

Commentary on candidate evidence for Question 3

The evidence for the following candidates has achieved the marks given below:

Candidate 1

The candidate was awarded **4 marks**.

Coefficients and powers of x had been simplified, leading to the award of marks 2 and 3. The continued appearance of the summation sign meant that the general term had not been isolated, so mark 1 was not awarded. Marks 4 and 5 were awarded because the correct term was calculated.

Candidate 2

The candidate was awarded **4 marks**.

The general term had been isolated, leading to the award of mark 1. The coefficients had been simplified but the powers of x had not been simplified as part of a general term, so mark 2 was awarded and mark 3 was not. Marks 4 and 5 were awarded because the correct term was calculated.

The non-standard use of n rather than r was acceptable in the context of the candidate's solution.

Candidate 3

The candidate was awarded **3 marks**.

The solution to part (a) did not contain a general term but in part (b), there was a term showing simplification of coefficients, allowing mark 2 to be awarded. Since the summation sign was included, and simplification of the powers of x occurred separately, neither mark 1 nor mark 3 could be awarded. Marks 4 and 5 were awarded because the correct term was calculated.

Commentary on candidate evidence for Question 9

The evidence for the following candidates has achieved the marks given below:

Candidate 4

The candidate was awarded **1 mark**.

In part (a), the candidate had formed the sum of three consecutive integers, so mark 1 was awarded. Although the required algebra followed, there was no communication of divisibility, so mark 2 could not be awarded.

In part (b), the candidate did not explicitly identify consecutive integers, so mark 3 was not awarded.

Candidate 5

The candidate was awarded **2 marks**.

In part (a), the candidate had formed the sum of three consecutive integers, so mark 1 was awarded. The required algebra followed, and there was communication of divisibility therefore mark 2 was awarded.

In part (b), the candidate did not state that their final expression was the form of *any* odd integer, so mark 3 was not awarded.

Candidate 6

The candidate was awarded **3 marks**.

Although the candidate's proofs lacked formality, the required elements were present, and all 3 marks were awarded.

Candidate 7

The candidate was awarded **1 mark**.

In part (a), the candidate had not formed the sum of *any* three consecutive integers, and mark 1 was not awarded. The required algebra followed, and there was communication of divisibility, so mark 2 was awarded.

In part (b), the candidate did not provide the form of *any* odd integer, and mark 3 was not awarded.

Commentary on candidate evidence for Question 12

The evidence for the following candidates has achieved the marks given below:

Candidate 8

The candidate was awarded **2 marks**.

The candidate proved the statement to be true for $n = 1$, so mark 1 was awarded. The use of 'consider it to be true for $n = k + 1$ ' meant that mark 2 could not be awarded. Mark 3 was awarded for the correct decomposition of the sum to $(k + 1)$ terms and use of the inductive hypothesis but marks 4 and 5 could not be awarded because the subsequent algebra was incorrect. The conclusion was also absent so mark 5 would not have been awarded even if the preceding algebra had been correct.

Candidate 9

The candidate was awarded **3 marks**.

The candidate proved the statement to be true for $n = 1$, so mark 1 was awarded. The appropriate elements were present for the award of marks 2 and 3, despite the use of 'when' rather than 'consider.' There was insufficient algebraic manipulation for the award of mark 4, and mark 5 was unavailable because of this, and the lack of a conclusion.

Candidate 10

The candidate was awarded **3 marks**.

Although the final element required for this mark did not appear until the conclusion, mark 1 was awarded for correctly showing the statement to be true for $n = 1$. Mark 2 could not be awarded because of the absence of 'true' or equivalent. Marks 3 and 4 were awarded for the correct decomposition of the sum to $(k + 1)$ terms and use of the inductive hypothesis, and for the subsequent algebra. Mark 5 was not awarded because of the lack of implication in the final statement.

Commentary on candidate evidence for Question 15(b)

The evidence for the following candidates has achieved the marks given below:

Candidate 11

The candidate was awarded **6 marks**.

The candidate correctly obtained the integrating factor and, using an appropriate formula, arrived at the required integral. The result from part (a) was correctly applied and the correct manipulation followed. Marks 4 to 9 were awarded, the absence of dx in the integral was treated as corrected bad form. The constant of integration was not evaluated so mark 10 was not awarded, in accordance with note 7 of the marking instructions.

Candidate 12

The candidate was awarded **5 marks**.

The candidate correctly obtained the integrating factor and carried out the steps required to apply the result from part (a). Marks 4 to 8 were awarded, with the evidence for mark 7 being implied by mark 8. The constant of integration was not included in the multiplication for mark 9, and this meant that mark 10 was also not awarded, in accordance with note 8 of the marking instructions.

Candidate 13

The candidate was awarded **3 marks**.

The candidate correctly obtained the integrating factor and marks 4 and 5 were awarded. The RHS was not multiplied by the integrating factor, so mark 6 was not awarded. Mark 7 was awarded on follow-through. The candidate did not integrate correctly, losing mark 8. Although a constant of integration was introduced, it was not included in the multiplication for mark 9, and this meant that mark 10 could not be awarded.

Commentary on candidate evidence for Question 16(d)

The evidence for the following candidates has achieved the marks given below:

Candidate 14

The candidate was awarded **0 marks**.

The conclusion was false but mark 10 would have been lost anyway, on the grounds of incorrect notation.

Candidate 15

The candidate was awarded **0 marks**.

The candidate arrived at the correct conclusion but the justification was incorrect due to the reference to 'direction' rather than 'normal' vectors.

Candidate 16

The candidate was awarded **0 marks**.

The candidate noticed the relationship between the coefficients but was unable to interpret it geometrically.