1. a) ATTEMPT $P(2)$ e.g $16-44+40-12$ M1

OBTAINS ZERO & CONCLUDES A1

b) $(x-2)(2x^2-7x+6)$ M1

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

c) -112 c.a.o A1

d) $a = -15$ A1

$b = 50$ A1

$c = -112$ A1

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2 a) $(4,2)$ B1, B1

$\sqrt{20}$ OR $2\sqrt{5}$ B1

b) SIGHT OF $y^2 = 4y$ OR $x^2 = 8x$ o.e M1

$(8,0)$ & $(0,4)$ A1 A1

c)
- CIRCLE THROUGH O
- CENTRE IN 1st QUADRANT
- $(8,0)$ $(0,4)$ MARKED

G2 −1 eeoo

d) $AOB = 90° \Rightarrow AB$ IS A DIAMETER

MUST BE SEEN OR "ALL" IMPLIED

A1

so $4\sqrt{5}$ OR $\sqrt{20}$

(ALLOW $\sqrt{40}$ INCORRECTLY IF REASON IS CORRECT)

3. $\log_2\left(\frac{2z+1}{z}\right)$ OR $\log_2(4z)$ M1

$\frac{2z+1}{z} = 4$ O.E M1

$z = \frac{1}{2}$ C.A.O A1

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4. a) USE OF PYTHAGORAS M1

OBTAINS HEIGHT 24 M1

AREA = 168 A1

b) (a|b)

USE OF COSINE RULE M1

$\cos\theta = \frac{527}{625} \approx 0.843\ldots$ M1

$\theta = 0.5675\ldots$ A1

$\frac{1}{2} \times 25 \times 25 \times \sin(0.5675\ldots)$ M1

A.W.T 168 A1

b) USE OF COSINE RULE M1

ALL CORRECT TO ANSWER A1

b) OR

$\sin\theta = \frac{7}{25}$

$\cos\theta = \frac{24}{25}$

$\tan\theta = \frac{7}{24}$

} ANY OF THESE O.E M1

$2 \times 0.2837\ldots = 0.568$ A1

c) AREA OF SEMICIRCLE $= \frac{1}{2} \times \pi \times 7^2$ OR A.W.RT 76.97 B1

AREA OF SECTOR $= \frac{1}{2} \times 25^2 \times 0.5675\ldots$ OR A.W.R.T. 177 OR 178

FINAL ANSWER 67.5 ± 0.5 A1

5. a) $\frac{k}{2k-5} = \frac{k-6}{k}$ o.e B1

REARRANGES CORRECTLY & CONVINCINGLY TO ANSWER GIVEN M1A1

b) FACTORIZES $(k-2)(k-15)$ OR SIGHT OF 2 & 15 M1

$-1, 2, -4$ OR $25, 15, 9$ SEEN B1

$\frac{25}{1-\frac{3}{5}}$ M1 "STRUCTURE"

M1 ALL CORRECT

$\frac{125}{2}$ C.a.o A1

(o.e

c) $\frac{-1\left((-2)^{10}-1\right)}{-2-1}$ o.e e.g $\frac{-1\left(1-(-2)^{10}\right)}{1-(-2)}$ M1

341 C.a.o A1

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6. a) $k^n + nk^{n-1}x + \frac{1}{2}n(n-1)k^{n-2}x^2 + \frac{1}{6}n(n-1)(n-2)k^{n-3}x^3$ M1 M1

SETS COEFFICIENTS EQUAL & DIVIDES OUT $n(n-1)$ / DIVIDES k^{n-2} M1 M1

CONVINCINGLY GETS THE ANSWER $n = 3k+2$ A1

b) $\binom{8}{4}2^4x^4$ M1

1120 C.a.o A1

7. a) $\frac{1}{2}x^2 \sin 60$ or $\frac{1}{4}x^2\sqrt{3}$ B1

$3xy + "\frac{1}{4}x^2\sqrt{3}" \times 2 = 54\sqrt{3}$ M1

$V = "\frac{1}{4}x^2\sqrt{3}" \times y$ M1

SUBS AN EXPRESSION FOR y M1

OBTAINS ANSWER GIVEN CONVINCINGLY A1

b) $\left(\frac{dV}{dx} =\right) \frac{27}{2} - \frac{3}{8}x^2$ M1

$"\frac{27}{2} - \frac{3}{8}x^2" = 0$ M1

OBTAINS CORRECTLY $x = 6$ A1

$\left(\frac{d^2V}{dx^2}\right) = -\frac{3}{4}x$ M1

SUBS $x=6$ INTO EITHER "$\frac{dV}{dx}$" OR "$\frac{d^2V}{dx^2}$", OBTAINS NEGATIVE & STATES MAX M1

STATES $\left(V_{MAX}\right) = 54$ A1

c) SUBS $x=6$ INTO EITHER $"3xy + \frac{1}{4}x^2\sqrt{3} \times 2 = 54\sqrt{3}"$ M1

OBTAINS $y = 2\sqrt{3} \simeq 3.46$ O.E A1

8. a)

$-3 = P+Q$
$5 = P+Q$ OR MENTION OF TRANSFORMATIONS M1

$P=1$ A1 → dep ON A METHOD
$Q=-4$ A1 →

b) "$4\cos 2x - 1$" $= 0$ B1

$\cos 2x = \frac{1}{4}$ M1

SIGHT OF 1.3181... B1 $(\pm 75.52°...)$

OR SIGHT OF 4.9651... B1 $(284.48°...)$

A.W.R.T $0.66°, 2.48°, 3.80°, 5.62°, 6.94°, 8.77°$ -1 eeo A2

(IGNORE EXTRAS)

(ALLOW WORKINGS IN DEGREES EXCEPT FINAL TWO ANSWER MARKS)

9.

ATTEMPTS TO FIND INTERSECTIONS WITH $y=8$ OR WITH $y=5$ M1

SOLNS TOGETHER 1 & 3 OR (1,8) (3,8) MA1

SOLNS TOGETHER 0 & 4 OR (0,5) (4,5) MA1

$\int 5 + 4x - x^2 \, dx$ LIMITS $\int_0^1$ OR $\int_3^4$ M1 M1

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

$[\ldots] - [\ldots]$ THEIR LIMITS M1

SIGHT OF $\frac{20}{3}$, $\frac{5}{3}$, 5 AND/OR 6 ADD/SUBTRACTED (AT LEAST TWO OF THESE SEEN) M1

FINAL ANSWER $\frac{20}{3}$ A1 c.a.o