

STEP III, 2022, Q2 EC

Question 2

The fifth most popular question, being attempted by just a little over half the candidates, it was the fourth most successful with a mean score of 9/20.

Whilst the algebra associated with this question was not difficult, the logic and communication required was certainly too much for many students.

In part (i) it required some justification that a had to be even. Contradiction or infinite descent could be used but either way the argument had to be made clear. Claiming “this can be continued forever” or moduli were always decreasing would eventually get to zero was not good enough. Successful candidates were able to explain why the integer nature of the solutions was vital to reach a contradiction.

In part (ii) many candidates were able to see that this was a similar problem to the first one, and most observed that divisibility by three was now the key idea.

In part (iii), many candidates were able to consider the remainders when divided by 3, but again many struggled to communicate clearly an argument leading to the final contradiction.

By part (iv) most candidates were expecting to recreate the original equation again and the fact that this did not happen meant some came to a dead halt. Other were either oblivious to the issue or were bluffing their way through as a slightly more subtle argument was now required.



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