

Paper 1MA1: 3H			
Question	Working	Answer	Notes
1		171	P1 for process to find one share P1 for process to find total A1 cao
2		plan	C1 a partially correct plan C1 correct plan
3		$t = 3(y + 2a)$	M1 adding $2a$ to both sides or multiplying each term by 3 A1 $t = 3(y + 2a)$ or $t = 3y + 6a$
4		$7.15 \leq x < 7.25$	B1 for 7.15 and 7.25 B1 cao
5 (a)		improvement	C1 appropriate improvement eg do not have axes starting at (0, 0)
(b)		explanation	C1 explanation eg pine cone has a very short width for its length
6 (a)		1.95	M1 method to find one temperature eg $4500 \div 1200$ M1 for complete method A1 cao
(b)		D	B1 cao

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7		complete chain of reasoning	C1 starts chain of reasoning eg finds area of large square and area of triangle or use of Pythagoras for $(x+y)^2 - 4 \times (x \times y \div 2)$ oe or $\sqrt{x^2 + y^2} \times \sqrt{x^2 + y^2}$ C1 complete chain of reasoning with correct algebra C1
8 (a)  (b)		36.4	P1 start process eg method to find area of trapezium P1 complete process to find volume of tank P1 process to find time eg volume $\times 1000 \div 300$ P1 process to find 85% of volume or of time A1 for 36.4 or 36 mins 24 secs C1 explanation eg if the average rate was slower it would take more time, if the average rate was faster it would take less time
9 (a)  (b)		No with reason  3.15	C1 partial explanation, eg $0.96 \times 0.975$ C1 No with full explanation, eg $0.96 \times 0.975 = 0.936$ so only a 6.4% reduction P1 complete process to find value after 2 years eg $(145000 - '5800') \times 2.5/100$ oe or $145000 \times 0.96 \times 0.975 (= 135720)$ P1 $(140000 - '135720') \div '135720' \times 100$ oe A1 for 3.15 – 3.154

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10		1 : 2.53	P1 for substituting values to find surface gravity of either Earth (= 9.805..) or Jupiter (= 24.796..) for complete process P1 A1 for 1 : 2.528 to 2.53
11		$x = 4.5$ $y = -2.5$	M1 for a correct process to eliminate one variable (condone one arithmetic error) A1 cao for either $x$ or $y$ M1 (dep) for substituting found value into one of the equations or appropriate method after starting again (condone one arithmetic error) A1 cao
12		12.2	P1 begins process eg $150 \div 19.3$ (= 7.77..) or $150 \div 8.9$ (= 16.85..) complete process to find total volume P1 complete process to find the density of the alloy A1 for answer in range 12.1 to 12.2
13		Triangle $(-6, 2)$ , $(-6, -1)$ , $(-3, -1)$	M1 for correct shape and the correct orientation in the wrong position or two vertices correct. A1 cao

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14 (a)		histogram	C1 for 2 correct bars of different widths or at least 3 correct frequency densities C1 all bars in correct proportions or 4 correct bars with axes scaled and labelled C1 fully correct histogram with axes scaled and labelled
(b)	$81 \div 2 = 40.5$ 90 to 105 is 29	108.2	C1 for $81 \div 2 = 40.5$ and $11.5 \div 18 \times 5 (= 3.19..)$ C1 For answer in range 108 to 109
15		shown	C1 for $\frac{a(b+1) - a}{(b+1)^2}$ or $\frac{a(b+1)^2 - a(b+1)}{(b+1)^3}$ oe C1 complete chain of reasoning
16		18.2	M1 for $\frac{260}{360} \times \pi \times 8$ oe or $\frac{100}{360} \times \pi \times 8$ oe A1 for 18.1 to 18.2
17		proof	C1 starts proof eg $n(n+1)$ or $(n-1) \times n$ C1 $n(n+1) + n+1$ or $(n-1) \times n + n$ C1 for convincing proof including $(n+1)^2$ or $n^2$

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18 (a)	values 0, 2, 5, 9, 15, 24	86	M1 for starting to find area under curve M1 for method to find the area under the curve between $t = 0$ and $t = 10$ (and at least 2 areas) A1
(b)		overestimate with reason	C1 for overestimate and appropriate reason linked to method eg area between trapeziums and curve also included
19		proof leading to $\frac{7}{22}$	M1 for finding two correct recurring decimals that when subtracted would result in a terminating decimal or integer with intention to subtract eg $x = 0.31818\dots$ , $100x = 31.81818\dots$ A1 fully correct proof
20		$\frac{1}{4}$	P1 starts process eg $\vec{AB} = 2\mathbf{b} - 2\mathbf{a}$ P1 process to find $\vec{AP}$ or $\vec{BP}$ P1 complete process to find $\vec{OP}$ A1 for $\frac{1}{4}$ oe

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21		10.4	<p>P1 starts process by using cosine rule to find <math>CD</math> eg <math>(CD)^2 = 4.9^2 + 3.8^2 - 2 \times 4.9 \times 3.8 \times \cos 80</math> (= 31.98..)</p> <p>P1 uses sine rule to find angle <math>ACD</math> or angle <math>ADC</math> eg <math>\frac{\sin C}{3.8} = \frac{\sin 80}{5.655'}</math> or <math>\frac{\sin D}{4.9} = \frac{\sin 80}{5.655'}</math></p> <p>P1 uses sine rule to find <math>BC</math> or <math>BD</math> eg <math>\frac{BD}{\sin 25} = \frac{5.655'}{\sin 33.6'}</math></p> <p>P1 process to find area eg <math>1/2 ab \sin C</math> A1 for 10.4 to 10.43</p>

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22 (a)		chain of reasoning	C1 for a relevant product eg $\frac{y}{y+5} \times \frac{5}{y+4}$
			C1 for a correct equation eg $2 \times \left( \frac{y}{y+5} \times \frac{5}{y+4} \right) = \frac{6}{11}$
			C1 for method to eliminate fractions from algebraic expression
			C1 complete chain of reasoning
			M1 method to solve equation eg $(ax + b)(cx + d)$ with $ac = 3$ and $bd = \pm 60$
(b)		$\frac{3}{11}$	A1 for selecting $y = 6$
			A1 for $\frac{3}{11}$ oe
23		$2(x+4)^2 + 3$	P1 process to find $a$ , eg $2x^2 + 16x + 35 = 2(x^2 + \dots)$ or $a = 2$
			P1 for $2((x+4)^2 + \dots)$ or $b = 4$
			A1 for $2(x+4)^2 + 3$ or $a = 2, b = 4, c = 3$
			B1 fit from answer of form $a(x+b)^2 + c$
		$(-4, 3)$	