**IGCSE (9–1) Maths - practice paper 2H mark scheme**

**Results Plus data on 92 of the 100 marks:**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Paper 2** |  |  |  |  | **Edexcel averages:** |  |  |  |  |  |
| **Year** | **Paper** | **Qu. no** | **New qu. no.** | **Mean score** | **Max score** | **Mean %** |  | **ALL** | **A\*** | **A** | **B** | **C** | **D** | **E** |
| 1706 | 4HR | Q02 | Q01 | 3.09 | 4 | 77.3 |  | 3.09 | 3.78 | 3.31 | 2.84 | 2.20 | 1.32 | 0.49 |
| 1701 | 4H | Q02 | Q02 | 4.51 | 5 | 90.2 |  | 4.51 | 4.97 | 4.88 | 4.72 | 4.44 | 3.89 | 2.45 |
| 1701 | 3H | Q05c, e | Q03a-b | 2.53 | 4 | 63.3 |  | 2.53 | 3.68 | 3.11 | 2.59 | 1.83 | 0.93 | 0.48 |
| 1606 | 3H | Q7b | Q03c | 1.85 | 2 | 92.5 |  | 1.85 | 1.98 | 1.95 | 1.86 | 1.51 | 0.95 | 0.36 |
| 1701 | 3H | Q09 | Q04 | 1.73 | 3 | 57.7 |  | 1.73 | 2.68 | 2.28 | 1.72 | 1.13 | 0.40 | 0.17 |
| 1701 | 3H | Q10 | Q05 | 1.77 | 3 | 59.0 |  | 1.77 | 2.88 | 2.39 | 1.63 | 0.99 | 0.37 | 0.09 |
| 1706 | 4H | Q08 | Q06 | 2.09 | 3 | 69.7 |  | 2.09 | 2.92 | 2.35 | 1.41 | 0.58 | 0.23 | 0.12 |
| 1706 | 4H | Q09 | Q07 | 3.37 | 4 | 84.3 |  | 3.37 | 3.86 | 3.62 | 3.23 | 2.39 | 1.04 | 0.28 |
| 1706 | 4H | Q10 | Q08a,b,d,e | 4.86 | 6 | 81.0 |  | 4.86 | 5.74 | 5.03 | 4.31 | 3.50 | 2.54 | 1.39 |
| 1706 | 4HR | Q05g | Q08c | 0.91 | 1 | 91.0 |  | 0.91 | 0.99 | 0.94 | 0.88 | 0.81 | 0.71 | 0.49 |
| 1706 | 4H | Q11 | Q09 | 3.09 | 5 | 61.8 |  | 3.09 | 4.66 | 3.39 | 1.78 | 0.53 | 0.14 | 0.18 |
| 1706 | 4H | Q12 | Q10 | 1.42 | 3 | 47.3 |  | 1.42 | 1.96 | 1.42 | 1.05 | 0.66 | 0.42 | 0.22 |
| 1706 | 4H | Q13 | Q11 | 2.56 | 5 | 51.2 |  | 2.56 | 4.13 | 2.55 | 1.18 | 0.47 | 0.28 | 0.19 |
| 1706 | 4H | Q14 | Q12 | 2.76 | 4 | 69.0 |  | 2.76 | 3.40 | 2.87 | 2.34 | 1.72 | 1.14 | 0.61 |
| 1706 | 3HR | Q13 | Q13 | 1.46 | 3 | 48.7 |  | 1.46 | 2.62 | 1.67 | 0.82 | 0.33 | 0.07 | 0.02 |
| 1706 | 4H | Q15 | Q14 | 3.27 | 6 | 54.5 |  | 3.27 | 5.27 | 3.36 | 1.49 | 0.53 | 0.18 | 0.04 |
| 1706 | 4H | Q16 | Q15 | 4.17 | 5 | 83.4 |  | 4.17 | 4.90 | 4.62 | 3.82 | 2.50 | 1.40 | 0.64 |
| 1706 | 4H | Q17 | Q16 | 3.38 | 6 | 56.3 |  | 3.38 | 5.44 | 3.31 | 1.70 | 0.71 | 0.32 | 0.11 |
| 1706 | 4H | Q18 | Q17 | 1.53 | 3 | 51.0 |  | 1.53 | 2.25 | 1.63 | 0.96 | 0.39 | 0.11 | 0.03 |
| 1706 | 4H | Q19 | Q18 | 1.79 | 3 | 59.7 |  | 1.79 | 2.65 | 1.95 | 1.09 | 0.38 | 0.21 | 0.07 |
| 1706 | 4H | Q20 | Q19 | 1.50 | 4 | 37.5 |  | 1.50 | 2.65 | 1.37 | 0.53 | 0.13 | 0.05 | 0.01 |
| Spec pprs | 1H | Q20 | Q20 |  | 4 |  |  |  |  |  |  |  |  |  |
| 1706 | 4H | Q21 | Q21 | 2.30 | 6 | 38.3 |  | 2.30 | 4.53 | 1.78 | 0.43 | 0.05 | 0.01 | 0.01 |
| SAMs | 2H | Q24 | Q22 |  | 4 |  |  |  |  |  |  |  |  |  |
| 1706 | 4H | Q23 | Q23 | 0.95 | 4 | 23.8 |  | 0.95 | 2.18 | 0.37 | 0.06 | 0.02 | 0.02 | 0.01 |
|  |  |  |  | **56.89** | **92** | **61.8** |  | **56.89** | **80.12** | **60.15** | **42.44** | **27.80** | **16.73** | **8.46** |

**Problem-solving questions: 1, 7, 9, 16, 18, 21, 23**

**Reasoning questions: 2, 12, 13, 14, 17, 20, 22**

| Q | **Working** | **Answer** | **Mark** | **Notes** |
| --- | --- | --- | --- | --- |
| 1 | (a) (i) |  | 5, 15 | 1 | B1 |  |
|  |  (ii) |  | 5, 7, 9, 10, 11, 13, 15 | 1 | B1 |  |
|  | (b) |  | 4, 6, 8, 10, 12, 14 | 2 | B2 | B2 for all correct and none incorrect.If not B2 then B1 for 4 or more correct and no more than 1 incorrect. |
|  |  |  |  |  |  | **Total 4 marks** |

| 2 | (a) |  or 0.3 |  | 3 | M1 |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  or  |  |  | M1 | dep |
|  |  |  | 0.15 |  | A1 |  |
|  | (b) |  |  | 2 | M1 |  |
|  |  |  | 80 |  | A1 | Note: Award M1A1 for 80 out of 200Award M1A0 for 80/200  |
|  |  |  |  |  |  | **Total 5 marks** |

| 3 | (a) | 7 × (−2)² + 5 or 7 × 4 + 5 or7 (−2)² + 5  |  | 2 | M1 | for correct substitution **or** 7 × 4 **or** 28 |
| --- | --- | --- | --- | --- | --- | --- |
|  | 33 |  | A1 |  |
|  | (b) | −7*t* $\geq $31 – 3 or 7*t* ≤ 3 – 31 oe |  | 2 | M1  | −7*t* $\geq $31 – 3 **or** 7*t* ≤ 3 – 31 **or** − 4 **or** *t* ≥ −4accept an equation or the wrong inequality sign in the working |
|  | *t*$ \leq $ −4 |  | A1 | or for −4 ≥ *t* |

| 3 | (c) |  |  |  | M1 | for 3 correct terms **or** 4 correct terms ignoring signs **or***x*2 − 7*x* + *a* for any non-zero value of *a* **or**... − 7*x* − 18 |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  | *x*2 − 7*x* − 18 | 2 | A1 |  |
|  |  |  |  |  |  | **Total 6 marks** |

| 4 |  | 4*x*² + 6*x*  + 6*x* + 9 or 4*x*² + 12*x* + 9 |  | 3 | M1 | for at least 3 terms correct in expansion of first pair of brackets |
| --- | --- | --- | --- | --- | --- | --- |
| 2*x*² − 10*x* + 3*x* – 15 or 2*x*2 – 7*x* – 15  |  |  | M1 | for at least 3 terms correct in expansion of second pair of brackets **or**all 4 terms correct ignoring signsallow –2*x*2 – 7*x* – 15 |
|  | 2*x*² + 19*x* + 24 |  | A1 |  |
|  |  | Alternative method |  |  |  |  |
|  |  | (2*x* + 3)[(2*x* + 3) – (*x* – 5)] |  |  | M1 |  |
| (2*x* + 3)(*x* + 8) |  |  | M1 |  |
|  | 2*x*² + 19*x* + 24 |  | A1 |  |
|  |  |  |  |  |  | **Total 3 marks** |

| 5 |  | 0.82*x* = 25.83 or 82% = 25.83 |  | 3 | M1 | or for use of 0.82 in a calculation |
| --- | --- | --- | --- | --- | --- | --- |
| $\frac{25.83}{0.82}$ or $\frac{25.83}{82}$ × 100 |  |  | M1 |  |
|  | 31.5(0) |  | A1 |  |
|  |  |  |  |  |  | **Total 3 marks** |

| 6 |  | 180 – 156 (=24) or 180(*n* – 2) = 156*n* oeor 90(2*n* – 4) = 156*n* oe |  |  | M1 |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | 360 ÷ “24” or (180 × 2) ÷ (180 – 156) or   |  |  | M1 | complete method |
|  |  |  | 15 | 3 | A1 |  |
|  |  |  |  |  |  | **Total 3 marks** |

| 7 |  | 420 ÷ (4 + 5 + 3) (=35) [or Manu = 140 or Liam = 175] |  |  | M1 |  | M2 for  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | “35” × 3 (=105) |  |  | M1 | or Ned = 105 |  oe  |
|  |  |  oe |  |  | M1 |  |
|  |  |  | 43 | 4 | A1 | 42.85 – 43  |
|  |  |  |  |  |  | **Total 4 marks** |

| 8 | (a) |  | *e*15 | 1 | B1 |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | (b) |  |  |  | M1 | for *ng*8 or 4*gm* or   |
|  |  |  | 4*g*8 | 2 | A1 | (condone *g*8) |
|  | (c) |  | *e*15 | 1 | B1 |  |
|  | (d) |  | 1 | 1 | B1 |  |
|  | (e) |  (3*x*2)2 or 9(*x*²)² or or  or or    |  |  | M1 | **or** *kx*4 **or** 9*xn* (not just 9 or *xn*) |
|  |  |  | 9*x*4 | 2 | A1 |  |
|  |  |  |  |  |  | **Total 7 marks** |

| 9 |  | eg (*d*2 = ) 72 + 72 **or** *r*2 + *r*2 = 7² **or** cos 45 =  **or** sin 45 =  **or** cos 45 = **or** sin 45 =   |  |  | M1 | Start of method to find radius or diameter of circle |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | eg (*d*=) (9.899..) **or** (r=)(=4.9...) **or** *d* =  **or** *d* =  **or** *r*2 = 24.5**or** *r* = 7cos 45 **or** *r* = 7sin 45 |  |  | M1 | complete method to find radius or diameter or *r*2(if method to find radius or diameter shown then allow use of radius = 5 for method marks only) |
|  |  | eg. π *×* “4.9..”2 (=76.969...) |  |  | M1 | For method to find area of circle or semi-circle or quarter circle – use of radius from correct working |
|  |  | eg. π *×* “4.9..”2  – 72 |  |  | M1 | for complete method |
|  |  |  | 28 | 5 | A1 | 27.9 – 28  |
|  |  |  |  |  |  | **Total 5 marks** |

| 10 |  | 10 12 15 16 17 19 19 23 24 27 27 **or**  |  |  | M1 | Ordered list – allow one error or omission |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | 15 and 24 identified |  |  | M1 |  |
|  |  |  | 9 | 3 | A1 |  |
|  |  |  |  |  |  | **Total 3 marks** |

| 11 | (a) | *y* = 3 – 1.5*x* or 2*x* – 1.5 = *y* or*m* = 2 (A) or *m* = −1.5 (B) or *m* = 2 (C) or *m* = −2 (D) |  |  | M1 | If using gradients, must state *m* = or gradient =  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  | A and C | 2 | A1 | (allow correct equations listed) |
|  | (b) | *y* =  *x* + *c* or *y* – *y*1 =    |  |  | M1 | *c* can be any value, e.g.  |
|  |  | 3 = × 1 + *c* or *c* = oe or *y* =  *x* + or*y* – 3 =  or 2(*y* – 3) = −5(*x* – 1) |  |  | M1 |  |
|  |  |  | 5*x* + 2*y* = 11 | 3 | A1 | oe eg. 10*x* + 4*y* = 22 or in a different but correct form but must have integer values, e.g. 2*y* = −5*x* + 11 |
|  |  |  |  |  |  | **Total 5 marks** |

| 12 | (a) (i) |  | 52 |  | B1 |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | (a) (ii) |  | angles in same segment or angles subtended by the same arc  | 2 | B1 | Dep on B1 in (ai) |
|  | (b) (i) |  | 104 |  | B1 | accept 256  |
|  | (b) (ii) |  | angle at centre is twice angle at circumference | 2 | B1oe | Dep on B1 in (bi) or correct working  |
|  |  |  |  |  |  | **Total 4 marks** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **13** |  |  |  | M1 | for either y = 2*x* + 1 **or** *x* + *y* = 10 drawn correctly |
|  |  |  |  | M1 | for all lines drawn correctly |
|  |  | Correct region | 3 | A1 | for all 3 lines correct and the region identifiedLines may be full lines or broken lines |
|  |  |  |  |  | **Total 3 marks** |

| 14 | (a) |  or (3*x* + 1)(*x* + 3) = 120 or(2*x* – 4)(*x* + 3) + ½(9– *x*)(*x* + 3) or(*x* + 5)(*x* + 3) − ½(9– *x*)(*x* + 3) |  |  | M1 | correct expression for area(trapezium)(rectangle + triangle)(rectangle – triangle) |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  oe |  |  | M1 | correct expansion of (all pairs) brackets in a correct equation |
|  |  | 3*x*² + 10*x* + 3 = 120 or1.5*x*² + 5*x* + 1.5 = 60 | shown | 3 | A1 | dep on fully correct working to get to 3*x*2 + 10*x* – 117 = 0 |
|  | (b) |  oroe or NB: denominator must be 2 × 3 or 6 and there must be evidence for correct order of operations in the numerator  |  |  | M2 | If not M2 then M1 for (may have just + rather than ±)Condone one sign error in substitution; allow partial evaluation |
|  |  |  | 4.80 | 3 | A1 | Award M2A1 for answers in range 4.796 – 4.8 (and no other answer) with sufficient correct working that would gain at least M1[Award M2A0 for working sufficient for M1 with both the –ve and +ve answers (−8.13 & 4.80)] |
|  |  |  |  |  |  | **Total 6 marks** |

| 15 | (a) |  | 0.2, 0.65, 0.35, 0.4, 0.6 | 2 | B2oe | B1 for any 2 correct probabilities (in correct position) |
| --- | --- | --- | --- | --- | --- | --- |
|  | (b) | 0.8 × “0.35”(=0.28) or “0.2” × “0.4”(=0.08) |  |  | M1 | ft from (a) | M2 ft from (a) for 1−(0.8×‘0.6’+‘0.2’×‘0.6’)M1 for 1 – (0.8×‘0.65’) or 1− (‘0.2’×‘0.6’) |
|  |  | 0.8 × “0.35” + “0.2” × “0.4” |  |  | M1 | ft from (a) |  |
|  |  |  | 0.36 oe | 3 | A1 | eg , 36% |
|  |  |  |  |  |  | **Total 5 marks** |

| 16 | (a) |  | 24*x*2 – 6*x* – 25  | 2 | M1A1 | for 2 correct from 3 × 8*x*² , −3×2*x* ,−25fully correct |
| --- | --- | --- | --- | --- | --- | --- |
|  | (b) | 24*x*2 – 6*x* – 25 = 5 |  |  | M1 | ft from (a) |
|  |  | 24*x*2 – 6*x* – 30 (= 0) or 4*x*2 – *x* – 5 (= 0)or 12*x*² − 3*x* – 15 (= 0) |  |  | M1 | ft from (a) for a 3 term quadraticwith no coefficients of zero |
|  |  | (4*x* – 5)(6*x* + 6) (=0) or (4*x* – 5)(*x* + 1) (= 0)(4*x* – 5)(3*x* + 3) (= 0) or   |  |  | M1 | ft from (a) for a 3 term quadraticwith no coefficients of zero.If using quadratic formula some simplification may be seen. |
|  |  |  | 1.25 oe, −1 | 4 | A1 | cao dep on M1[ignore attempts to work out y values] |
|  |  |  |  |  |  | **Total 6 marks** |

| 17 |  | 60 ÷ 30 (=2) or 270 ÷ 60 (=4.5) or 150 ÷ 30 (=5) or 156 ÷ 120 (=1.3) or 24 ÷ 60 (=0.4) |  |  | M1 | for use of areaeg. any one correct fd or any 2 correct bars of different widths |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | fd : 2, 4.5, 5, 1.3, 0.4  |  |  | M1 | for any 4 correct fd or bars |
|  |  |  | histogram | 3 | A1 | for a correct histogram, including frequency density (FD) label and scale/correct key |
|  |  |  |  |  |  | **Total 3 marks** |

| 18 |  | 0.5 × 6.4 × 9.7 × sin 110 (= 29.16…) |  |  | M1 |  | M2 for 6.4 × 9.7 × sin 110 |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | 2 × “29.16…” |  |  | M1 |  |
|  |  |  | 58.3 | 3 | A1 | for 58.3 – 58.4 |
|  |  | alternative |  |  |  |  |
|  |  | *AC* = (=13.323...)*DAC* =  or*ACD* =    |  |  | M1 | For method to find *AC* and angle *DAC* or angle *ACD* |
|  |  | Area = (sin ‘43.167..’ × 6.4 × 2 × ‘13.323..’) ÷ 2 Or area = (sin ’26.83..’ × 9.7 × 2 × ’13.323...’) ÷ 2  |  |  | M1 | find *DB* and then area using half product of diagonals |
|  |  |  | 58.3 |  | A1 | for 58.3 – 58.4 |
|  |  |  |  |  |  | **Total 3 marks** |

| 19 |  | 45.75 or 45.85 or 63.25 or 63.75 |  |  | B1 | Accept **or** 45.8499... **or** **or** 63.7499...  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  (= 1.379)... or (=0.764)... |  |  | M1 | Or for **or**  where,   |
|  |  | × 60 oe e.g.   |  |  | M1 | × 60 oe, e.g.   |
|  |  |  | 82.8 | 4 | A1 | Or better (82.76990185)  |
|  |  |  |  |  |  | **Total 4 marks** |

| 20 |  | eg. 2*n* + 1, 2*n* + 3 |  |  | M1 | for algebraic representation of two consecutive odd numbers  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | (2*n* + 3)2 – (2*n* + 1)2 =(4*n*2 + 6*n* + 6*n* + 9) – (4*n*2 + 2*n* + 2*n* + 1) |  |  | M1 | for correct expansion of at least one bracket  |
|  |  | 8*n* + 8 |  |  | M1 | for simplified answer, may be factorised |
|  |  |  | proof | 4 | A1 | for completion of proof |
|  |  |  |  |  |  | **Total 4 marks** |

| 21 |  | 15.62 + 4.32 – 2×15.6×4.3×cos72o (=220.39…) |  |  | M1 | substitution into Cosine rule |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | *LN* = 14.8(4561…) |  |  | A1 | 14.8(4561…) |
|  |  |  or **or** |  |  | M1 | ft *LN* dep on 1st M1 or correct start to alternative method to find angle *MLN* **or** angle *NLP* **or** angle *LNP*[4.3²=14.8..²+15.6²−2×14.8×15.6cos*NLP*] |
|  |  | (=51.49..) or (=15.99..) or(=87.99 or 92.00..)  |  |  | M1 | ft *LN* dep on 1st M1or complete alternative method to find angle *MLN* **or** angle *NLP* **or** angle *LNP*NB: *LNP* = 180 −87.99 = 92.009...  |
|  |  | (=51.49..) and(=15.99..) or(=87.99 or 92.00..)  |  |  | M1 | ft *LN* dep on 1st M1or complete method to find angle *MLN* **and** angle *NLP* (or *LNP* acute or obtuse) |
|  |  |  | 67.5 | 6 | A1 | for 67.46 – 67.8 |
|  |  |  |  |  |  | **Total 6 marks** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Question** | **Working** | **Answer** | **Mark** | **AO** | **Notes** |
| **22** |  |  |  |  | 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 |

| 23 |  |   **or**  |  |  | M1 | allow  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | *r* =  oe |  |  | A1 | (allow 1.33... or better) |
|  |  |   |  |  | M1 | dep on 1st M1 (need not include) or answer of  (=4.96(44…)) |
|  |  |  |   | 4 | A1 |  (accept 1.58(024…) |
|  |  |  |  |  |  | **Total 4 marks** |