**9** A particle travels in a straight line so that, $t$ seconds after passing a fixed point, its velocity, $v\,\text{ms}^{-1}$, is given by

$$v = \text{e}^{\frac{t}{4}} \quad \text{for } 0 \leqslant t \leqslant 4,$$

$$v = \frac{16\text{e}}{t^2} \quad \text{for } 4 \leqslant t \leqslant k.$$

The total distance travelled by the particle between $t = 0$ and $t = k$ is 13.4 metres. Find the value of $k$. [6]