

Chapter 4
Short answer question

This question is about using a helicopter to transport a heavy load.

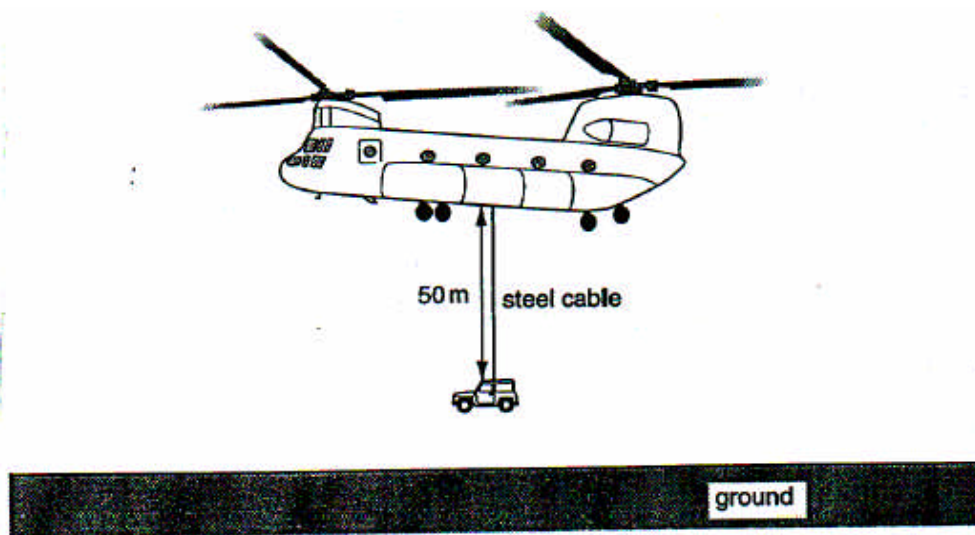


Fig. 1(not to scale)

A vehicle is suspended beneath a helicopter on a steel cable.

- (a) The helicopter lifts the vehicle of mass 1500kg at a vertical acceleration of 3.0 ms^{-2} . Show that the tension in the cable is $1.9 \times 10^4\text{ N}$.
 $g = 9.8\text{ N kg}^{-1}$.
- (b) This steel cable, of length 50m and cross-sectional area $8.0 \times 10^{-5}\text{ m}^2$, stretches elastically during lifting.
- (i) Calculate the stress in the steel cable caused by the tension.

(ii) Show that this stress causes the cable to extend by 0.055m.
The Young Modulus for steel $E = 2.2 \times 10^{11} \text{ N m}^{-2}$.

(iii) Calculate the energy stored in the stretched cable.