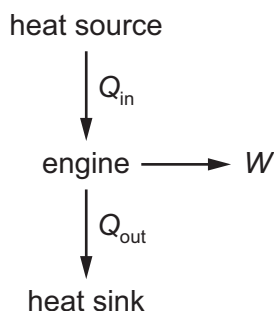
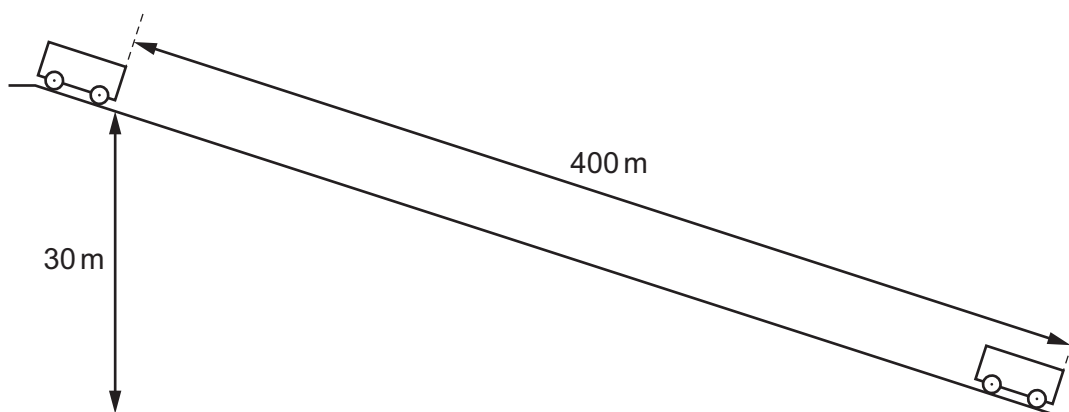


- 18 An engine transforms thermal energy into mechanical work. The engine takes in thermal energy  $Q_{\text{in}}$  from a heat source and gives out thermal energy  $Q_{\text{out}}$  to a heat sink, producing useful work  $W$ .



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  $14 \text{ ms}^{-1}$       B  $24 \text{ ms}^{-1}$       C  $31 \text{ ms}^{-1}$       D  $190 \text{ ms}^{-1}$
- 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  $\Delta V$  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.