

11. A competitor is running a 20 kilometre race.

She runs each of the first 4 kilometres at a steady pace of 6 minutes per kilometre. After the first 4 kilometres, she begins to slow down.

In order to estimate her finishing time, the time that she will take to complete each subsequent kilometre is modelled to be 5% greater than the time that she took to complete the previous kilometre.

Using the model,

(a) show that her time to run the first 6 kilometres is estimated to be 36 minutes 55 seconds, (2)

(b) show that her estimated time, in minutes, to run the r th kilometre, for $5 \leq r \leq 20$, is

$$6 \times 1.05^{r-4} \tag{1}$$

(c) estimate the total time, in minutes and seconds, that she will take to complete the race. (4)