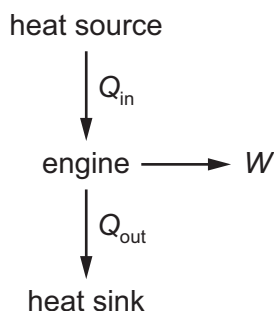
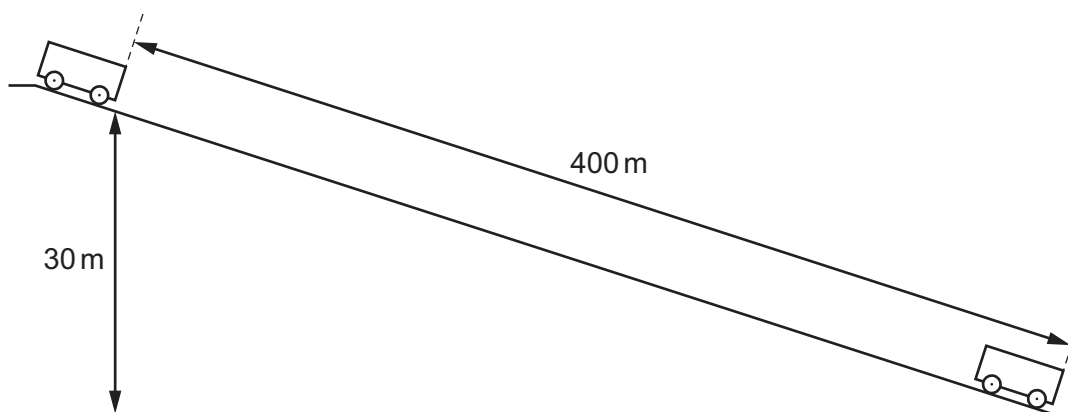


- 18 An engine transforms thermal energy into mechanical work. The engine takes in thermal energy Q_{in} from a heat source and gives out thermal energy Q_{out} to a heat sink, producing useful work W .



What is the efficiency of this engine?

- A $\frac{W}{Q_{\text{in}} + Q_{\text{out}}}$ B $\frac{W}{Q_{\text{in}} - Q_{\text{out}}}$ C $\frac{W}{Q_{\text{in}}}$ D $\frac{W}{Q_{\text{out}}}$
- 19 A truck of mass 500 kg moves from rest at the top of a section of track 400 m long and 30 m high, as shown. The frictional force acting on the truck is 250 N throughout its journey.



What is the final speed of the truck?

- A 14 m s^{-1} B 24 m s^{-1} C 31 m s^{-1} D 190 m s^{-1}
- 20 Which condition must apply for the work done by an expanding gas to be $p\Delta V$, where p is the pressure of the gas and ΔV is its change in volume?
- A No thermal energy must be supplied to the gas.
 B The expansion must be at a constant rate.
 C The pressure must be constant.
 D The temperature of the gas must be constant.