

What is the tens digit in the sum

$$7! + 8! + 9! + \dots + 2006! ?$$

We know that $10!$ and all higher terms are multiples of 100 (since they include the product $2 \times 5 \times 10 = 100$) so the tens digit of the whole sum will be the tens digit of

$$\begin{aligned} 7! + 8! + 9! &= 5040(1 + 8 + 8 \times 9) \\ &= 5040 \times 81 \end{aligned}$$

We have $40 \times 81 = 3240$ so the tens digit is a $\textcircled{4}$