| Paper 1MA1: 3H | | | |
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| Question | Working | Answer | Notes |
| 1 | | 171 | P1    for process to find one share <br> P1    for process to find total <br> A1    cao |
| 2 | | plan | C1    a partially correct plan <br> C1    correct plan |
| 3 | | $t = 3(y + 2a)$ | M1    adding $2a$ to both sides or multiplying each term by 3 <br> A1    $t = 3(y + 2a)$ or $t = 3y + 6a$ |
| 4 | | $7.15 \leq x < 7.25$ | B1    for 7.15 and 7.25 <br> 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 $4500 \div 1200$ <br> M1    for complete method <br> 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 <br><br> C1   for $(x + y)^2 - 4 \times (x \times y \div 2)$ oe or $\sqrt{x^2 + y^2} \times \sqrt{x^2 + y^2}$ <br><br> C1   complete chain of reasoning with correct algebra |
| 8   (a) | | 36.4 | P1   start process eg method to find area of trapezium <br> P1   complete process to find volume of tank <br> P1   process to find time eg volume × 1000 ÷ 300 <br> P1   process to find 85% of volume or of time <br> 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 <br> 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) <br> P1   (140 000 − '135720') ÷ '135720' × 100 oe <br> 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..)<br>P1    for complete process<br>A1    for 1 : 2.528 to 2.53 |
| 11 | | $x = 4.5$<br>$y = -2.5$ | M1    for a correct process to eliminate one variable (condone one arithmetic error)<br>A1    cao for either $x$ or $y$<br>M1    (dep) for substituting found value into one of the equations or appropriate method after starting again (condone one arithmetic error)<br>A1    cao |
| 12 | | 12.2 | P1    begins process eg 150÷19.3 (= 7.77..) or 150÷8.9 (= 16.85..)<br>P1    complete process to find total volume<br>P1    complete process to find the density of the alloy<br>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.<br>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) | $81 \div 2 = 40.5$ <br> 90 to 105 is 29 | 108.2 | C1   for $81 \div 2 = 40.5$ and $11.5 \div 18 \times 5 \ (= 3.19..)$ <br> 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 <br><br> 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 <br> A1   for 18.1 to 18.2 |
| 17 | | proof | C1   starts proof eg $n(n+1)$ or $(n-1) \times n$ <br> C1   $n(n+1) + n+1$ or $(n-1) \times n + n$ <br> 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 <br> M1 <br><br> A1 | for starting to find area under curve <br> for method to find the area under the curve between $t = 0$ and $t = 10$ (and at least 2 areas) |
| (b) | | overestimate with reason | C1 | for overestimate and appropriate reason linked to method eg area between trapeziums and curve also included |
| 19 | | proof <br> leading to $\dfrac{7}{22}$ | M1 <br><br><br><br> A1 | for finding two correct recurring decimals that when subtracted would result in a terminating decimal or integer with intention to subtract eg $x = 0.31818...$, $100x = 31.81818...$ <br> fully correct proof |
| 20 | | $\dfrac{1}{4}$ | P1 <br><br> P1 <br> P1 <br> A1 | starts process eg $\overrightarrow{AB} = 2\mathbf{b} - 2\mathbf{a}$ <br> process to find $\overrightarrow{AP}$ or $\overrightarrow{BP}$ <br> complete process to find $\overrightarrow{OP}$ <br> for $\dfrac{1}{4}$ oe |

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| 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 $\dfrac{\sin C}{3.8} = \dfrac{\sin 80}{'5.655'}$ 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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| 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 $bd = \pm 60$ |
| | | | A1    for selecting $y = 6$ |
| | | | A1    for $\dfrac{3}{11}$ oe |
| 23 | | $2(x + 4)^2 + 3$ | P1    process to find $a$, eg $2x^2 + 16x + 35 = 2(x^2 + \ldots)$ or $a = 2$ |
| | | | P1    for $2((x + 4)^2 + \ldots))$ or $b = 4$ |
| | | | A1    for $2(x + 4)^2 + 3$ or $a = 2$, $b = 4$, $c = 3$ |
| | | $(-4, 3)$ | B1    ft from answer of form $a(x + b)^2 + c$ |