3: A particle P moves along the x-axis.

At time t seconds, where $t \geqslant 1$

- the displacement of P from O is x metres in the positive x direction, where $x < \frac{1}{2}$
- the velocity of P is v m s^{-1} in the positive x direction
- the acceleration of P is a m s^{-2} in the positive x direction

Given that

$$a = 4x - 2$$

and that when $t = 1$, $x = 0$ and $v = 1$

(a) find v in terms of x,

(4)

(b) find v in terms of t.

(5)

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Question 3 continued

(Total for Question 3 is 9 marks)