| 2 | (a) (i) |  | (5, 1) | 1 | B1 |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  (ii) |  |  | 1 | B1 |  |
|  | (b) |  | *D*(3, 3) marked | 1 | B1 | Condone omission of *D* if unambiguous. |
|  | (c) |  |  | 2 | M1 | For $\frac{2}{4}$ or oe or a clear attempt to work out  for *AB* (condone omission of negative sign) |
|  |  |  |  |  | A1 | oe |
|  |  |  |  |  |  | **Total 5 marks** |

| 3 | (a) |  |  | 1 | B1 | oe  |
| --- | --- | --- | --- | --- | --- | --- |
|  | (b) |  | any three squares shaded | 1 | B1 |  |
|  | (c) | Eg or or   |  | 2 | M1 | For a complete methodIf M1 not awarded thenSCB1 for 129.5 |
|  |  |  | 55.5 |  | A1 |  |
|  |  |  |  |  |  | **Total 4 marks** |

| 4 | (a) | Square width 6 with hole width 4. | correct shape drawn | 1 | B1 |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | (b) |  | 20, 24 | 1 | B1 |  |
|  | (c) | Eg  or  or or(8, 12, 16, 20, 24), 28, 32, 36, 40 |  | 2 | M1 | For a complete method orFor a sequence continued to at least the ninth term, following through a single arithmetical error or For 4*n* +4 |
|  |  |  | 40 |  | A1 |  |
|  | (d) |  | 10 | 1 | B1 |  |
|  | (e) |  |  | 2 | B2 | oe B1 for *n* + 2 or  |
|  |  |  |  |  |  | **Total 7 marks** |

| 5 | (a) (i) |  |  | 2 | B1 |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  (ii) |  |  |  | B1 |  |
|  | (b)  | Eg  or or $\frac{48}{6}$ or $\frac{12}{6}$  |  | 2 | M1 | For a complete method |
|  |  |  | 2 |  | A1 | cao |
|  |  |  |  |  |  | **Total 4 marks** |

| 7 | (a) (i) |  | 69 | 2 | B1 | allow  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  (ii) |  | 98 |  | B1 | allow  |
|  | (b) |  |  | 1 | B1 |  |
|  | (c) | Eg  or $\frac{50}{5}$ |  | 2 | M1 | For a complete method |
|  |  |  | 10 |  | A1 |  |
|  |  |  |  |  |  | **Total 5 marks** |

| 10 | (a) |  |  | 1 | B1 |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | (b) | Eg  or 24 $-$ 15 |  | 2 | M1 | For a correct substitution |
|  |  |  | 9 |  | A1 |  |
|  |  |  |  |  |  | **Total 2 marks** |

| 12 | (a) (i) |  | 9.746794345 | 2 | B1 | Allow 9.7467(94345…) rounded or truncated to at least 5SF |
| --- | --- | --- | --- | --- | --- | --- |
|  |  (ii) |  | 9.75 |  | B1 | ft if at least 3DP given in (i) |
|  | (b) (i) | or  |  | 3 | M1 | For 32.8(58...) rounded or truncated to at least 3SF seen |
|  |  |  | 7.791004515 |  | A1 | Allow 7.791(0045...) rounded or truncated to at least 4SF |
|  |  (ii) |  | 7.79 |  | B1 | ft if at least 4SF given in (i) |
|  |  |  |  |  |  | **Total 5 marks** |

| 13 | (a) (i) |  |  | 1 | B1 |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  (ii) |  |  | 1 | B1 |  |
|  | (b) |  | 35 | 1 | B1 |  |
|  |  |  |  |  |  | **Total 3 marks** |

| 14 | (a) | a, b, d, e | a, b, d, e | 2 | B2 | B1 for a, e **or** a, b, d **or**  b, d, e **or**a, b, e **or** a, d, e **or**a, b, c, d, e **or**  a, b, d, e, for a Venn diagram with a, c, e, f correctly shown |
| --- | --- | --- | --- | --- | --- | --- |
|  | (b) |  | c, e, f | 1 | B1 |  |
|  |  |  |  |  |  | **Total 3 marks** |

| 16 | (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) | 5*q* – 15 (= 12 – *q*)or  |  | 3 | M1 |  |
| E.g. 5*q* + *q* = 12 + 15 or 6*q* = 27 |  |  | M1 | For a correct equation with the *q* terms collected on one side of the equation and the non *q* terms on the other side.ft from 5*q* – 3 = 12 – *q* for this mark only |
|  | 4.5 |  | A1 | for 4.5 **or** oe dep on at least M1 |
|  | (c) | −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* |
|  |  |  |  |  |  | **Total 7 marks** |

| 17 | (a) |  | 4*n* + 3 | 2 | B2 | B1 for 4*n* + *x* where *x* is any integer |
| --- | --- | --- | --- | --- | --- | --- |
|  | (b) |  | 78, 76, 74 | 2 | B2 | B1 for one correct term |
|  | (c) |  | Correct reason | 1 | B1 | The first sequence is only odd numbers and the second is only even numbers |
|  |  |  |  |  |  | **Total 5 marks** |

| 19 | (a) |  | 22 000 000 | 1 | B1 |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | (b) |  | 9.5 × 105 | 1 | B1 |  |
|  | (c) |  |  | 2 | M1 | for 0.06 oe or  where *n* is a negative integer other than  |
|  |  |  |  |  | A1 |  |
|  |  |  |  |  |  | **Total 4 marks** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Question** | **Working** | **Answer** | **Mark** | **AO** | **Notes** |
| **20** |  | 22.50 ÷ 15 (=1.5) **or** 100 ÷ 15(=6.6….) |  |  | AO1 | M1 |  | M2 for 22.5 ÷ 0.15 |
|  |  | ‘1.5’ × 100 (=150) **or** ‘6.6…’ ×22.5(0) |  |  |  | M1 | dep |  |
|  |  |  | 150 | 3 |  | A1 |  |
|  |  |  |  |  |  |  | **Total 3 marks** |

| **22** |  | 180 −  or  or 144 oe |  | 4 | M1 | Unless inconsistently labelled |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  or 18 |  |  | M1 | Or M2 for 144 – (180 – 144) |
|  |  | ‘144’ – 2 × ‘18’ |  |  | M1 |
|  |  |  |  108 |  | A1 | dep on M1 |
|  |  | *Alternative* |  |  |  |  |
|  |  | Pentagon approach – drawing in a pentagon or a statement recognising that the required angle is one of a regular pentagon  |  | 4 | M1 | May be implied by further work |
|  |  | 180 −  or   |  |  | M2 | (M1 for exterior angle of pentagon as long as not seen as interior angle or given as answer) |
|  |  |  | 108 |  | A1 | dep on M1 |
|  |  |  |  |  |  | **Total 4 marks** |