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| Q | Scheme | Marks | AOs | Pearson Progression Step and Progress Descriptor |
| **1** | States | **M1** | 1.1b | 3rd  Solve problems using the sum of the first *n* natural numbers |
| Makes an attempt to simplify the expression, for example  or | **M1** | 1.1b |
| Correctly solves the quadratic. | **M1** | 1.1b |
| As *k* must be a positive integer, states *k* = 55 | **A1** | 2.3 |
| (4 marks) | | | | |
| Notes | | | | |

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| Q | Scheme | Marks | AOs | Pearson Progression Step and Progress Descriptor |
| **2** | States or implies that | **M1** | 2.1 | 3rd  Solve problems using the sum of the first *n* natural numbers |
| Correctly substitutes into the standard formulae: | **M1** | 1.1b |
| Makes an attempt to simplify, for example  is seen | **M1** | 1.1b |
| Follows a logical progression to obtain  **cso**. | **A1** | 1.1b |
| (4 marks) | | | | |
| Notes | | | | |

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| Q | Scheme | Marks | AOs | Pearson Progression Step and Progress Descriptor |
| **3a** | States or implies that | **M1** | 2.1 | 3rd  Solve problems using the sum of the first *n* natural numbers |
| Correctly substitutes into the standard formulae: | **M1** | 1.1b |
| Follows a logical progression to obtain  **cso**. | **A1** | 1.1b |
|  | **(3)** |  |  |
| **3b** | States  or | **M1** | 2.2a | 3rd  Solve problems using the sum of the first *n* natural numbers |
| Solves the inequality and states that as *k* must be a positive integer, *k* = 41. | **A1** | 2.3 |
|  | **(2)** |  |  |
| (5 marks) | | | | |
| Notes | | | | |

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| Q | Scheme | Marks | AOs | Pearson Progression Step and Progress Descriptor |
| **4** | States or implies that | **M1** | 2.1 | 3rd  Solve problems using the sum of the first *n* natural numbers |
| Correctly substitutes into the standard formulae: | **M1** | 1.1b |
| Simplifies to state:  oe. | **M1** | 1.1b |
| Equates *n*2 coefficients and states that *a* = 7 and equates *n* coefficients and states that *b* = –4 | **A1** | 1.1b |
| (4 marks) | | | | |
| Notes  **Alternative Method**  **M1:** States that when *r* = 1, *a* + *b* = 3.  **M1:** States that when *r* = 2, (*a* + *b*) + (2*a* + *b*) = 13.  **M1:** Makes attempt to solve simultaneous equations.  **A1:** States that *a* = 7 and equates *n* coefficients and states that *b* = –4 | | | | |

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| Q | Scheme | Marks | AOs | Pearson Progression Step and Progress Descriptor |
| **5a** | Attempts to use the fact that  to substitute into the standard formulae: | **M1** | 2.1 | 3rd  Solve problems using the sum of the first *n* natural numbers |
| Simplifies to state  oe. | **A1** | 1.1b |
| Attempts to use the fact that  to substitute into the standard formulae: | **M1** | 2.1 |
| Simplifies to state  oe. | **A1** | 1.1b |
| Correctly finds *a* = 9 and *b* = −2 | **A1** | 1.1b |
| Attempts to find an expression for , for example  is seen. | **M1** | 1.1b |
| Simplifies to obtain oe. | **A1** | 1.1b |
|  | **(7)** |  |  |
| **5b** | States or implies | **M1** | 2.1 | 3rd  Solve problems using the sum of the first *n* natural numbers |
| Simplfies to obtain 1265 | **A1** | 1.1b |
|  | **(2)** |  |  |
| (9 marks) | | | | |
| Notes | | | | |

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| Q | Scheme | Marks | AOs | Pearson Progression Step and Progress Descriptor |
| **6a** | Substitutes at least one of the standard formulae into their expanded expression. | **M1** | 2.1 | 3rd  Understand and use the sum of the first *n* square numbers |
| Correctly finds: | **A1** | 1.1b |
| Factorises the *n*: | **M1\*** | 1.1b |
| Obtains , showing all work clearly. cso. | **A1** | 1.1b |
|  | **(4)** |  |  |
| **6b** | States or implies that | **M1** | 2.1 | 3rd  Understand and use the sum of the first *n* square numbers |
| Substitutes into the standard formulae: | **A1** | 1.1b |
| Solves to obtain 1446 | **M1** | 1.1b |
|  | **(3)** |  |  |
| (7 marks) | | | | |
| Notes  **6a:** Award second method mark providing *n* is factored out of the expression. Student does not need to factor the  at this point in order to achieve the method mark. | | | | |

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| Q | Scheme | Marks | AOs | Pearson Progression Step and Progress Descriptor |
| **7a** | States or implies that | **M1** | 2.1 | 4th  Understand and use the sum of the first *n* cube numbers |
| Correctly substitutes into the standard formulae: | **M1** | 1.1b |
| Factors out the  term. For example,  is seen. | **M1** | 1.1b |
| Follows a logical progression to obtain  **cso**. | **A1** | 1.1b |
|  | **(4)** |  |  |
| **7b** | Makes an attempt to substitute *n* = 20 into . For example,  is seen. | **M1** | 2.2a | 4th  Understand and use the sum of the first *n* cube numbers |
| Correctly finds 628 300 | **A1** | 1.1b |
|  | **(2)** |  |  |
| (6 marks) | | | | |
| Notes  **7a:** Award third method mark providing *n2* is factored out of the expression. Student does not need to factor the  at this point in order to achieve the method mark.  For the 3rd method mark, it is acceptable to use the method of difference of squares:  and then simplify. | | | | |

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| Q | Scheme | Marks | AOs | Pearson Progression Step and Progress Descriptor |
| **8** | Substitutes at least one of the standard formulae into their expanded expression. | **M1** | 2.1 | 3rd  Understand and use the sum of the first *n* square numbers |
| Correctly finds:  and finds | **A1** | 1.1b |
| Equates both expressions and cancels all terms by , obtaining | **M1** | 1.1b |
| Simplifies to obtain | **M1** | 1.1b |
| Solves to find *n* = 12, recognising that *n* must be a positive integer. | **A1** | 2.3 |
| (5 marks) | | | | |
| Notes | | | | |

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| Q | Scheme | Marks | AOs | Pearson Progression Step and Progress Descriptor |
| **9a** | Correctly finds: | **M1** | 2.2a | 5th  Solve problems using the sum of the first *n* square and cube numbers |
| Factorises : | **M1\*** | 1.1b |
| Obtains , showing all work clearly. cso. | **A1** | 1.1b |
|  | **(3)** |  |  |
| **9b** | Correctly substitutes into the standard formulae: | **M1** | 2.2a | 5th  Solve problems using the sum of the first *n* square and cube numbers |
| Makes an attempt to simplify, for example  is seen | **M1** | 1.1b |
| Follows a logical progression to obtain  **cso**. | **A1** | 1.1b |
|  | **(3)** |  |  |
| (6 marks) | | | | |
| Notes  **9a:** Award second method mark providing *n* is factored out of the expression. Student does not need to factor the  at this point in order to achieve the method mark. | | | | |