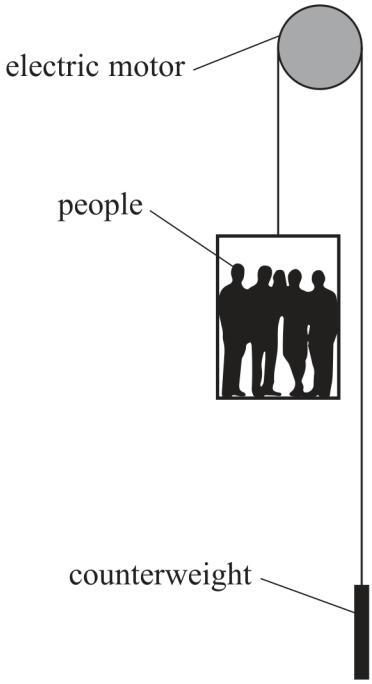
12 The diagram shows a lift system for moving people up and down a tall building. There is a counterweight to balance the weight of the lift. An electric motor is used to raise and lower the lift.



(a) Explain how the counterweight affects the amount of work required from the electric motor to raise the lift.

(2)

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(b) The electric motor raises the lift through a height of 40.0 m in a time of 30.0 s.

Show that the output power of the electric motor is about 12 kW.

total mass of lift and people = 2 250 kg
mass of counterweight = 1 300 kg

(4)

(c) The electric motor dissipates energy to the surroundings at a rate of 3 600 W.

Determine the efficiency of the electric motor.

(2)

Efficiency = ...

(Total for Question 12 = 8 marks)