STEP III 2017 Question 11 — Examiner Report

A fifth of the candidates attempted this with just a little less success than that for question 5. Only a minority drew a sketch of the problem; had more done so, some errors might have been precluded. In part (i), a large minority ignored the condition 'initially at rest', a handful gave a negative answer for u, and a few attempted to conserve energy, but that was rare. In the second part, some candidates attempted to just write down the given answer employing conserved momentum with verbal justification. The inequality generally followed if a telescoping argument was used although the care shown in dealing with the strict inequality and the $r = n$ case was poor. Attempts at (iii) were generally sound though some took the projectile speed as u.