**IGCSE (9–1) Maths - practice paper 6H mark scheme**

**Results Plus data on 84 of the 100 marks:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Paper 6** | | | |  |  |  |  | **Edexcel averages:** | |  |  |  |  |  |
| **Year** | **Paper** | **Qu. no** | **New qu. no.** | **Mean score** | **Max score** | **Mean %** |  | **ALL** | **A\*** | **A** | **B** | **C** | **D** | **E** |
| Spec pprs | 1H | Q02 | Q01 |  | 3 |  |  |  |  |  |  |  |  |  |
| 1701 | 3H | Q03 | Q02 | 2.12 | 3 | 70.7 |  | 2.12 | 2.92 | 2.73 | 2.35 | 1.67 | 0.75 | 0.34 |
| 1706 | 4HR | Q06 | Q03 | 4.02 | 5 | 80.4 |  | 4.02 | 4.82 | 4.47 | 3.84 | 2.80 | 1.48 | 0.62 |
| 1706 | 4HR | Q07 | Q04 | 4.08 | 5 | 81.6 |  | 4.08 | 4.72 | 4.39 | 4.01 | 3.17 | 2.12 | 0.65 |
| 1701 | 3H | Q08 | Q05 | 5.38 | 7 | 76.9 |  | 5.38 | 6.88 | 6.61 | 5.88 | 4.69 | 2.90 | 1.23 |
| 1706 | 4HR | Q09 | Q06 | 2.50 | 3 | 83.3 |  | 2.50 | 2.97 | 2.82 | 2.41 | 1.76 | 0.79 | 0.13 |
| 1601 | 3HR | Q08c | Q07 | 2.15 | 3 | 71.7 |  | 2.15 | 2.76 | 2.14 | 1.17 | 0.47 | 0.05 | 0.00 |
| 1701 | 3HR | Q12 | Q08 | 4.15 | 6 | 69.2 |  | 4.15 | 5.38 | 4.20 | 3.33 | 2.48 | 2.02 | 1.28 |
| 1506 | 4H | Q12 | Q09 | 2.32 | 3 | 77.3 |  | 2.32 | 2.82 | 2.48 | 2.07 | 1.51 | 0.83 | 0.39 |
| SAMs | 1H | Q10 | Q10 |  | 5 |  |  |  |  |  |  |  |  |  |
| 1606 | 4H | Q12 | Q11 | 2.81 | 4 | 70.3 |  | 2.81 | 3.69 | 3.05 | 2.05 | 0.79 | 0.17 | 0.02 |
| 1701 | 3HR | Q15 | Q12 | 2.33 | 4 | 58.3 |  | 2.33 | 3.68 | 2.31 | 1.22 | 0.46 | 0.12 | 0.00 |
| 1701 | 3HR | Q16 | Q13 | 4.91 | 7 | 70.1 |  | 4.91 | 6.74 | 5.45 | 3.92 | 2.02 | 0.85 | 0.24 |
| 1701 | 3H | Q14 | Q14 | 2.44 | 4 | 61.0 |  | 2.44 | 3.93 | 3.53 | 2.63 | 1.14 | 0.21 | 0.08 |
| 1601 | 3H | Q17 | Q15 | 3.63 | 5 | 72.6 |  | 3.63 | 4.85 | 4.38 | 3.68 | 2.62 | 1.62 | 0.59 |
| Spec pprs | 2H | Q16 | Q16 |  | 4 |  |  |  |  |  |  |  |  |  |
| 1606 | 4H | Q19 | Q17 | 1.59 | 3 | 53.0 |  | 1.59 | 2.43 | 1.49 | 0.73 | 0.26 | 0.04 | 0.00 |
| Spec pprs | 2H | Q18 | Q18 |  | 4 |  |  |  |  |  |  |  |  |  |
| 1701 | 3H | Q21 | Q19 | 1.00 | 3 | 33.3 |  | 1.00 | 2.10 | 1.03 | 0.54 | 0.22 | 0.13 | 0.08 |
| 1706 | 4HR | Q21 | Q20 | 2.55 | 5 | 51.0 |  | 2.55 | 4.24 | 2.62 | 1.37 | 0.54 | 0.14 | 0.02 |
| 1701 | 3HR | Q21 | Q21 | 2.81 | 5 | 56.2 |  | 2.81 | 4.50 | 2.63 | 1.49 | 0.57 | 0.19 | 0.04 |
| 1406 | 3HR | Q19 | Q22 | 1.46 | 3 | 48.7 |  | 1.46 | 2.09 | 1.23 | 0.84 | 0.64 | 0.35 | 0.25 |
| 1706 | 4HR | Q23 | Q23 | 1.31 | 3 | 43.7 |  | 1.31 | 2.34 | 1.29 | 0.56 | 0.14 | 0.01 | 0.02 |
| 1701 | 3H | Q24 | Q24 | 0.95 | 3 | 31.7 |  | 0.95 | 2.20 | 1.03 | 0.30 | 0.07 | 0.00 | 0.00 |
|  |  |  |  | **54.51** | **84** | **64.9** |  | **54.51** | **76.06** | **59.88** | **44.39** | **28.02** | **14.77** | **5.98** |

**Problem-solving questions: 10, 21, 24**

**Reasoning questions: 2, 5, 6, 8, 12, 13, 15, 16, 17, 18, 20**

| Q | | **Working** | **Answer** | **Mark** | **Notes** | |
| --- | --- | --- | --- | --- | --- | --- |
| 1 |  | 120 ÷ 1002 (=0.012) or 810 ÷ 120 (=6.75) |  |  | M1 |  |
|  |  | 810 ÷ “0.012” or “6.75” × 1002 |  |  | M1 |  |
|  |  |  | 67 500 | 3 | A1 |  |
|  |  |  |  |  |  | **Total 3 marks** |

| 2 |  | − |  | 3 | M1 | for correct improper fractions (subtraction sign not necessary)  **OR** two improper fractions with a common denominator with at least one of the fractions correct |
| --- | --- | --- | --- | --- | --- | --- |
| E.g. − or  oe |  |  | M1 | for correct fractions with a common denominator a multiple of 15  i.e. in form − |
|  | |  | shown |  | A1 | dep on M2 for correct conclusion tofrom correct working **with** sight of the result of the subtraction e.g. |
|  |  | Alternative method |  |  |  |  |
|  | | (5) – (3) |  | 3 | M1 | for two correct fractions with a common denominator a multiple of 15 |
| − |  |  | M1 |  |
|  | shown |  | A1 | dep on M2 for correct conclusion tofrom correct working **with** sight of the result of the subtraction e.g.or 2 − |
|  | | Alternative method |  |  |  |  |
| E.g. 5 – 3 |  | 3 | M1 | for two correct fractions with a common denominator a multiple of 15 |
| E.g. 4 – 3 |  |  | M1 | for a complete correct method |
|  |  |  | shown |  | A1 | dep on M2 for correct conclusion tofrom correct working |
|  |  |  |  |  |  | **Total 3 marks** |

| 3 | (a) |  | 30 < *d* ≤ 40 | 1 | B1 | Accept |
| --- | --- | --- | --- | --- | --- | --- |
|  | (b) | 5×5 + 15×12 + 25×17 + 35×20 + 45×6 or 25 + 180 + 425 + 700 + 270 or  1600 |  | 4 | M2 | *f* × *d* for at least 4 products with correct mid- interval values **and** intention to add.  If not M2 then award M1 for  *d* used consistently for at least 4 products within interval (including end points) **and** intention to add  **or**  for at least 4 correct products with correct mid-interval values with no intention to add |
|  |  | or |  |  | M1 | dep on M1 (ft their products)  NB: accept their 60 if addition of frequencies is shown |
|  |  |  | 26.7 |  | A1 | Accept 26.6 – 26.7 inclusive  Accept 27 if M3 awarded  Do not accept fractions or mixed numbers, eg  or |
|  |  |  |  |  |  | **Total 5 marks** |

| 4 | (a) | 4*x* ≥ 27 – 13 or  or –4*x* ≤ 13 – 27 or |  | 2 | M1  A1 | Accept an equation in place of an inequality or  accept wrong inequality sign or  accept 3.5 oe given as answer  oe  Must be the final answer |
| --- | --- | --- | --- | --- | --- | --- |
|  | (b) |  | Correct line drawn | 1 | B1 | For a closed circle at −1with line that goes at least as far as 3 or  for a closed circle at −1with an arrow on a line pointing to the right |
|  | (c) |  | −2, −1, 0, 1, 2 | 2 | B2 | B1 for list with one error or omission:  e.g.  −2, −1, 0, 1, 2, 3;  −1, 0, 1, 2;  −2, −1, 1, 2;  −3, −2, −1, 0, 1, 2  SCB1 for −3, −2, −1, 0, 1 |
|  |  |  |  |  |  | **Total 5 marks** |

| 5 | (a) | (−1, 6) (0, 4) (1, 2) (2, 0) (3, −2) (4, −4) (5, −6) | Correct line between *x* = −1 and *x* = 5 | 4 | B4 | For a correct line between *x* = −1 and *x* = 5 |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  | B3 | For a correct line through at least 3 of (−1, 6) (0, 4) (1, 2) (2, 0) (3, −2) (4, −4) (5, −6)  **OR**  for all of **(**−1, 6) (0, 4) (1, 2) (2, 0) (3, −2) (4, −4) (5, −6) plotted but not joined. |
|  |  |  | B2 | For at least 2 correct points plotted |
|  |  |  | B1 | For at least 2 correct points stated (may be in a table) or seen in working  **OR**  for a line drawn with a negative gradient through (0, 4) **OR**  for a line with the correct gradient. |
|  | (b) |  |  | 3 | M1 | for *y* = −4 drawn; accept full or dashed line  NB A shaded rectangle implies a choice of lines so M0 |
|  |  |  | M1 | for *x* = 1 drawn; accept full or dashed line  NB A shaded rectangle implies a choice of lines so M0 |
|  | For correct region identified |  | A1ft | for correct region identified.  Condone no label if region clear.  ft from an incorrect straight line in part (a) |
|  |  |  |  |  |  | **Total 7 marks** |

| 6 |  | Eg 9*x* = 22.5 or  or or 5*x* – (13 – 4*x*) = 9.5 or 4*x* + 5*x* – 9.5 = 13 or  or |  | 3 | M1 | For a complete method to eliminate one variable (condone one arithmetic error) |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | Eg 5 × "2.5" – 2*y* = 9.5 or 5*x* – 2 × "1.5" = 9.5 |  |  | M1 | Dep on M1  For substituting the other variable or starting again to eliminate the other variable |
|  |  |  | *x* = 2.5, *y* = 1.5 |  | A1 | dep on M1  NB: candidates showing no correct working score 0 marks. |
|  |  |  |  |  |  | **Total 3 marks** |

| **7** |  | × 100 oe | 548 | 3 | M2  A1 | M1 for or 5.47(9744136…) rounded or truncated to at least 3SF or  1.876 or (100 + 87.6)(% ) or 187.6(%)  or 187.6% = 1028 (million) or  or 1.876*x* = 1028 (million) oe or  = oe  awrt 548 |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  | **Total 3 marks** |

| 8 | a |  | correct graph | 2 | B2 | Points at end of intervals and joined with curve or line segments  If not B2 then B1 for 5 or 6 of their points from table plotted consistently within each interval at their correct heights and joined with smooth curve or line segments |
| --- | --- | --- | --- | --- | --- | --- |
|  | b |  |  | 2 | M1 ft | for a cf graph horizontal line or mark drawn at 40 or 40.5 or vertical line at correct place, ft their cf graph |
|  |  |  | 57 – 59 |  | A1 ft | from their cf graph |
|  | c |  |  | 2 | M1ft | for reading from cf axis ft their graph from 90 on time axis **or** 72 ft |
|  |  |  | 8 |  | A1ft |  |
|  |  |  |  |  |  | **Total 6 marks** |

| **9** |  | eg ⨯65000 oe or 10400 | 65000  ⨯ 0.843 |  | 3 | M1 | For ⨯65000  oe  or 10400 | (M2 for  65000⨯0.843)  **or** (M1 for  65000⨯0.84  or 54600  or 65000⨯0.842  or 45864  or 65000⨯0.844  or 32361.63..) |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | ⨯ (65000 – “10400”)  = 8736  ⨯ (65000 – “10400” – “8736”)  = 7338.24  65000 – “10400” – “8736”− “7338.24” |  | M1 | For completing  Method |
|  |  |  | |  |  | Accept (1 – 0.16) as equivalent to 0.84 throughout | |
|  |  |  | |  |  | **SC:** If no other marks gained, award M1 for 65000 x 0.48 oe (=31200) or 65000 ⨯ 0.52 oe (=33800) | |
|  |  |  | | 38525.76 | A1 | for 38525 – 38526 | |
|  |  |  | |  |  |  | **Total 3 marks** | |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Question** | | **Working** | **Answer** | **Mark** | **AO** | **Notes** | |
| **10** |  |  |  |  | AO2 | M1 |  |
|  |  | (*BC* = ) 5.7 |  |  |  | A1 |  |
|  |  | × 7.6 × ‘5.7’ **or** 21.6(6) **or** 21.7 |  |  |  | M1 | dep on first M1 |
|  |  |  |  |  |  |  | or eg. *ACB =* sin−1(=53.1...) **and** |
|  |  |  |  |  |  |  | × 9.5 × '5.7' × sin'53.1' |
|  |  | × *π* ×  **or** 12.7(587...) **or** 12.8 |  |  |  | M1 | dep on first M1 |
|  |  |  | 34.4 | 5 |  | A1 | for answer rounding to 34.4 |
|  |  |  |  |  |  |  | (*π*→ 34.4187... 3.14→34.4123...) |

| 11 | (a) | Eg or or 2.25 or or or 0.444(444…) or  (*AB* =) 11.7 ÷ or (*AB* =) 11.7 × or (*AB* =) 6 × oe  = or = oe | 5.2 | 2 | M1  A1 | For correct scale factor or correct equation involving *AB* or correct expression for *AB*  Accept 0.444(444…) rounded to at least 3SF |
| --- | --- | --- | --- | --- | --- | --- |
|  | (b) | Eg (A*D* =) × 4 or (A*D* =) × 11.7 or(*ED*) = × 4] – 4 or (*ED*) = × (11.7 – “5.2”) or = or = or  *ED* + 4 = × 4 or = or  A*D* = 9 | 5 | 2 | M1  A1 | For a correct expression for *ED* or *AD* or  For a correct equation involving *ED* or *AD* |
|  |  |  |  |  |  | **Total 4 marks** |

| 12 |  | −4*y* = 5 – 3*x* |  | 4 | M1 | isolates term in *y* |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | *y* = 0.75*x* (+ *c*) or gradient of A = 0.75 oe |  |  | M1 |  |
|  |  | gradient of B =  oe |  |  | M1 | or *y* = 0.8*x* (+ *c*)oe |
|  |  |  | No with correct figures |  | A1 | eg. No gradient of **A** = 0.75 but gradient of **B** = 0.8 oe |
|  |  |  |  |  |  | **Total 4 marks** |

| 13 | a | e.g. 3(3*x* + 1) – 5(*x* – 4) = 2×15 or or |  | 3 | M1 | deals with fractions eg. finds common denominator (15 or a multiple of 15) or multiplies by common multiple in a correct equation. |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | e.g. 9*x* + 3 – 5*x* + 20 = 30 |  |  | M1 | Expands brackets and multiplies by common denominator in a correct equation |
|  |  |  | 1.75 oe |  | A1 | dep on M1 |
|  | b | *t*(3*p* + 1) = 7 – 2*p* |  | 4 | M1 | multiplies by 3*p* + 1 must have brackets |
|  |  | 3*pt* + 2*p*  = 7 – *t* |  |  | M1 | isolates terms in *p* |
|  |  | *p*(3*t* + 2) = 7 – *t* |  |  | M1 | takes *p* out as a common factor |
|  |  |  |  |  | A1 | or  oe with *p* as the subject |
|  |  |  |  |  |  | **Total 7 marks** |

| 14 | (a) | *T* = *k* |  | 3 | M1 | or for  *k* may be numeric (but not 1) |
| --- | --- | --- | --- | --- | --- | --- |
| 400 = *k* or *k* = 16 or or *m* = 256 |  |  | M1 | implies the first M1 |
|  | *T* =16 |  | A1 | accept  Award 3 marks if *T* = *k* but *k* is evaluated correctly in part (a) or (b).  SC: B2 for correct formula for *x* in terms of *T* |
|  | (b) |  | 120 | 1 | B1 | ft for a correct answer from a substitution into an equation (or expression) in the form (*T* =) *k*  except  for *k* = 1 |
|  |  |  |  |  |  | **Total 4 marks** |

| **15** | ai |  | | 96 | 1 | B1 |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | aii |  | Angle at the centre is twice angle at the circumference | | 1 | B1 | (indep) |
|  | b | 73 − 26 | |  |  | M1 | for a complete method |
|  |  |  | | 47 |  | A1 |  |
|  |  |  | |  | 3 | B1 | (dep on M1) Alternate segment theorem |
|  |  | **Alternative Scheme** | |  |  |  |  |
|  | b | Angle *RST* = 180 − 73 (=107) **and**  Angle *SRT* = 180 − 26 − "107" | |  |  | M1 |  |
|  |  |  | | 47 |  | A1 |  |
|  |  |  | |  |  | B1 | (dep on M1) Alternate segment theorem |
|  |  |  | |  |  |  | **Total 5 marks** |

| 16 | (a)(i) (ii)  (b) |  | (180, 0) (270, −1)  Image result for graph of tan x from 0 to 360 | 4 | B1  B1  M1  A1 | Correct shape curve  Correct intersections of 0°, 180° and 360° with *x* axis |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  | **Total 4 marks** |

| 17 |  | Eg 7 × 5 – 7 ×2 × + 5 × 2 – 2 × 2 × × or35 − 14 + 10 − 4 or35 − 14 +10 – 40 or 35 − 14 + 50 – 20 × 2 | −5 + 12 | 3 | M1  M1  A1 | For brackets expanded correctly (need not be simplified)  *a* = −5 or *b* = 12  Dep on scoring the first M1  Dep on M1 |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  | **Total 3 marks** |

| 18 | (a) (i) |  | (7, −4) | 1 | B1 |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | (ii) |  | (3, −12) | 1 | B1 |  |
|  | (iii) |  | (6, −4) | 1 | B1 |  |
|  | (b) |  | 9 | 1 | B1 |  |
|  |  |  |  |  |  | **Total 4 marks** |

| 19 | (a) |  | 12 | 1 | B1 |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | (b) |  | 7 | 1 | B1 |  |
|  | (c) | Correct region shaded |  | 1 | B1 | Must be unambiguous |
|  |  |  |  |  |  | **Total 3 marks** |

| 20 | (a) (i) |  | 3b – 6a | 1 | B1 | Oe  Need not be simplified  Mark the final answer |
| --- | --- | --- | --- | --- | --- | --- |
|  | (ii) |  | 2b – 4a | 1 | B1ft | oe eg (‘3b −6a’)  Need not be simplified  Mark the final answer |
|  | (iii) |  | 6b – 3a | 1 | B1 | oe  Need not be simplified  Mark the final answer |
|  | (b) | Eg = 2b – a oe or = 4b – 2a |  | 2 | M1 | Work out or or  or |
|  |  |  | shown |  | A1 | Dep on M1  Correct conclusion from correct simplified vectors  Eg  or or    or *XB* and *XY* are parallel  or *YB* and *XY* are parallel  or *XB* and *YB* are parallel |
|  |  |  |  |  |  | **Total 5 marks** |

| 21 |  | (*OB*2 = ) 122 + 162 – 2 × 12 × 16 × cos(60o) |  | 5 | M1 | M2 for  √(122 + 162 – 2 × 12 × 16 × cos(60o)) |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | (*OB* =) or or 14.4…. or (*OB*2) = 208 |  |  | M1 |
|  |  | 0.5 × 12 × 16 × sin(60o) (= 83.1…or ) or   (=68.9…) or (=68.9…) |  |  | M1 | ft their 14.4 provided first M1 awarded. |
|  |  | 0.5 × 12 × 16 × sin(60o) +  (68.9....+ 83.1...) |  |  | M1 | ft their 14.4 provided first M1 awarded. |
|  |  |  | 152 |  | A1 | awrt 152 |
|  |  |  |  |  |  | **Total 5 marks** |

| 22 |  | or  or3(*x*² ‒ 16) < 0 |  | 3 | M1 | Allow x² = 16 oe.  3(x² ‒ 16) = 0 |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | M1 | For − 4 and 4 |
|  |  |  |  |  | A1 | for correct inequality  accept  and |
|  |  |  |  |  |  | **Total 3 marks** |

| 23 |  | 27.25 or 27.35 or 17.5 or 18.5 or 9.805 or 9.815 |  | 3 | B1 | Accept 27.34 **or** 27.3499… **or** 18.4or 18.499... **or** 9.814 **or** 9.81499... |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | M1 | For  oe where    27.25 ≤ LB < 27.3  **and** 18 < UB1 ≤ 18.5  **and** 9.81 < UB2 ≤ 9.815 |
|  |  |  | 0.891 |  | A1 | dep on seeing  Correct working must be seen  Accept 0.891 - 0.8915 |
|  |  |  |  |  |  | **Total 3 marks** |

| 24 |  | × ×  oe or × × oe OR× × *a* and × × *b**a* and *b* must both be a single fraction where0 < *a*, *b* < 1 and |  | 3 | M1 |  |
| --- | --- | --- | --- | --- | --- | --- |
| × × oe and × × oe |  |  | M1 | Both products correct  (addition not needed) |
|  |  |  | A1 | oe E.g. |
|  |  |  |  |  |  | **Total 3 marks** |