| Qn |  | **Working** | **Answer** | **Mark** | **Notes** |
| --- | --- | --- | --- | --- | --- |
| 1 | a | e.g.    |  |  | M1 | for a correct first step eg subtract *g* from both sides **OR** divide all terms by 2 **OR** divide all terms by *c* **OR** divide all terms by 2*c* |
|  |  |  |   | 2 | A1 | oe |
|  | b |  | 3*f* (3*e* – 4) | 2 | B2 | (B1 for 3(3*ef* – 4*f*)or *f*(9*e* −12) or 3*f*(*ke* – 4) or 3*f*(3*e* – *m*) where *k* ≠ 0 and *m* ≠ 0) |
|  | c | *x*2 – 5*x* + 2*x* − 10 |  |  | M1 | for any 3 correct terms **or** for 4 out of 4 correct terms ignoring signs **or** *x*2 – 3*x*… **or** for …−3*x* − 10 |
|  |  |  | *x*2 – 3*x* − 10 | 2 | A1 |  |
|  | d |  **OR** *n*−1 × *n*7 **OR** *n*4 × *n*2 **OR** *n*4 × *n*7 ×*n*−5 **OR**  *n*”11” ÷ *n*5 = *n*(”11” – 5) |  |  | M1 | for simplifying two terms |
|  |  |  | *n*6 | 2 | A1 |  |
|  |  |  |  |  |  | **Total 8 marks** |

| 2 |  | (adding) 10*x* = – 5 or 21*x* + 35*y* = 42 21*x* – 15*y* = – 33  then 50*y =* 75 |  | 3 | M1 | Correct method to eliminate *x* or *y* Or making coefficients of *x* or *y* the same **and** correct operator has been applied to eliminate *x* or *y* (2 out of 3 terms correct implies a correct operator)or correct algebraic substitution for *x* or *y* into other equation  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  | *x* = − 0.5 oe*y* = 1.5 oe |  | A1 A1 | Both A marks dep on M1 |
|  |  |  |  |  |  | **Total 3 marks** |

| 3 |  | (*x* ± 9)(*x* ± 4) | **or**  |  |  | M1 | **or** (*x* + *a*)(*x* + *b*) where *ab* = −36 **or** *a* + *b* = −5 **OR** correct substitution into quadratic formula (condone one sign error in *a*, *b* or *c*)(if + rather than ± shown then award M1 only unless recovered with answers) |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | (*x* − 9)(*x* + 4) |  **or**  |  |  | M1 | **or**  **or**   |
|  |  |  | 9, −4 | 3 | A1 | dep on at least M1 |
|  |  |  |  |  |  | **Total 3 marks** |

| 4 | (a) |  | 519 | 1 | B1 |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | (b) |  |  | 2 | M1  | A factor tree / division ladder of 3 or more factors (≠1), multiplying to 800, which must include 2 and 5. Condone 1 error when product ≠ 800 |
|  |  |  | 2×2×2×2×2×5×5 |  | A1  | dep on M1 oe eg 25 × 52 |
|  |  |  |  |  |  | **Total 3 marks** |

| 5 |  | 4*x* or *x* − 7 |  | 4 | M1 | Correct expression for *B* or *C* |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | *x* + 4*x* + *x* – 7 = 137 oe |  |  | M1 | Correct equation |
|  |  | *x* = 144 ÷ 6 (=24) or 6*x* = 144 or 6*x* – 144 = 0 |  |  | M1 | Gathering up the *x*’s and numbers Dep on previous M1 |
|  |  |  | 17 |  | A1 |  |
|  |  |  |  |  |  | **Total 4 marks** |

| 6 | (a) |  | 2, −1.5, −3, 0 | 2 | B2 | B1 for 2 or 3 values correct |
| --- | --- | --- | --- | --- | --- | --- |
|  | (b) |  |  | 2 | M1ft | At least 5 points plotted correctly ft from table dep on B1 in part (a) |
|  |  |  |  |  | A1 | For correct smooth curve. |
|  |  |  |  |  |  | **Total 4 marks** |

| 7 | (a) |  | −1, 0, 1, 2, 3, 4 | 2 | B2 | B1 for – 2, −1, 0, 1, 2, 3, 4 or −1, 0, 1, 2, 3 |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  | **Total 2 marks** |

| 8 | a |  | 9 | 1 | B1 |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | b | (g(2) =)  oe |  |  | M1 | **or** for sight of fg(*x*) e.g.  |
|  |  |  | 10.24 | 2 | A1 | oe e.g.  |
|  |  |  |  |  |  | **Total 3 marks** |

| 9 |  | e.g. 6(*x* – 1) (= 6*x* – 6) |  |  | M1 | method to find expression for perimeter of hexagon |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | e.g. 2(*x* + 5) + 2*x* – 3 (= 4*x* + 7) |  |  | M1 | method to find expression for perimeter of triangle |
|  |  | “6*x* – 6” = “4*x* + 7” |  |  | M1 | (dep on at least M1) for equating both expressions  |
|  |  | e.g. 6*x* – 4*x* = 7 + 6 |  |  | M1 | (dep on previous M1 and equation of the form *ax* + *b* = *cx* + *d* )for rearranging the *x* terms on one side and the numerical terms on the other and all expansions correct. |
|  |  |  | 5.5 | 5 | A1 | oe (dep on M2) |
|  |  |  |  |  |  | **Total 5 marks** |

| 10 |  | e.g. 36 ÷ (2 + 6) (= 4.5) **or** oe **or** Asha = £9 **OR** Julie = £27 |  |  | M1 |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | e.g. 3 × “4.5” **or**  **or**  **or**   |  |  | M1 | or an answer of   |
|  |  |  | 13.5(0) | 3 | A1 | SCB1 for 36/5 × 7(= 43.2) or 36/9 × 2(= 8) |
|  |  |  |  |  |  | **Total 3 marks** |

| 11 |  | e.g.  **and**  oe |  |  | M1 | both fractions expressed as improper fractions |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | e.g.  **OR**  oe |  |  | M1 | correct cancelling or multiplication of numerators and denominators without cancelling |
|  |  | e.g. **or** **or** **or** candidate clearly shows that in the question, the result of  and that their answer becomes   | shown | 3 | A1 | Dep on M2 for conclusion to  from correct working – either sight of the result of the multiplication e.g.  must be seen or correct cancelling prior to the multiplication to  NB: use of decimals scores no marks |
|  |  |  |  |  |  | **Total 3 marks** |

| 12 |  |  | Fully correct perpendicular bisector with all relevant arcs shown. | 2 | B2 | Fully correct bisector with all arcs. Correct arcs can be on the same side of *AB*. B1 for all correct arcs and no bisector drawn or for a correct bisector within guidelines but no arcs.NB: On tramlines = within tramlines. |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  | **Total 2 marks** |

**13**

| 13 | a |  | 23 | 1 | B1 | accept 22 – 24 |
| --- | --- | --- | --- | --- | --- | --- |
|  | b | e.g. 29 − 17 |  |  | M1 | For subtracting readings from 15 and 45 |
|  |  |  |  |  |  |  |
|  |  |  | 12 | 2 | A1 | accept 10 – 14 |
|  | c |  |  |  | B1 | ft comparison of the medians |
|  |  |  | Two comparisons (at least one of which must be in context) | 2 | B1 | ft comparison of the IQR**Note: to award 2 marks at least one comparison must be in context** |
|  |  |  |  |  |  | **Total 5 marks** |

| 14 |  | 5, 7, 11, 12, 13, 14, 15, 16, 17, 18, 18 |  | 3 | M1 | Ordering marks (allow 1 error) |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | 11 and 17 selected |  |  | M1 | LQ = 11 and UQ =17 identified |
|  |  |  | 6 |  | A1 |  |
|  |  |  |  |  |  | **Total 3 marks** |

| 15 |  | (*AOC* =) 38 × 2 (= 76) |  | 4 | M1 |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  | 52 |  | A1 |  |
|  |  |  |  |  | B2 | (dep on M1) for all reasons relevant to their method – underlined words must be seen.angle at the centre is 2 × (double) angle at circumference **/** angle at circumference is ½ angle at centreangles in a triangle add to 180°  **or** angles in a triangle add to 180°base angles in an isosceles triangle (are equal)If not B2 then award B1 (dep on M1) for a correct circle theorem |
|  |  |  |  |  |  | **Total 4 marks** |

| 16 |  |  **or**  **or** 4 − *y* |  |  | M1 | for multiplying numerator and denominator by  **or** a correct expression for the numerator or denominator |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |   | 2 | A1 |  |
|  |  |  |  |  |  | **Total 2 marks** |

| 17 | (a) |  |  | 3 | B3 | All 8 values inserted correctlyB2 for 4 to 7 correct valuesB1 for 2 or 3 correct valuesNB: Expressions involving *x* do not have to be simplified. |
| --- | --- | --- | --- | --- | --- | --- |
|  | (b) | “[(25 – *x*) + (*x* – 6) + (16 – *x*) + 3 + 6 + 2 + 9 + 5]” = 50 |  | 2 | M1ft | For sum of all their values = 50 oe |
|  |  |  | 10 |  | A1 |  |
|  |  |  |  |  |  | **Total 5 marks** |

| 18 | (a)  | Factorising numerator as (5*x* + 4)(2*x* + 3) |  | 3 | M1 |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |   | Factorising denominator as (2*x* + 3)(2*x* – 3) |  |  | M1  |  |
|  |  |  |   |  | A1 |  |
|  | (b) | (85*y* = ) 215*y* or (4*n* = )22*n* or 25*y*+2 |  | 4 | M1 |  |
|  |  | 25*y*+2 = 215*y* – 2*n* oe  |  |  | M1 | e.g. 22*n* = 215y – 5*y* – 2 |
|  |  | 5*y* + 2 = 15*y* – 2*n* oe |  |  | M1 | Correct equation using the powers |
|  |  |  | *n* = 5*y* − 1 |  | A1 | Dep on M2 (accept 5*y* – 1) |
|  |  |  |  |  |  | **Total 7 marks** |

| 19 |  | (*N* + 1)2 = (*N*² + 2*N* + 1) and (*N* − 1)2 = (*N*² − 2*N* + 1) |  | 3 | M1 |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | (*N*² + 2*N* + 1) – (*N*² − 2*N* + 1) = 4*N* |  |  | M1 | Must reach 4*N* correctly |
|  |  |  | *N* = 5*x* oeTherefore 4*N* = 20*x* |  | A1 | Dep. on M2. A correct conclusion (i.e. 20 “*x*”) following fully correct working |
|  |  | **Alt:** *N* = 5*x* oe in both *A* and *B*  |  |  | M1 |  |
|  |  | (5*x* + 1)2 = (25*x*² + 10*x* + 1) and (5*x* – 1)2 = (25*x*² − 10*x* + 1)  |  |  | M1 |  |
|  |  |  | (25*x*² + 10*x* + 1) − (25*x*² − 10*x* + 1) = 20*x* |  | A1 | Dep. on M2. Subtraction of two correct brackets to reach 20 “*x*” |
|  |  | **Alt:** *A*2 – *B*2 = ( *A* + *B*) (*A* – *B*)*A* + *B* = 2*N* and *A* – *B* = 2 |  |  | M1 |  |
|  |  | *A*2 – *B*2 = 2 *N* x 2 = 4*N* |  |  | M1 |  |
|  |  |  | *N* = 5*x* oeTherefore 4*N* = 20*x* |  | A1 | Dep. on M2. A correct conclusion (i.e. 20 “*x*”) following fully correct working |
|  |  |  |  |  |  | **Total 3 marks** |

| 20 |  | – 2(*x*2 + 6*x* – 3.5) or – 2(*x*2 + 6*x*) + 7 |  | 3 | M1 | Factorising by – 2  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | – 2[(*x* + 3)2 – 9 – 3.5] or – 2[(*x* + 3)2 – 9] + 7 |  |  | M1 | Completing the square |
|  |  |  | 25 – 2(*x* + 3)2 |  | A1 |  |
|  |  | Alt : *a* + b(*x*2 + 2*cx* + *c*2) |  |  |  |  |
|  |  | 2*bc* = −12 or *a* + *bc*2 = 7 or *b* = – 2 |  |  | M1 | Equating coefficients or stating value of *b* |
|  |  | 2 × −2 × *c* = −12 or *c* = 3  |  |  | M1 | Equating coefficients or stating value of *c* |
|  |  | *a* + −2 × (3)2 = 7 or *a*  = 25 seen |  |  | A1 | Equating coefficients or stating value of *a* |
|  |  |  |  |  |  | Special Cases:SC B2 for answer of – 2(*x* + 3)2 + constantor 25 – 2(*x* + positive constant)2SC B1 for answer of – 2(*x* – 3)2 + constant |
|  |  |  |  |  |  | **Total 3 marks** |

| 21 |  | *OC* = 3**a** + 4**b** |  | 5 | B1 | Correct expression for *OC*  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | *ON*  = *t*(3**a** + 4**b**)  |  |  | M1 | Correct expressions for *ON* |
|  |  | *ON =* 3**a** + s(–3**a** + 6**b**) |  |  | M1 |
|  |  | *t*(3**a** + 4**b**) = 3**a** + s(*–* 3**a** + 6**b**)→ *t* = 0.6, *s* = 0.4 |  |  | A1 |   *t* or *s* value correct |
|  |  |  | *ON* = 1.8**a** + 2.4**b**oe |  | A1 | e.g. *ON* = (3**a** + 4**b**) |
|  |  | **Alt:** |  |  |  |  |
|  |  | *AB = –* 3**a** + 6**b** |  |  | B1 | Correct expression for *AB* |
|  |  | *AN = s*(*–*3**a** + 6**b**) |  |  | M1 | Correct expressions for *AN* |
|  |  | *AN =* – 3**a** + *t*(3**a** + 4**b**) |  |  | M1 |
|  |  | *– 3***a** + *t*(3**a** + 4**b**) = *s*(*–* 3**a** + 6**b**)→ *t* = 0.6, *s* = 0.4 → *AN* = *–*1.2**a**+ 2.4**b***ON* = 3**a** + *AN* |  |  | A1 |   *t* or *s* value correct |
|  |  |  | *ON* = 1.8**a** + 2.4**b**oe |  | A1 | e.g. *ON* = (3**a** + 4**b**) |
|  |  | **Alt:** |  |  |  |  |
|  |  | *OC* = 3**a** + 4**b** |  |  | B1 | Correct expression for *OC* |
|  |  | *ON* : *NC* = 6 : 4 (i.e 3:2) |  |  | M1 |  |
|  |  | *ON* = *OC* |  |  | M2 |  |
|  |  |  | *ON* = 1.8**a** + 2.4**b**oe |  | A1 | e.g. *ON* = (3**a** + 4**b**) |
|  |  |  |  |  |  | **Total 5 marks** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  | **Edexcel averages: scores of candidates who achieved grade:** |
| **Qn** | **Paper** | **Question** | **Skill tested** | **Max score** | **Mean %** | **ALL** | **9** | **8** | **7** | **6** | **5** | **4** | **3** |
| **1** | **1HR** | Q03 | Algebraic manipulation | 8 | 91 | 7.28 | 7.92 | 7.84 | 7.64 | 7.35 | 6.94 | 5.70 | 4.42 |
| **2** | **2HR** | Q07 | Simultaneous linear equations | 3 | 86 | 2.57 | 2.95 | 2.80 | 2.78 | 2.39 | 2.35 | 1.88 | 1.25 |
| **3** | **1HR** | Q06 | Quadratic equations | 3 | 83 | 2.49 | 2.92 | 2.85 | 2.72 | 2.11 | 2.01 | 1.63 | 1.00 |
| **4** | **2HR** | Q01 | Powers and roots | 3 | 89 | 2.68 | 2.90 | 2.92 | 2.70 | 2.56 | 2.52 | 2.25 | 2.25 |
| **5** | **2HR** | Q03 | Linear equations | 4 | 82 | 3.29 | 3.94 | 3.84 | 3.60 | 3.13 | 2.33 | 1.62 | 0.67 |
| **6** | **2HR** | Q15 | Graphs | 4 | 86 | 3.43 | 3.86 | 3.71 | 3.56 | 3.18 | 3.08 | 2.70 | 2.30 |
| **7** | **2HR** | Q11a | Inequalities | 2 | 81 | 1.62 | 1.95 | 1.87 | 1.76 | 1.61 | 1.10 | 0.92 | 0.36 |
| **8** | **1HR** | Q17ac | Function notation | 3 | 82 | 2.45 | 2.93 | 2.87 | 2.53 | 2.21 | 1.77 | 1.42 | 0.89 |
| **9** | **1HR** | Q10 | Linear equations | 5 | 75 | 3.74 | 4.80 | 4.74 | 4.08 | 2.98 | 1.87 | 0.97 | 0.36 |
| **10** | **1HR** | Q01 | Ratio and proportion | 3 | 78 | 2.35 | 2.87 | 2.76 | 2.44 | 2.30 | 1.69 | 0.96 | 0.97 |
| **11** | **1HR** | Q02 | Fractions | 3 | 78 | 2.32 | 2.68 | 2.60 | 2.38 | 2.29 | 2.08 | 1.62 | 1.03 |
| **12** | **2HR** | Q06 | Construction | 2 | 73 | 1.45 | 1.81 | 1.65 | 1.52 | 1.25 | 0.99 | 0.72 | 0.67 |
| **13** | **1HR** | Q12 | Statistical measures | 5 | 67 | 3.35 | 4.58 | 4.00 | 3.09 | 2.37 | 2.12 | 1.54 | 1.14 |
| **14** | **2HR** | Q14 | Statistical measures | 3 | 62 | 1.85 | 2.54 | 2.10 | 1.79 | 1.34 | 1.06 | 0.83 | 0.61 |
| **15** | **1HR** | Q14 | Circle properties | 4 | 58 | 2.32 | 3.18 | 2.68 | 2.24 | 1.70 | 1.35 | 1.06 | 0.69 |
| **16** | **1HR** | Q13b | Powers and roots | 2 | 62 | 1.23 | 1.93 | 1.62 | 1.06 | 0.62 | 0.51 | 0.13 | 0.00 |
| **17** | **2HR** | Q17ab | Set language and notation | 5 | 56 | 2.78 | 4.21 | 3.20 | 2.41 | 1.76 | 1.34 | 1.07 | 0.84 |
| **18** | **2HR** | Q21 | Algebraic manipulation | 7 | 53 | 3.71 | 6.33 | 4.54 | 2.86 | 1.97 | 0.86 | 0.50 | 0.14 |
| **19** | **2HR** | Q25 | Algebraic manipulation | 3 | 42 | 1.26 | 2.28 | 1.55 | 0.84 | 0.40 | 0.23 | 0.06 | 0.00 |
| **20** | **2HR** | Q23 | Algebraic manipulation | 3 | 41 | 1.23 | 2.52 | 1.42 | 0.72 | 0.32 | 0.15 | 0.00 | 0.00 |
| **21** | **2HR** | Q26 | Vectors | 5 | 28 | 1.39 | 2.73 | 1.25 | 0.77 | 0.41 | 0.19 | 0.06 | 0.06 |
|  |  |  |  | **80** | **68** | **54.79** | **71.83** | **62.81** | **53.49** | **44.25** | **36.54** | **27.64** | **19.65** |

**Suggested grade boundaries**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Grade** | **9** | **8** | **7** | **6** | **5** | **4** | **3** |
| Mark | 67 | 58 | 49 | 40 | 32 | 24 | 18 |