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 ÷ 1200 M1 for complete method A1 cao
(b)		D	B1 cao

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Question	Working	Answer	Notes	
7		complete chain of reasoning	C1 C1 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 $\sqrt{x^2 + y^2} \times \sqrt{x^2 + y^2}$ complete chain of reasoning with correct algebra
8 (a)		36.4	P1 P1 P1 P1 A1	start process eg method to find area of trapezium complete process to find volume of tank process to find time eg volume × 1000 ÷ 300 process to find 85% of volume or of time for 36.4 or 36 mins 24 secs
(b)			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)		No with reason	C1 C1	partial explanation, eg 0.96 × 0.975 No with full explanation, eg 0.96 × 0.975 = 0.936 so only a 6.4% reduction
(b)		3.15	P1 P1 A1	complete process to find value after 2 years eg (145000 – '5800') × 2.5/100 oe or 145000 × 0.96 × 0.975 (= 135720) (140 000 – '135720') ÷ '135720' × 100 oe for 3.15 – 3.154

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Question	**Working**	**Answer**	**Notes**
10		1 : 2.53	P1 for substituting values to find surface gravity of either Earth (= 9.805..) or Jupiter (= 24.796..) P1 for complete process 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÷19.3 (= 7.77..) or 150÷8.9 (= 16.85..) P1 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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Question	**Working**	**Answer**	**Notes**
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 ÷ 2 = 40.5 90 to 105 is 29	108.2	C1 for 81 ÷ 2 = 40.5 and 11.5 ÷ 18 × 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 $\frac{260}{360}\times\pi\times8$ oe or $\frac{100}{360}\times\pi\times8$ 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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Question	**Working**	**Answer**	**Notes**
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 $x = 0.31818...$, $100x = 31.81818...$ A1 fully correct proof
20		$\frac{1}{4}$	P1 starts process eg $\overrightarrow{AB} = 2\mathbf{b} - 2\mathbf{a}$ P1 process to find $\overrightarrow{AP}$ or $\overrightarrow{BP}$ P1 complete process to find $\overrightarrow{OP}$ A1 for $\frac{1}{4}$ oe

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Question	**Working**	**Answer**	**Notes**
21		10.4	P1 starts process by using cosine rule to find CD eg $(CD)^2 = 4.9^2+3.8^2 - 2\times4.9\times3.8\times\cos80$ (= 31.98..) P1 uses sine rule to find angle ACD or angle ADC eg $\frac{\sin C}{3.8} = \frac{\sin 80}{'5.655'}$ or $\frac{\sin D}{4.9} = \frac{\sin 80}{'5.655'}$ P1 uses sine rule to find BC or BD eg $\frac{BD}{\sin 25} = \frac{'5.655'}{\sin'33.6'}$ P1 process to find area eg 1/2 $ab\sin C$ A1 for 10.4 to 10.43

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Question	**Working**	**Answer**	**Notes**
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
(b)		$\frac{3}{11}$	M1 method to solve equation eg $(ax + b)(cx + d)$ with $ac = 3$ and $bd = \pm 60$ A1 for selecting $y = 6$ A1 for $\frac{3}{11}$ oe
23		$2(x + 4)^2 + 3$ (–4, 3)	P1 process to find a, eg $2x^2 + 16x + 35 = 2(x^2 + \ldots)$ or $a = 2$ P1 for $2((x + 4)^2 + \ldots))$ or $b = 4$ A1 for $2(x + 4)^2 + 3$ or $a = 2$, $b = 4$, $c = 3$ B1 ft from answer of form $a(x + b)^2 + c$