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.
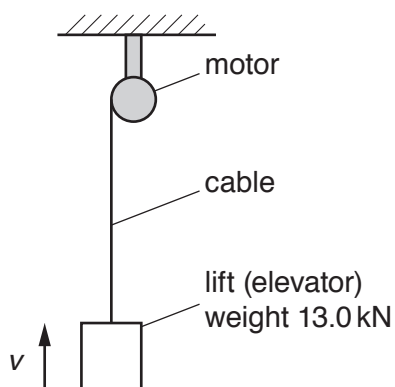


**Fig. 2.1**

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.
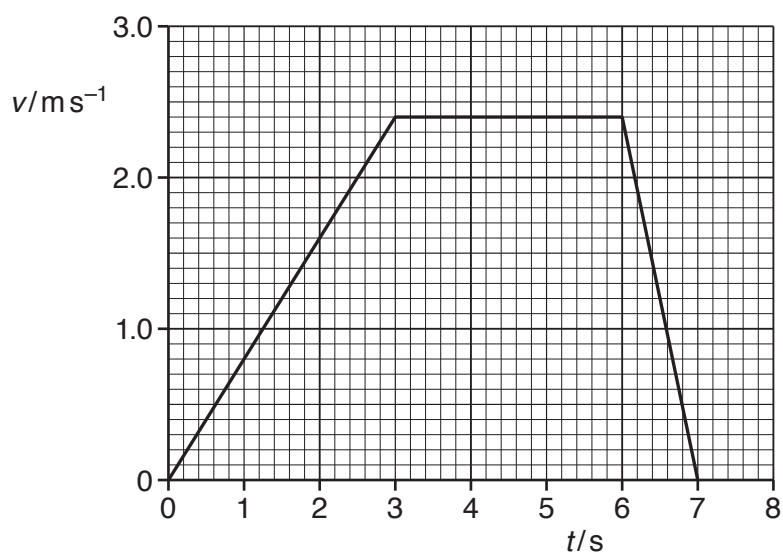


**Fig. 2.2**

**(i)** 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.

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[Total: 9]