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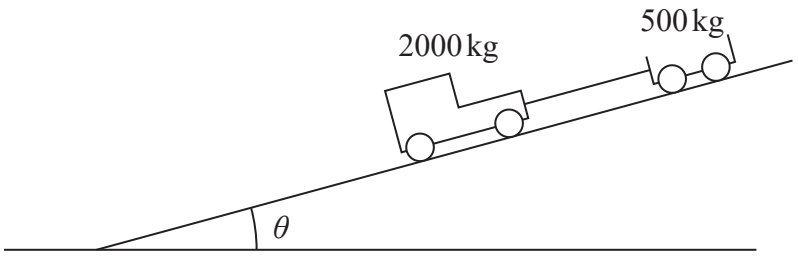


Figure 3

A railway truck of mass 500 kg is pushed up a straight track by a railway engine of mass 2000 kg. The track is inclined to the horizontal at an angle θ, where $\sin\theta = \frac{1}{14}$, as shown in Figure 3. The engine produces a constant driving force of magnitude 3050 N. The truck experiences a constant resistance to motion of magnitude 100 N and the engine experiences a constant resistance to motion of magnitude 200 N. The engine and the truck are connected by a coupling which is modelled as a light rod that is parallel to the track.

Find

(i) the acceleration of the system,

(ii) the magnitude of the force exerted on the truck by the coupling.

(8)

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