2 **(a)** State what is meant by *work done*.

.....

..... [1]

(b) A lift (elevator) of weight 13.0 kN is connected by a cable to a motor, as shown in Fig. 2.1.

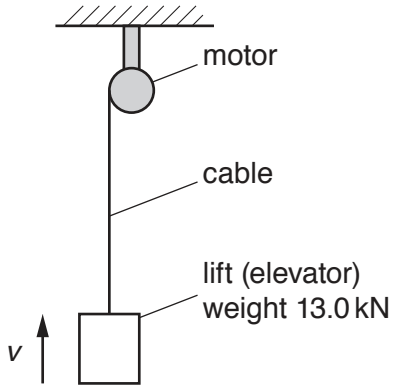

Fig. 2.1

The lift is pulled up a vertical shaft by the cable. A constant frictional force of 2.0 kN acts on the lift when it is moving. The variation with time t of the speed v of the lift is shown in Fig. 2.2.

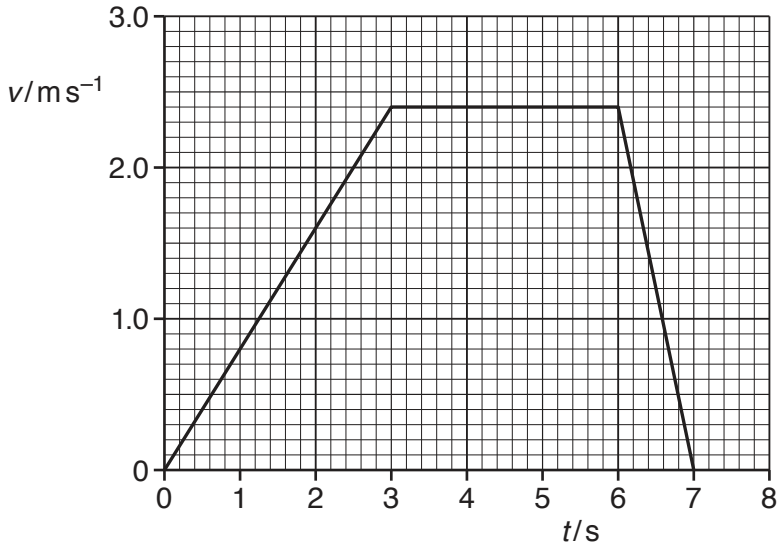

Fig. 2.2

(i) Use Fig. 2.2 to determine:

1. the acceleration of the lift between time $t = 0$ and $t = 3.0\,s$

acceleration = ... $m\,s^{-2}$ [2]

2. the work done by the motor to raise the lift between time $t = 3.0\,s$ and $t = 6.0\,s$.

work done = ... J [2]

(ii) The motor has an efficiency of 67%. The tension in the cable is $1.6 \times 10^4\,N$ at time $t = 2.5\,s$.

Determine the input power to the motor at this time.

input power = ... W [3]

(iii) State and explain whether the increase in gravitational potential energy of the lift from time $t = 0$ to $t = 7.0\,s$ is less than, the same as, or greater than the work done by the motor. A calculation is not required.

.....

..... [1]

[Total: 9]