4. **In this question you must show all stages in your working.**

Solutions relying entirely on calculator technology are not acceptable.

A particle P is moving along the x-axis.

At time t seconds, where $0 \leqslant t \leqslant \frac{2}{3}$, P is x metres from the origin O and is moving with velocity v m s^{-1} in the positive x direction where

$$v = (2x + 1)^{\frac{3}{2}}$$

When $t = 0$, P passes through O.

(a) Find the value of x when the acceleration of P is 243 m s^{-2}

(4)

(b) Find v in terms of t.

(6)

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Question 4 continued

(Total for Question 4 is 10 marks)