A car of mass 900 kg is moving up a hill inclined at $\sin^{-1} 0.12$ to the horizontal. The initial speed of the car is $11\,\text{m s}^{-1}$. After 12 s, the car has travelled 150 m up the hill and has speed $16\,\text{m s}^{-1}$. The engine of the car is working at a constant rate of 24 kW.

(a) Find the work done against the resistive forces during the 12 s. [5]

The car then travels along a straight horizontal road. There is a resistance to the motion of the car of $(1520 + 4v)$ N when the speed of the car is $v\,\mathrm{m\,s^{-1}}$. The car travels at a constant speed with the engine working at a constant rate of 32 kW.

(b) Find this speed. [3]