**International GCSE in Mathematics A - Paper 4H mark scheme**

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| **Question** | | **Working** | **Answer** | **Mark** | **AO** | **Notes** | |
| **1** |  | 2 × 2 × 5 or 2 × 3 × 5 or 3 × 3 × 5 |  |  | AO1 | M1 | for one of 20, 30, 45 written as product of prime factors or |
|  |  | or two of |  |  |  |  | list of at least 3 multiples of any two of 20, 30, 45 |
|  |  | 20, 40, 60 … |  |  |  |  |  |
|  |  | 30, 60, 90 … |  |  |  |  |  |
|  |  | 45, 90, 105 |  |  |  |  |  |
|  |  | 2 × 2 × 5 and 2 × 3 × 5 and 3 × 3 × 5 |  |  |  | M1 |  |
|  |  | or all of |  |  |  |  |  |
|  |  | 20, 40, 60 , 80 … 180 |  |  |  |  |  |
|  |  | 30, 60, 90 … 180 |  |  |  |  |  |
|  |  | 45, 90, 105 … 180 |  |  |  |  |  |
|  |  |  | 180 | 3 |  | A1 | for 180 or 2 × 2 × 3 × 3 × 5 oe |
| **2** |  |  |  |  | AO1 | M1 | for 7*n* + *k* (*k* may be zero) |
|  |  |  | 7*n* – 5 oe | 2 |  | A1 |  |
| **3** |  | × (10 + 14) × 9 oe (= 108) |  |  | AO2 | M1 | for area of cross section |
|  |  | ‘108’ × 6 (=648) |  |  |  | M1 | (dep on previous M1) for volume of prism |
|  |  | ‘648’ × 0.7 |  |  |  | M1 | (independent) |
|  |  |  | 453.6 | 4 |  | A1 | accept 454 |

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| **Question** | | **Working** | **Answer** | **Mark** | **AO** | **Notes** | |
| **4** | **a** |  | *p*9 | 1 | AO1 | B1 |  |
|  | **b** |  | *m*−12 | 1 | AO1 | B1 |  |
|  | **c** |  | 1 | 1 | AO1 | B1 |  |
|  | **d** |  |  | 1 | AO1 | B1 |  |
|  | **e** | 5*x* + 35 = 2*x* – 10 or |  |  | AO1 | M1 | for removing bracket or dividing all terms by 5 |
|  |  |  |  |  |  |  |  |
|  |  | e.g. 5*x* – 2*x* = −10 − 35 **or** |  |  |  | M1 | for isolating *x* terms in a correct equation |
|  |  |  |  |  |  |  |  |
|  |  |  | −15 | 3 |  | A1 | dep on M1 |
| **5** |  | 14000 × 4 (=56000) |  |  | AO1 | M1 | NB. multiplication by 4 may occur before or after percentage decrease |
|  |  | 0.075 × ‘56000’ (=4200) **or**  0.075 × 14000 (=1050) |  |  |  | M1 |  |
|  |  | ‘56000’ – ‘42000’ **or**  14000 – ‘1050’ |  |  |  | M1 | (dep) |
|  |  |  | 51 800 | 4 |  | A1 |  |

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| **Question** | | **Working** | **Answer** | **Mark** | **AO** | **Notes** | | |
| **6** | **a** |  | triangle with  vertices | 1 | AO2 | B1 |  | |
|  |  |  | (3, −1) (3, −4) (5, −4) |  |  |  |  | |
|  | **b** |  | Rotation |  | AO2 | B1 |  | |
|  |  |  | centre (−3, 0) |  |  | B1 |  | |
|  |  |  | 90° anticlockwise | 3 |  | B1 | accept +90°, 270° clockwise, −270° | |
|  |  |  |  |  |  |  | NB. If more than one transformation then no marks can be  awarded | |
| **7** | **a** | 4 × 15 (=60) **or** |  | 2 | AO3 | M1 |  | |
|  |  | **or** |  |  |  |  |  | |
|  |  | 4 × 15 − 39 |  |  |  |  |  | |
|  |  |  | 21 |  |  | A1 |  | |
|  | **b** | *d* − *a* = 10 **or** *a =* 11 **or** |  | 2 | AO3 | M1 | ft from (a) | |
|  |  | *a* = “21” – 10 **or** |  |  |  |  | (can be implied by 11, *b¸ c*, 21 **OR** | |
|  |  | *b* + *c* = 39 − 11 = 28 |  |  |  |  | *a, b, c, d* with *b* + *c* = 28) | |
|  |  |  | 14 |  |  | A1 cao |  | |
| **8** |  | 0.02 × 40 000 (=800) **or** 1.02 × 40 000  (=40 800) **or** 2400 |  |  | AO1 | M1 |  |  |
|  |  | "40 800" × 0.02(=816) **and**  "41 616" × 0.02(=832.32) **OR** |  |  |  | M1 | (dep) method to find interest for year 2 **and** year 3 | |
|  |  | 2448.32 |  |  |  |  |  |  |
|  |  |  | 42 448.32 | 3 |  | A1 |  | |

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| **Question** | | **Working** | **Answer** | **Mark** | **AO** | **Notes** | |
| **9** |  | 3*x* + *y* = 13 **or** 6*x* + 2*y* = 26  − 3*x* – 6*y* = 27 + *x* – 2*y* = 9 |  |  | AO1 | M1 | multiplication of one equation with correct operation selected  **or** rearrangement of one equation with substitution into  second |
|  |  | eg. 3*x* – 2 = 13 **or** 15 + *y* = 13 |  |  |  | M1 | (dep) correct method to find second variable |
|  |  |  | 5, −2 | 3 |  | A1 | for both solutions dependent on correct working |
| **10** |  |  |  |  | AO1 | M1 |  |
|  |  | **or**   **or** |  |  |  | M1 |  |
|  |  |  | answer given | 3 |  | A1 | correct answer from correct working |
| **11** |  | (6 – 2) × 180 (=720) |  |  | AO2 | M1 | complete method to find sum of interior angles |
|  |  | ‘720’ – (86 + 123 + 140 + 105)  (=266) **or** ‘720’ – 454 (=266) |  |  |  | M1 | dep on 1st method mark |
|  |  | ‘266’ ÷ 2 |  |  |  | M1 | dep on 1st method mark |
|  |  |  | 133 | 4 |  | A1 |  |

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| **Question** | | **Working** | **Answer** | **Mark** | **AO** | **Notes** | |
| **12** | **a** |  | 8, 25, 50, 90, 112, 120 | 1 | AO3 | B1 | cao |
|  | **b** | Plotting points from table at ends of  interval |  |  | AO3 | M1 | ± ½ sq ft from sensible table ie clear attempt to add frequencies |
|  |  | Points joined with curve or line  segments |  | 2 |  | A1 | ft from points if 4 or 5 correct or if all points are plotted consistently within each interval at the correct heights |
|  |  |  |  |  |  |  | Accept cf graph which is not joined to the origin |
|  |  |  |  |  |  |  | **NB** A bar chart, unless it has a curve going consistently through a  point in each bar, scores no points. |
|  | **c** | 60 (or 60.5) indicated on cf graph  or stated |  |  | AO3 | M1 | for 60 (or 60.5) indicated on cf axis or stated |
|  |  |  | approx 33 | 2 |  | A1 | If M1 scored, ft from cf graph |
|  |  |  |  |  |  |  | If no indication of method, ft only from correct curve & if answer is correct (± ½ sq tolerance) award M1 A1 |
| **13** |  |  |  |  | AO1 | M1 | Isolate term in *b* |
|  |  |  |  |  |  | M1 | Isolate *b*2 |
|  |  |  |  | 3 |  | A1 | oe with *b* as the subject |

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| **Question** | | **Working** | **Answer** | **Mark** | **AO** | **Notes** | |
| **14** | **a** | 2 correct points plotted |  |  | AO1 | M1 |  |
|  |  | eg (0, 4) and (3, 0) |  |  |  |  |  |
|  |  | 4*x* + 3*y* = 12 drawn |  | 2 |  | A1 |  |
|  | **b** | correct region |  | 3 | AO1 | B3 | Correct region |
|  |  |  |  |  |  |  | B2 for *x* = 4 and *y* = −3 drawn **and** consistent shading correct for at  least two inequalities |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  | B1 for *x* = 4 and *y* = −3 drawn |
|  |  |  |  |  |  |  |  |
| **15** | **a** |  |  | 3 | AO1 | B3 | Correct diagram |
|  |  |  |  |  |  |  | B2 for 3 over-lapping circles with 7 in intersection **and** at least 2  other correct numbers |
|  |  |  |  |  |  |  | B1 for 3 over-lapping circles with 7 in intersection |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  | **b** |  | oe | 1 | AO3 | B1 | ft from diagram |
|  | **c** |  | oe | 1 | AO3 | B1 | ft from diagram |

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| **Question** | | **Working** | **Answer** | **Mark** | **AO** | **Notes** | |
| **16** | **a** | or |  |  | AO1 | M1 |  |
|  |  | 24 =  oe or (*k* = 375) |  |  |  | M1 | implies first M1 |
|  |  |  |  | 3 |  | A1 | accept with *k* = 375 stated elsewhere in question |
|  | **b** | oe or |  |  | AO1 | M1 |  |
|  |  |  | 15 | 2 |  | A1 |  |
| **17** | **a** |  | −3 | 1 | AO1 | B1 |  |
|  | **b** |  | 2 | 1 | AO1 | B1 |  |
|  | **c** | g(2) = 6 |  |  | AO1 | M1 |  |
|  |  |  | 0.75 oe | 2 |  | A1 |  |
| **18** |  | correct length scale factor |  |  | AO2 | M1 |  |
|  |  | eg.  or  or |  |  |  |  |  |
|  |  |  |  |  |  | M1 | for complete method |
|  |  |  | 728 | 3 |  | A1 |  |

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| **Question** | | **Working** | **Answer** | **Mark** | **AO** | **Notes** | |
| **19** |  |  | E, B, D, A | 3 | AO1 | B3 | All correct |
|  |  |  |  |  |  |  | B2 for 3 correct |
|  |  |  |  |  |  |  | B1 for 2 correct |
| **20** | **a** |  |  |  | AO3 | M1 |  |
|  |  |  |  | 2 |  | A1 | oe, eg  Allow 0.16(666...) rounded or truncated to at least 2dp |
|  | **b** | or  oe |  |  | AO3 | M2 | M1 for  oe |
|  |  | or  or  oe |  |  |  |  | Accept fractions evaluated |
|  |  |  |  |  |  |  | , |
|  |  |  |  |  |  |  | rounded or truncated to at least 2dp |
|  |  |  |  | 3 |  | A1 | oe, eg.  or |

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| **Question** | | **Working** | **Answer** | **Mark** | **AO** | **Notes** | |
| **21** |  |  |  |  | AO2 | M1 | Or method using a right angled triangle to find length *MX* (*MX* is  perpendicular to *LN*) |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  | M1 | or cos−1 = |
|  |  | *MLN* = 26.7(73...) |  |  |  | A1 | *LMX*= 63.232 |
|  |  | *LMN* = 180 − 47 – ‘26.7...’ or  106(.2260622…) |  |  |  | M1 | *LMN* = 63.232 + (180 – (90+47))… or 106(.2260622…) |
|  |  | × 8.5 × 13.8 × sin("106") |  |  |  | M1 |  |
|  |  |  | 56.3 | 6 |  | A1 | Accept an answer that rounds to 56.3 or 56.4 unless clearly obtained  from incorrect working. |
| **22** | **a** | 2(*x*2 − 4*x* ) + 9 **or** |  |  | AO1 | M1 |  |
|  |  | 2(*x*2 − 4*x* + ) |  |  |  |  |  |
|  |  | 2((*x* − 2)2 – 22) + 9 **or** |  |  |  | M1 |  |
|  |  | 2((*x* − 2)2 – 22 + ) |  |  |  |  |  |
|  |  |  | 2(*x* − 2)2 + 1 | 3 |  | A1 |  |
|  | **b** |  | explanation | 1 | AO1 | B1 | eg. Because minimum is at (2, 1) |

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| **Question** | | **Working** | **Answer** | **Mark** | **AO** | **Notes** | |
| **23** |  | or |  |  | AO2 | M1 |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  | M1 | dep |
|  |  |  | oe | 3 |  | A1 | accept 7.07(06…) |
| **24** |  |  |  |  | AO1 | M1 | method to rationalise |
|  |  |  |  |  |  | M1 | correct expansion of brackets |
|  |  |  |  |  |  | B1 | may be seen before expansion |
|  |  |  | shown | 4 |  | A1 | answer from fully correct working with all steps seen |
| **25** |  | (*v* = ) 3*t*2 – 5 × 2*t* − 8 |  |  | AO1 | M1 | for 2 out of 3 terms differentiated correctly |
|  |  | 3*t* 2 – 10*t* – 8 = 0 |  |  |  | A1 | correct equation |
|  |  | (3*t* + 2)(*t* – 4) = 0 |  |  |  | M1 | for method to solve quadratic |
|  |  |  | 4 | 4 |  | A1 | *t* = 4 only |