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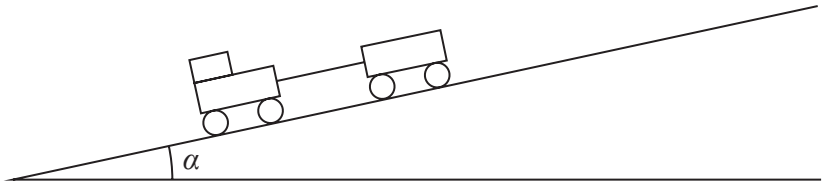


Figure 3

A railway engine of mass 1500 kg is attached to a railway truck of mass 500 kg by a straight rigid coupling. The engine pushes the truck up a straight track, which is inclined to the horizontal at an angle α, where $\sin\alpha = \frac{7}{25}$. The coupling is parallel to the track and parallel to the direction of motion, as shown in Figure 3.

The engine produces a constant driving force of magnitude D newtons. The engine and the truck experience constant resistances to motion, from non-gravitational forces, of magnitude 1200 N and 500 N respectively.

The thrust in the coupling is 2000 N.

The coupling is modelled as a light rod.

(a) Find the acceleration of the engine and the truck.

(4)

(b) Find the value of D.

(4)

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Q6

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