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Qn		**Working**	**Answer**	**Mark**		**Notes**
1	(a)		All 5 points plotted	2	B1 B1	for at least 2 correct points plotted for all points plotted correctly
	(b)		40%	2	B1 B1	for line of best that can be used to estimate percentage score on paper 2 for 39 – 44%
	(c)		reason	1	C1	for reason, e.g. lobf can vary, data is only a sample, scale cannot be read exactly
	(d)		1	2	M1 A1	for method to find gradient, eg triangle drawn with "change in distance ÷ change in time for 0.9-1.4
	(e)		interpretation given	1	C1	as the score in paper 1increases, the score in paper 2 increases.
2	(a)		Enlargement, SF2, centre (1,3)	2	B1 B1	for enlargement and scale factor 2 for centre (1,3)
	(b)		Reflection in $y = x$	2	B1 B1	for reflection for mirror line $y = x$
3		$12(3x + 5) = 10(4x - 3)$ $36x + 60 = 40x - 30$ $90 = 4x; x = 22.5$ $2\big((4 \times 22.5) - 3\big) + 20 = 200$	194cm	5	P1 P1 P1 A1 B1	for process of forming an expression for one area for process of forming an equation to find value of x for complete process to solve the equation for $4x = 90$ or $x = 22.5$ ft using value of x in perimeter of B
4		$\frac{5^2 - 11^2}{2\pi^2}$ $\frac{-96}{2\pi^2} = -4.86341$	-4.9	3	M1 M1 A1	for substituting correctly for -96 or 19.73… seen cao
5		$(1 \times 10) + (3 \times 8) + (5.5 \times 5) +$ $(8.5 \times 3) + (12 \times 4) = 135$ $135 \div 30 = 4.5$	5	3	M1 M1 A1	for $f \times x$ using midpoints for $\Sigma fx \div 30$ cao

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6	$13.6^2 + 9.3^2 = 271.4$ $\sqrt{271.45} = 16.47573974$ $16.47573974 - 9.3 = 7.175739741$	7.18cm	4	P1 P1 P1 A1	starts process eg. Pythagoras theorem for 271.4 seen for subtracting radius from their answer cao
7 (a)		$\frac{1}{8}$ or 0.125	1	B1	cao
(b)	$\sqrt[3]{\frac{3.5}{1.866025404}}$ $\sqrt[3]{14 - 7\sqrt{3}} = 1.233247274$	1.233247274	2	M1 A1	for $\sqrt[3]{\frac{3.5}{1.866025404}}$ cao
8	$s^2 = 2r + \frac{rw}{5}$ $5s^2 = r(10 + w)$ $r = \frac{5s^2}{10+w}$	$r = \frac{5s^2}{10+w}$ oe	3	M1 M1 A1	for $s^2 = 2r + \frac{rw}{5}$ for $5s^2 = 10r + rw$ or $5s^2 = r(10 + w)$ cao
9	$10 - x = \sqrt{8^2 - x^2}$ $(10 - x)^2 = 8^2 - x^2$ $100 - 20x + x^2 = 64 - x^2$ $2x^2 - 20x + 36 = 0$	Proof shown	4	M1 M1 M1 C1	for $10 - x = \sqrt{8^2 - x^2}$ for $100 - 20x + x^2 = 64 - x^2$ for $2x^2 - 20x + 36 = 0$ cao
10	First difference 8, 12, 16, 20 2nd difference 4. hence $2n^2$ -3 -1 1 3 n^{th} term is $2n - 5$	$2n^2 + 2n - 5$	3	M1 M1 A1	for 2nd difference is 4 for $2n^2$ cao

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11	$x = 0.2\dot{1}\dot{3}$ $10x = 2.\dot{1}\dot{3}$ $1000x = 213.\dot{1}\dot{3}$ $990x = 211$ $x = \frac{211}{990}$	$\frac{211}{990}$	3	M1 for forming 2 equations eg. $10x = 2.\dot{1}\dot{3}$ & $1000x = 213.\dot{1}\dot{3}$ M1 for $990x = 211$ A1 cao
12	$\frac{4}{5} \times 2x$ or $\frac{1}{5} \times 2x$ $\frac{2x}{7} : \frac{5x}{7} : \frac{8x}{5} : \frac{2x}{5}$ $\frac{10x}{35} : \frac{25x}{35} : \frac{56x}{35} : \frac{14x}{35}$	10 : 25 : 56 : 14	3	P1 for process of using "twice" e.g $\frac{4}{5} \times 2x$ or $\frac{1}{5} \times 2x$ P1 for $\frac{2}{7} : \frac{5}{7} : \frac{4}{5} \times 2x : \frac{1}{5} \times 2x$ A1 cao
13	$tan16 = \frac{opposite}{8000}$ $8000tan16 = 2293.963086$ $2293.963086 \div 30 = 76.4654362$	76.5m/s	4	P1 starts process to find angle 16 or shows in a diagram P1 for using tan ratio to find the distance P1 for 2293.963… seen A1 cao
14 (a)	$L = \frac{k}{d^2}$; $12.5 = \frac{k}{2^2}$; $12.5 \times 4 = k$ $k = 50$; $L = \frac{50}{d^2}$; $L = \frac{50}{5^2}$; $L = 2$	2 days	3	M1 for finding k M1 for correct substitution eg $L = \frac{50}{5^2}$ A1 cao
(b)	$1.3 = \frac{50}{d^2}$; $d^2 = \frac{50}{1.3}$; $d^2 = \frac{500}{13}$ $d = \sqrt{\frac{500}{13}}$	6.2g/m^2	2	M1 for correct substitution eg $d^2 = \frac{50}{1.3}$ A1 cao
15		1320	2	M1 for $12 \times 11 \times 10$ A1 cao

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16	$160 \div 10 = 16$ scale goes up in 4s $15 \times 4 = 60$; $5 \times 8 = 40$	60, 40 Correct histogram	2 2	M1 for method to find scale of frequency density B1 for all correct entries B1 for one correct column drawn B1 for columns drawn on graph
17	$12.8 \div 5.4 = \frac{64}{27}$ LSF= $\frac{4}{3}$; ASF= $\frac{16}{9}$ $5000 \div \frac{16}{9} = 2812.5$	2812.5cm^2	4	M1 for volume scale factor M1 for linear scale factor M1 for $5000 \div \frac{16}{9}$ A1 cao
18	$x^2 + 14x - 63$ $(x+7)^2 - 49 - 63$ $(x+7)^2 - 112$	$a = 7$ $b = 112$	3	M1 for process to complete the square M1 for process to find value of a or b A1 cao
19	$\sqrt{4^2 - 2^2} = 2\sqrt{3}$ $\frac{2\sqrt{3}}{2} \times 2 = 2\sqrt{3}$ one triangle 4 triangles $= 8\sqrt{3}$ $sinx = \frac{2\sqrt{3}}{4}$; $x = 60°$; $180 - 120 = 60°$; area of sector $\frac{1}{6} \times 16\pi = \frac{8\pi}{3}$ $\frac{8\pi}{3} \times 2 = \frac{16\pi}{3}$; $\frac{16\pi}{3} + 8\sqrt{3} = 30.61156$	30.6cm^2	5	P1 for splitting the shape into triangles and sectors P1 for base of triangle $2\sqrt{3}$ seen P1 for process to find angle of sector P1 for area of sector ie $8\pi/3$ seen A1 cao
20	$V = 12.25$ UB, 12.15 LB $R = 2.65$ UB, 2.55 LB $P = \frac{12.15^2}{2.65}$	55.7	4	M1 for upper and lower bound of V and R M1 for using lowest value of V and highest value of R M1 for correct substitution into formula A1 cao

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21	$\sqrt{25^2 + 40^2 + 5^2} = 15\sqrt{10}$	47.4km	3	M1 for using Pythagoras Theorem eg $\sqrt{25^2 + 40^2}$ M1 for using Pythagoras theorem eg $\sqrt{25^2 + 40^2 + 5^2}$ A1 cao

TOTAL FOR PAPER IS 80 MARKS