

**10** A particle  $P$  is moving in a straight line. At time  $t$  seconds, where  $t \geq 0$ ,  $P$  has velocity  $v \text{ m s}^{-1}$  and acceleration  $a \text{ m s}^{-2}$  where  $a = 4t - 9$ . It is given that  $v = 2$  when  $t = 1$ .

**(a)** Find an expression for  $v$  in terms of  $t$ . **[3]**

The particle  $P$  is instantaneously at rest when  $t = t_1$  and  $t = t_2$ , where  $t_1 < t_2$ .

**(b)** Find the values of  $t_1$  and  $t_2$ . **[2]**

**(c)** Determine the total distance travelled by  $P$  between times  $t = 0$  and  $t = t_2$ . **[3]**