9 **(a)** A vehicle travels along a straight, horizontal road. At time $t = 0$ seconds, the vehicle, travelling at a velocity of $w\,\text{ms}^{-1}$, passes point O. The vehicle travels at this constant velocity for 12 seconds. It then slows down, with constant deceleration, for 10 seconds until it reaches a velocity of $(w - 14)\,\text{ms}^{-1}$. It continues to travel at this velocity for 28 seconds until it reaches point A, 458 m from O.

Find the value of w. [4]

(b) A particle moves in a straight line. The velocity, $v\,\text{ms}^{-1}$, of the particle at time t seconds, where $t \geqslant 0$, is given by $v = (t-4)(t-5)$.

(i) Find the value of t for which the acceleration of the particle is $0\,\text{ms}^{-2}$. [2]

(ii) Find the set of values of t for which the velocity of the particle is negative. [2]

(iii) Find the distance travelled by the particle in the first 5 seconds of its motion. [4]