  -  $(3\theta-5)(5\theta-12)$  MI

OR ATTEMPT IN QUADRATIC FORMULA

GIVES CORRECT PAIRINGS

$r=9$  WITH  $\theta = \frac{5}{3}$

$r = \frac{15}{2}$  WITH  $\theta = \frac{12}{5}$

43 -1 eeo

6. a)

USES GAP  $\frac{\pi}{12}$  B1

ATTEMPTS CORRECT EVALUATIONS OF  $\cos^2 x$  FOR THEIR  
 $x$  VALUES (AT LEAST 2 NON ZERO VALUES) B1

USES  $\frac{\text{THICKNESSES}}{2}$  [ FIRST + LAST + 2  $\times$  REST ] M1

$$\frac{\pi/12}{2} \left[ 1 + \frac{1}{4} + 2 \left( \frac{2+\sqrt{3}}{4} + \frac{3}{4} + \frac{1}{2} \right) \right] \text{ M1}$$

0.735 A1

b)

USE OF  $1 - \cos^2 x$  B1

SPITS INTO  $\int_0^{\pi/3} 1 \, dx$  &  $\int_0^{\pi/3} \cos^2 x \, dx$  M1

GIVES  $\frac{\pi}{3}$  M1

A.W.R.T 0.312 A1

7.

$\pi - (1.1 + 0.7)$  OR  $1.3416^\circ$  B1

USES SINE RULE TO FIND AC OR BC M1

$$|BC| = 56.229... \text{ OR } |AC| = 77.787... \text{ A1}$$

USES TRIGONOMETRY ON RIGHT ANGLE TRIANGLE CORRECTLY M1 A1

STOPS 50.1112... A1

8. a) SUBSTITUTES  $x=1$  INTO  $f(x)$  M1  
 SHOWS 0 AND CONCLUDES A1

b)  $(x-1)(x^2+ax+b)$  M1

$(x-1)(x^2-3)$  M1

$(x-1)(x-\sqrt{3})(x+\sqrt{3})$  A1

c) SHOWS  $\tan\theta = 1$  OR  $\sqrt{3}$  OR  $-\sqrt{3}$  M1

SLOPE OF 45 OR 60 OR -60 M1

$45^\circ, 60^\circ, 120^\circ, 225^\circ, 240^\circ, 300^\circ$  A4 -1 e e o o

9.  $x = y^5$  B1

$\log_2\left(\frac{x}{y}\right)$  B1

$\log_2 4$  B1

$\frac{x}{y} = 4$  B1

$y^5 = 4y$  OR  $x^5 = 1024x$  M1

$y^2 = 2$  OR  $x^2 = 32$  A1

$y = \sqrt{2}$  A1 C.a.o

$x = 4\sqrt{2}$  A1 C.a.o

10. SLOPE OF  $\binom{13}{7}$  OR  $\binom{13}{6}$  OR IN THE 2ND PART  $\binom{1}{7}$   $\binom{14}{6}$  OR  $\binom{14}{8}$  M1

a) 1716 A1

b) 3003 A1