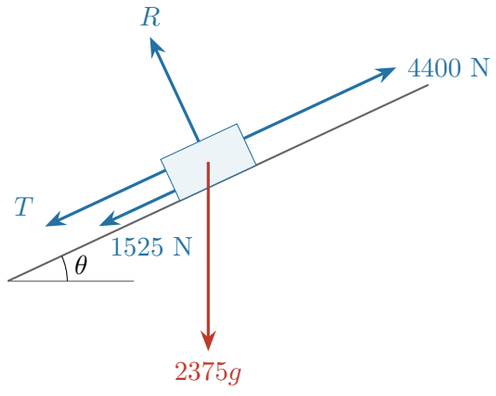
Part (a)(i)

Game plan: We draw only the forces acting on the jeep. The trailer pulls backwards on the jeep through the coupling.

Step 1: Draw the jeep's force diagram

Let T be the coupling tension and R the normal reaction. The slope is drawn steeper than it is in the question so the directions are clear.



The engine force acts up the slope. Friction and the coupling tension act down the slope. Weight is vertical, and the reaction is perpendicular to the slope.

Final Answer

The five forces are **4400 N uphill, 1525 N downhill, T downhill, $2375g$ vertically downwards and R perpendicular to the slope**.

Part (a)(ii)

Game plan: The speed is constant, so the resultant force along the slope is zero. We write an equation for each vehicle and add them to remove the coupling tension.

Step 1: Resolve the weight along the slope

Newton's second law — **Logbook Page 50**

$$\text{resultant force} = ma.$$

The downhill component of a weight mg is $mg\sin\theta$. Since $a = 0$, taking uphill as positive gives

$$\begin{aligned} \text{jeep:} \quad & 4400 - 1525 - T - 2375g\sin\theta = 0, \\ \text{trailer:} \quad & T - 375 - 350g\sin\theta = 0. \end{aligned}$$

Step 2: Add the equations and solve

The coupling forces cancel because they are internal to the combined jeep and trailer:

$$\begin{aligned} 4400 - 1525 - 375 - (2375 + 350)g\sin\theta &= 0, \\ 2725(9.8)\sin\theta &= 2500, \\ \sin\theta &= \frac{2500}{26705}, \\ \theta &= \sin^{-1}\left(\frac{2500}{26705}\right). \end{aligned}$$

Final Answer

$\boldsymbol{\theta \approx 5.37^\circ}$.