10. The positive integer n is between 1 and 20. Milly adds up all the integers from 1 to n inclusive. Billy adds up all the integers from $n+1$ to 20 inclusive. Their totals are the same. What is the value of n?

A 11 B 12 C 13 D 14 E 15

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10. D The total of the numbers from 1 to 20 is $\frac{1}{2} \times 20 \times (20+1) = 210$. If Milly and Billy have totals which are equal, their totals must each be 105. Milly's total, of the numbers from 1 to n, is $\frac{1}{2}n(n+1)$ so $\frac{1}{2}n(n+1) = 105$ which gives $n^2 + n = 210$. Therefore $n^2 + n - 210 = 0$ which factorises to give $(n + 15)(n - 14) = 0$. As n is a positive integer, $n = 14$.