1. A van of mass 1200 kg is moving **up** a straight road that is inclined at an angle θ to the horizontal, where $\sin\theta = \frac{1}{14}$

The engine of the van is working at a constant rate of 20 000 W.

The resistance to motion of the van from non-gravitational forces is modelled as a constant force of magnitude R newtons.

At the instant when the acceleration of the van is $0.75\,\text{m s}^{-2}$, the speed of the van is $\lambda\,\text{m s}^{-1}$ and $R = 26\lambda$ where λ is a non-zero constant.

(a) Show that $R = 260$

(4)

Later on, the van is moving **down** the same straight road. The model for the resistance to motion of the van still has magnitude 260 N.

The engine of the van is now working at a constant rate of P watts.

At the instant when the speed of the van is $12\,\text{m s}^{-1}$, the acceleration of the van is $1.8\,\text{m s}^{-2}$

(b) Find the value of P

(4)

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Question 1 continued

(Total for Question 1 is 8 marks)