2. **In this question you must show all stages of your working.**

Solutions relying on calculator technology are not acceptable.

A particle P is moving in a straight line.

At time t seconds, the speed, $v\,\text{m s}^{-1}$, of P is given by the continuous function

$$v = \begin{cases} \sqrt{2t+1} & 0 \leqslant t \leqslant k \\ \dfrac{3}{4}t & t > k \end{cases}$$

where k is a constant.

(a) Show that $k = 4$, explaining your method carefully.

(3)

(b) Find the acceleration of P when $t = 1.5$

(3)

At time $t = 0$, P passes through the point O

(c) Find the distance of P from O when $t = 8$

(7)

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Question 2 continued

(Total for Question 2 is 13 marks)