Commentary on candidate evidence

Question 14(a)

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

Candidate 10

The candidate was awarded **4 marks.**

Evidence for Marks 1, 2, 3 and 5 was present, and these marks were awarded. The candidate appeared to check for consistency, and therefore intersection, using their third equation but simply substituted into an equation which had already been used. Absence of a valid check meant that 4 could not be awarded.

Candidate 11

The candidate was awarded **5 marks.**

Again, evidence for Marks 1, 2, 3 and 5 was present. This time, the candidate produced just enough evidence that a correct substitution had been made and checked. Therefore mark 4 was awarded.

Question 10

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

Candidate 12

The candidate was awarded **1 mark.**

In part (a), a counterexample and conclusion were present, so mark 1 was awarded.

In part (b), there was no general proof, no form for n, and therefore no algebraic manipulation. No further marks awarded. All A/B marks.

Candidate 13

The candidate was awarded **4 marks.**

In part (a), a counterexample and conclusion were present, so mark 1 was awarded.

In part (b), marks 2 and 3 were clearly earned. Given that the Marking Instructions treat $n=3n+1$ as bad form for mark 2, it was consistent with this to allow similar leeway and award Mark 4.

Candidate 14

The candidate was awarded **3 marks.**

In part (a), no counterexample was present, so mark 1 could not be awarded.

In part (b), the candidate had begun an attempt at a proof by contradiction. Although this was not completed satisfactorily, the evidence did contain a complete direct proof, and full marks were awarded for this part.

Question 5

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

Candidate 15

The candidate was awarded **4 marks.**

This proof contained all the required elements: substitution in the proof for $n=1$, assumption that the statement is true for $n=k$ and consideration of $n=k+1$, correct statement and manipulation for $n=k+1$, for Marks 1 to 3. For Mark 4, the algebra was completed accurately and the concluding statement had all the required elements, including reference to the implication that if true for $n=k$, then true for $n=k+1$. This candidate also appropriately used an aim at the side, separate from the main body of the proof, as an aid to developing the proof itself. The transcription error had been corrected in the following line and was therefore treated as bad form.

Candidate 16

The candidate was awarded **2 marks.**

Mark 1 was awarded for correctly demonstrating true for $n=1$. The inductive hypothesis did not contain “true” or an equivalent, so mark 2 could not be given. The incorrect appearance of “ $r=k$ ” in the summation was treated as bad form, given the following line, and Mark 3 was awarded.
There was no demonstration of the need for implication in the final statement, so mark 4 could not be awarded.

Candidate 17

The candidate was awarded **3 marks**.

Mark 1 was awarded for correctly demonstrating true for $n=1$. The candidate placed a “conjecture” in the middle of the proof, interrupting the logic, but eventually did enough to gain Marks 2 and 3. The poor layout was considered bad form. Two factors led to Mark 4 not being awarded: the use of "= conjecture" and the lack of explicit implication in the conclusion.