Question Number	Answer	Mark
12(a)	Amount of work from the electric motor is reduced **(1)** Because there is energy transfer between the counterweight and the lift **Or** Because counterweight contributes to total work done (on lift cage) **Or** Because the counterweight reduces the force required from the motor **Or** Because total work done (on lift cage) is sum of work done by counterweight/gravity and by the motor. **(1)**	**2**
12(b)	Use of $\Delta W = F\Delta x$ **or** $\Delta E_{grav} = mg\Delta h$ **(1)** Use of conservation of energy **(1)** Use of P = W / t **(1)** P = 12.4 (kW) **(1)** **Or** Calculates resultant force **(1)** Use of $\Delta W = F\Delta x$ **(1)** Use of P = W / t **(1)** P = 12.4 (kW) **(1)** <u>Example of calculation</u> For counterweight $\Delta E_{grav} = mg\Delta h$ $= 1300 \text{ kg} \times 9.81 \text{ ms}^{-2} \times 40.0 \text{ m} = 5.101 \times 10^5 \text{ J}$ For lift $\Delta E_{grav} = mg\Delta h$ $= 2250 \text{ kg} \times 9.81 \text{ ms}^{-2} \times 40.0 \text{ m} = 8.829 \times 10^5 \text{ J}$ Energy required $= 8.829 \times 10^5 \text{ J} - 5.101 \times 10^5 \text{ J} = 3.728 \times 10^5 \text{ J}$ $P = 3.728 \times 10^5 \text{ J} \div 30 \text{ s} = 1.243 \times 10^4 \text{ W}$	**4**
12(c)	Use of efficiency = useful power output ÷ total power input **(1)** Efficiency = 0.78 (ecf from (b) **(1)** <u>Example of calculation</u> Efficiency = 12.4 kW÷ (12.4 + 3.6) kW = 0.775	**2**
	Total for question 12	**8**