| 1 |  | 30 + 4*x* + 10 + *x* + 20 (= 5*x* + 60) **or**  180 – 30 (=150) |  | 4 | M1 | Allow 5*x* + 60 = *n*where *n* ≠ 180 or for subtracting 30 from 180 | M2 for 5*x* + 30 = 150oe |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | e.g. 30 + 4*x* + 10 + *x* + 20 = 180 **or** 5*x* + 60 = 180 oe**or** 180 – 30 – 10 – 20 (=120) |  |  | M1 | for setting up the equation or for subtracting all numerical values of angles from 180 |
|  |  | 5*x* = ‘120’ **or ‘**120’ ÷ 5 |  |  | M1 | for correctly simplifying to *ax* = *b* or for dividing ‘120’ by 5 |
|  |  |  | 24 |  | A1 | for 24 |
|  |  |  |  |  |  | ***Total 4 marks*** |

| 2 | (a) |  | *x*7 | 1 | B1 |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | (b) | eg 78 × 74 = 712 or 78 ÷ 73 = 75 or 75 × 74 or 74 ÷ 73 = 7 or 78 × 7 or 7’12’ ÷ 73 = 7’12’−3 |  | 2 | M1 | for one correct step – must be written as a power of 7 |
|  |  |  | 79 |  | A1 | for 79 |
|  |  |  |  |  |  | ***Total 3 marks*** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **3** | (a) | *m*2 – 8*m* + 5*m* – 40 |  | 2 | M1 for any 3 correct terms **or** for 4 out of 4 correct terms ignoring signs  **or**for *m*2 – 3*m* … **or**for …– 3*m* – 40 |
|  |  |  | *m*2 – 3*m* – 40 |  | A1  |
|  |  |  |  |  | **Total 2 marks** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **4** |  | 12 × 9 (=108) **or** (9 – 6) × *x* (= 3*x*)  |  | 4 | M1 for one correct relevant area |
|  |  | E.g. 129 – ‘108’ (= 21) **or**‘108’ + ‘3*x*’ = 129  |  |  | M1 (dep on M1) for 129 used correctly with another area **or** for a correct equation (ft) with bracket(s) expanded |
|  |  | E.g. ‘21’ ÷ (9 – 6) **or***x* =  |  |  | M1 for a complete method  |
|  |  |  | 7 |  | A1 Accept 7 cm |
|  |  |  |  | **Total 4 marks** |

| 5 |  |  or   |  | 3 | M1 | for correct improper fractions or fractional part of numbers written correctly over a common denominator |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  or  or  oe |  |  | M1 | for correct fractions with a common denominator of 15 or a multiple of 15 |
|  |  | or if shows at the beginning then show that the addition comes to   | Shown |  | A1 | dep on M2 for a correct answer from fully correct working **or** shows that RHS =  **and** fully correct working shows LHS =  |
|  |  |  |  |  |  | ***Total 3 marks*** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **6** |  | E.g. or oe |  | 4 | M1 for expansion of a correct bracket  |
|  |  | 2 × 3(2*x* – 5) = 9 – *x* oe **or** 2(‘6*x* – 15’) = 9 – *x* oe  **or**3(2*x* – 5) = oe |  |  | M1 for removal of fraction **or** separating fraction (RHS) in an equation |
|  |  | 12*x* + *x* = 9 + 30 oe **or**oe |  |  | M1 ft (dep on 4 terms) for terms in *x* on one side of equation; number terms on the other  |
|  |  |  | 3 |  | A1 dep on at least M2 awarded |
|  |  |  |  | **Total 4 marks** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **7** |  |  | 5*y*(1 + 4*y*) | 2 | B2 If not B2 then award B1 for5(*y* + 4*y*2) **or** *y* (5 + 20*y*) **or** 5*y*(*a* + 4*y*) where *a* is an integer and *a* ≠ 0 **or** 5*y*(1 + *by*) where *b* is an integer and *b* ≠ 0 |
|  |  |  |  |  | **Total 2 marks** |

| 8 |  | 2*x* ˃ 4 – 7 **or** *x* + 3.5 > 2 |  | 2 | M1 | For a correct first step allow 2*x* = 4 – 7 or *x* + 3.5 = 2or an answer of *x* = −1.5 or *x* < −1.5 or −1.5 |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  | *x* ˃ −1.5 |  | A1 | for *x* ˃ −1.5 oe |
|  |  |  |  |  |  | **Total 2 marks** |

| 9 |   | (*x* ± 8)(*x* ± 5) |  **or**   |  |  | M1 | **or** (*x* + *a*)(*x* + *b*) where *ab* = −40 **or** *a* + *b* = −5 **OR** correct substitution into quadratic formula (condone one sign error in *a*, *b* or *c* and missingbrackets)(if + rather than ± shown then award M1 only unless recovered with answers) |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | (*x* − 8)(*x* + 5) |  **or**   |  |  | M1 |   **or**   |
|  |  |  | 8, −5 | 3 | A1 | dep on at least M1 for correct values |
|  |  |  |  |  |  | ***Total 3 marks*** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **10** |  | (2*x* + 5)(*x* + 1) = 2*x*2 + 2*x* + 5*x* + 5 (= 2*x*2 + 7*x* + 5) **or**(*x* + 1)(3 – *x*) = −*x*2 + 3*x* – *x* + 3 (= −*x*2 + 2*x* + 3) **or**(3 – *x*) (2*x* + 5) = −2*x*2 + 6*x* − 5*x* + 15 (= −2*x*2 + *x* + 15) |  | 3 | M1 for multiplying out two brackets correctly at least 3 terms correct | M2 for at least 4 terms correct out of a maximum of 8 terms6*x*2 −2*x*3 + 6*x* − 2*x*2 + 15*x* − 5*x*2 +15 − 5*x* |
|  |  | E.g.[(2*x*2 + 7*x* + 5)(3 – *x*) =] −2*x*3 − 7*x*2 − 5*x* + 6*x*2 + 21*x* + 15 **or**[(−*x*2 + 2*x* + 3)(2*x* + 5) =]−2*x*3 − 5*x*2 + 10*x* + 4*x*2 + 6*x* + 15 **or** [(−2*x*2 + *x* + 15)(*x* + 1) =] −2*x*3 − 2*x*2 + 15*x* + *x*2 + *x* + 15 |  |  | M1 for at least 3 terms correct out of a maximum of 6 terms**or** for at least 4 terms correct out of a maximum of 8 terms |
|  |  |  | Shown |  | A1 |
|  |  |  |  |  | **Total 3 marks** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **11**  |  | 28, 56, 84, 112… **and** 105, 210, 315, 420…**or** 2, 2, 7 **and**  3, 5, 7**or****or** **or** 2, 2, 3, 5, 7 oe |  | 2 | M1for any correct valid method e.g.for starting to list at least **four** multiples of each number **or** 2, 2, 7 **and**  3, 5, 7 seen (may be in a factor tree and ignore 1)**or** a fully correct Venn diagram |
|  |  |  | 420 |  | A1 cao |
|  |  |  |  | **Total 2 marks** |

| 12 | (a) |  | 4.35 | 1 | B1 | accept   |
| --- | --- | --- | --- | --- | --- | --- |
|  | (b) |  | 4.25 | 1 | B1 | cao |
|  |  |  |  |  |  | **Total 2 marks** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **13** |  |  | Trapezium with vertices at (6, 3) (8, 3) (8, 6) (4, 6) | 2 | B2If not B2 then award B1 for shape of correct size and orientation **or** 3 or 4 points plotted correctly |
|  |  |  |  | **Total 2 marks** |

| 14 |  | Fully correct angle bisector with all relevant arcs shown | 2 | B2  | Fully correct angle bisector with all arcs shown.B1 for all arcs and no angle bisector drawn or for a correct angle bisector within guidelines but not arcs or insufficient arcs  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  | ***Total 2 marks*** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **15** | (a) | E.g. 56 – 38  |  | 2 | M1 for subtracting readings from 60 and 20 oe |
|  |  |  | 18 |  | A1 for answer in the range 17 – 19 |
|  | (b) | [40.5, 43] |  | 3 | B1 |
|  |  | ‘42’ ÷ 0.6 oe |  |  | M1 for complete method to find the number of men |
|  |  |  | 70 |  | A1 |
|  |  |  |  | **Total 5 marks** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **16** |  |  | 1 | 1 | B1 |
|  |  |  |  |  | **Total 1 mark** |

| *17* |  |  |  | 4 | M1 | for squaring |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  or  |  |  | M1 | for removing the fraction |
|  |  |  or  **or** or  |  |  | M1 | for expanding the bracket **and** rearranging for *x* so that the terms in *x* are on one side of the correct equation |
|  |  |  |  |  | A1 | for  or (need to see *x* = somewhere) |
|  |  |  |  |  |  | ***Total 4 marks*** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **18** |  |  ororororor |  | 3 | M1 for correct expansion of brackets showing **four** terms (need not be simplified) **or** for the use of (*a* + *b*)2 = *a*2 + 2*ab* + *b*2 **or**for showing or stating  = 2oe |
|  |  |  |  |  | M1 (dep on M1) |
|  |  |  | Shown |  | A1 for fully correct working leading to given expression  |
|  |  |  |  |  | **Total 3 marks** |

| 19 |  |  | C, B, E | 3 | B3(B2(B1 | for all 3 correctfor 2 correct)for 1 correct) |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  | ***Total 3 marks*** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **20** |  | E.g.or or  |  | 3 | M1 for **one** of cube rooting **or** inverting **or** squaring **or** where *k* is an integer ≠ 0 |
|  |  | E.g.or or or or or  |  |  | M1 for **two** of cube rooting **or** inverting **or** squaring**or** where *k* is an integer ≠ 0  |
|  |  |  |  |  | A1 Allow or  |
|  |  |  |  | **Total 6 marks** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **21** |  |  | *x* ≥ −1 oe  *x* + *y* ≤ 4 oe *y* ≥  oe  | 3 | B3 for all 3 correct inequalities (B2 for two correct inequalities B1 for one correct inequality)(SC B3 for *x* ≤ −1, *x* + *y* ≥ 4 and *y* ≤ oe)(If no marks gained B1 for understanding of equation *x* + *y* = 4 e.g. *y* > 4 − *x*)Accept < for ≤ and > for ≥ throughout  |
|  |  |  |  | **Total 3 marks** |

| 22 |  | 32.4 × 1003 |  | 2 | M1 | for 32.4 × 1003 oe |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  | 32 400 000 |  | A1 | for 32 400 000 accept 3.24 × 107 |
|  |  |  |  |  |  | ***Total 2 marks*** |

| 23 |  |  |  | 5 | M1 | for substituting linear equation into the quadratic equation |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | 2*x*² + 2*x* – 24 (=0) or *x*² + *x* −12 (=0)or 2*x*² + 2*x* =24 or *x*² + *x* =12 |  |  | A1 | for a correct equation in the form *ax*2 + *bx* + *c* = 0 or  *ax*2 + *bx* = −*c* |
|  |  | (*x* + 4)(*x* − 3) (= 0) oror  |  |  | M1ft | dep on M1 for solving their quadratic equation using any correct method (allow one sign error and some simplification – allow as far as ) or if factorising, allow brackets which expanded give 2 out of 3 terms correct) |
|  |  | *x* = −4 and *x* = 3 |  |  | A1 | for both *x* values dep on M1 |
|  |  | (−4, −2) and (3, 5) | (−4, −2) and (3, 5) |  | A1 | for both solutions dep on M1 |
| **Alternative mark scheme for 23** |
|  |  |  |  | 5 | M1 | for substituting linear equation into the quadratic equation |
|  |  | 2*y*² − 6*y* – 20 (=0) or *y*² − 3*y* – 10 (=0) 2*y*² − 6*y* = 20 or *y*² − 3*y* = 10 |  |  | A1 | for a correct equation in the form *ay*2 + *by* + *c* = 0 or *ay*2 + *by* = −*c* |
|  |  | or or  |  |  | M1ft | dep on M1 for solving their quadratic equation using any correct method (allow one sign error and some simplification – allow as far as ) or if factorising, allow brackets which expanded give 2 out of 3 terms correct |
|  |  | *y* = 5 and *y* = −2 |  |  | A1 | for both *y* values dep on M1 |
|  |  | (−4, −2) and (3, 5) | (−4, −2) and (3, 5) |  | A1 | for both solutions dep on M1 |
|  |  |  |  |  |  | ***Total 5 marks*** |

| 24 |  |  =    |  | 3 | M1 | for finding oror  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  oeoe(= 4 : 1) oe oe oe |  |  | M1 | For use of a correct ratio or fraction linking *AP* and *PM* **or** *AP* and *AM* **or** *AM* and *PM*(in either order)vectors must be in form *p***a** + *q***b**  |
|  |  |  | 3 : 1 |  | A1 |  |
|  |  |  |  |  |  | ***Total 3 marks*** |

| 25 |  |  oroe |  | 4 | M1 | Writing 1st fraction as a fraction over a common denominator (can be 2 separate fractions) |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | or  |  |  | M1 | Complete factorisation of numerator or denominator of 2nd fraction |
|  |  |  |  |  | M1 | may be partially simplified  |
|  |  |  |  |  | A1 | e.g. or ororoeisw for incorrect denominator expansion |
|  |  |  |  |  |  | ***Total 4 marks*** |

| 26 |  |  |  | 3 | M1 | for  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | eg  |  |  |  M1 | Dep on M1 for a correct numerator **and** multiplying out the denominator to 7 – 1 or 6 |
|  |  |   |  |  | A1 | Dep on M2Allow   |
|  |  |  |  |  |  | ***Total 3 marks*** |

| 27 |  | e.g. *n*2 – (*n* – 1)2 or (*n* + 1)2 – *n*2 |  | 3 | M1 | for setting up a correct algebraic expression (any letter can be used) |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | e.g. *n*2 – *n*2 + 2*n* – 1 or *n*2 + 2*n* + 1 − *n*2 |  |  | M1 | Correct expansion of brackets and correct signs or a correct result |
|  |  |  | e.g. 2*n* – 1 is always odd |  | A1 | dep on M2 for eg 2*n* – 1 or 2*n* + 1 or – (2*n* + 1) oe **and** a suitable conclusion SCB1 for eg (2*n*)² − (2*n* – 1)² or (2*n* + 1)² − (2*n*)² oe |
|  |  |  |  |  |  | ***Total 3 marks*** |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | **Practice Papers Set 12 – 1H** | **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** | **2H** | Q04 | Angles, lines and triangles | 4 | 81 | 3.24 | 3.99 | 3.97 | 3.94 | 3.72 | 3.32 | 2.36 | 1.53 |
| **2** | **2H** | Q01 | Powers and roots | 3 | 89 | 2.68 | 2.97 | 2.97 | 2.93 | 2.83 | 2.66 | 2.50 | 2.20 |
| **3** | **1H** | Q07a | Algebraic manipulation | 2 | 89 | 1.78 | 1.99 | 1.97 | 1.95 | 1.90 | 1.88 | 1.64 | 1.36 |
| **4** | **1H** | Q03 | Mensuration of 2D shapes | 4 | 81 | 3.23 | 3.99 | 3.95 | 3.90 | 3.70 | 3.41 | 2.36 | 1.64 |
| **5** | **2H** | Q03 | Fractions | 3 | 84 | 2.51 | 2.95 | 2.90 | 2.83 | 2.69 | 2.57 | 2.04 | 1.73 |
| **6** | **1H** | Q07d | Linear equations | 4 | 79 | 3.15 | 3.96 | 3.92 | 3.77 | 3.48 | 2.86 | 2.32 | 1.92 |
| **7** | **1H** | Q07b | Algebraic manipulation | 2 | 76 | 1.51 | 1.98 | 1.93 | 1.79 | 1.62 | 1.38 | 1.15 | 0.79 |
| **8** | **2H** | Q07a | Inequalities | 2 | 79 | 1.57 | 1.96 | 1.89 | 1.79 | 1.71 | 1.43 | 1.31 | 1.11 |
| **9** | **2H** | Q07b | Quadratic equations | 3 | 69 | 2.08 | 2.94 | 2.87 | 2.66 | 2.20 | 1.74 | 1.25 | 0.70 |
| **10** | **1H** | Q15a | Algebraic manipulation | 3 | 64 | 1.91 | 2.96 | 2.91 | 2.59 | 2.12 | 1.42 | 0.73 | 0.34 |
| **11** | **1H** | Q02 | Applying number | 2 | 71 | 1.42 | 1.91 | 1.77 | 1.58 | 1.41 | 1.24 | 1.05 | 1.01 |
| **12** | **1HR** | Q11ab | Degree of accuracy | 2 | 156 | 1.56 | 1.94 | 1.83 | 1.55 | 1.39 | 1.20 | 0.73 | 0.44 |
| **13** | **1H** | Q08 | Transformation geometry | 2 | 63 | 1.26 | 1.93 | 1.81 | 1.51 | 1.34 | 1.05 | 0.69 | 0.44 |
| **14** | **2H** | Q05 | Construction | 2 | 58 | 1.16 | 1.86 | 1.60 | 1.36 | 1.18 | 0.88 | 0.70 | 0.41 |
| **15** | **1H** | Q12 | Graphical representation of data | 5 | 53 | 2.67 | 4.68 | 3.91 | 3.27 | 2.70 | 1.93 | 1.19 | 0.72 |
| **16** | **1H** | Q07c | Powers and roots | 1 | 57 | 0.57 | 0.90 | 0.76 | 0.64 | 0.57 | 0.47 | 0.34 | 0.27 |
| **17** | **2H** | Q16 | Expressions and formulae | 4 | 50 | 2.01 | 3.83 | 3.28 | 2.50 | 1.77 | 1.12 | 0.70 | 0.45 |
| **18** | **1H** | Q17a | Applying number | 3 | 44 | 1.33 | 2.77 | 2.43 | 1.72 | 0.95 | 0.57 | 0.30 | 0.13 |
| **19** | **2H** | Q15 | Graphs | 3 | 46 | 1.39 | 2.66 | 2.06 | 1.42 | 1.07 | 0.90 | 0.70 | 0.66 |
| **20** | **1H** | Q17b | Powers and roots | 3 | 38 | 1.13 | 2.51 | 1.97 | 1.32 | 0.79 | 0.47 | 0.33 | 0.17 |
| **21** | **1H** | Q10 | Inequalities | 3 | 35 | 1.04 | 2.65 | 1.99 | 1.26 | 0.58 | 0.22 | 0.09 | 0.05 |
| **22** | **2H** | Q02 | Measures | 2 | 32 | 0.64 | 1.67 | 1.15 | 0.66 | 0.42 | 0.17 | 0.10 | 0.04 |
| **23** | **2H** | Q22 | Quadratic equations | 5 | 32 | 1.59 | 4.49 | 2.96 | 1.57 | 0.83 | 0.36 | 0.11 | 0.09 |
| **24** | **2H** | Q23 | Vectors | 3 | 31 | 0.94 | 2.74 | 1.74 | 0.90 | 0.43 | 0.22 | 0.09 | 0.06 |
| **25** | **2H** | Q24 | Algebraic manipulation | 4 | 25 | 0.98 | 2.60 | 1.62 | 1.01 | 0.56 | 0.37 | 0.22 | 0.09 |
| **26** | **2H** | Q20 | Applying number | 3 | 24 | 0.73 | 2.44 | 1.42 | 0.57 | 0.19 | 0.08 | 0.02 | 0.00 |
| **27** | **2H** | Q17 | Algebraic manipulation | 3 | 20 | 0.60 | 2.14 | 1.17 | 0.35 | 0.11 | 0.08 | 0.01 | 0.01 |
|  |  |  | **TOTAL** | **80** | **56** | **44.68** | **73.41** | **62.75** | **51.34** | **42.26** | **34.00** | **25.03** | **18.36** |

**Suggested grade boundaries**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Grade** | **9** | **8** | **7** | **6** | **5** | **4** | **3** |
| Mark | 68 | 57 | 47 | 38 | 29 | 21 | 17 |