

## STEP II, 2020, Q11 EC

This was the more popular of the probability questions and many good attempts were seen, although the majority were incomplete and only attempted the first one or two parts. Some candidates made errors when dealing with the conditional probabilities, often thinking for example that  $P(A \text{ wins})$  could be obtained by adding  $P(A \text{ wins}|H \text{ first})$  and  $P(A \text{ wins}|T \text{ first})$ . In general, those that were able to work confidently with the conditional probabilities were able to perform very well on this question.

In the first part, a number of candidates failed to consider that games could begin with either heads or tails when showing that the probability that the game never ends is 0. Additionally, some candidates assumed that  $p = q = \frac{1}{2}$  for the first part of the question, although they often did then use correct expressions in terms of  $p$  and  $q$  in the later parts of the question.

In part (ii) some candidates tried to find a way to enumerate all possible sequences for any total number of flips, but this approach almost always resulted in some of the possible cases being omitted.

Many candidates failed to spot that the solution to the third part could be found by an analogous method to that used in part (ii) and so in many cases no attempt was made at this final part.



# NextStepMaths.com

To view mark schemes, fully worked solutions and examiner's comments, and for more details about tutoring and other services offered, go to [NextStepMaths.com](https://www.NextStepMaths.com)