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			$7.15 \le x < 7.25$	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	starts chain of reasoning eg finds area of large square and area of triangle or use of Pythagoras
			C1	for $(x+y)^2 - 4\times(x\times y\div2)$ oe or $\sqrt{x^2+y^2}\times\sqrt{x^2+y^2}$
			C1	complete chain of reasoning with correct algebra
8 (a)		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 × 1000 ÷ 300
			P1	process to find 85% of volume or of time
			A1	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	partial explanation, eg 0.96 × 0.975
			C1	No with full explanation, eg 0.96 × 0.975 = 0.936 so only a 6.4% reduction
(b)		3.15	P1	complete process to find value after 2 years eg (145000 – '5800') × 2.5/100 oe or 145000 × 0.96 × 0.975 (=135720)
			P1	(140000 – '135720') ÷ '135720' × 100 oe
			A1	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)	$81 \div 2 = 40.5$ 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 $\dfrac{a(b+1)-a}{(b+1)^2}$ or $\dfrac{a(b+1)^2-a(b+1)}{(b+1)^3}$ oe
			C1	complete chain of reasoning
16		18.2	M1	for $\dfrac{260}{360} \times \pi \times 8$ oe or $\dfrac{100}{360} \times \pi \times 8$ 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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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 $(CD)^2 = 4.9^2 + 3.8^2 - 2 \times 4.9 \times 3.8 \times \cos 80$ ($= 31.98..$)
			P1	uses sine rule to find angle ACD or angle ADC eg $\dfrac{\sin C}{3.8} = \dfrac{\sin 80}{'5.655'}$ or $\dfrac{\sin D}{4.9} = \dfrac{\sin 80}{'5.655'}$
			P1	uses sine rule to find BC or BD eg $\dfrac{BD}{\sin 25} = \dfrac{'5.655'}{\sin'33.6'}$
			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 $\dfrac{y}{y+5} \times \dfrac{5}{y+4}$
			C1	for a correct equation eg $2\times\left(\dfrac{y}{y+5} \times \dfrac{5}{y+4}\right)=\dfrac{6}{11}$
			C1	for method to eliminate fractions from algebraic expression
			C1	complete chain of reasoning
(b)		$\dfrac{3}{11}$	M1	method to solve equation eg $(ax+b)(cx+d)$ with $ac=3$ and $bd=\pm60$
			A1	for selecting $y=6$
			A1	for $\dfrac{3}{11}$ oe
23		$2(x+4)^2+3$	P1	process to find a, eg $2x^2+16x+35=2(x^2+...)$ or $a=2$
			P1	for $2((x+4)^2+....))$ or $b=4$
		$(-4, 3)$	A1	for $2(x+4)^2+3$ or $a=2, b=4, c=3$
			B1	ft from answer of form $a(x+b)^2+c$