Problem 1

A rope pulls a 20 kg box along a horizontal surface with a tension force of 100 N directed along the horizontal. Over a distance of 2.5 m, this force takes the box from rest up to a speed of 3 m/s. What is the coefficient of kinetic friction $\mu_k$ between the box and the floor?

Problem 2

A 0.65 kg box slides down a ramp inclined at 26° above the horizontal. The coefficient of kinetic friction between the block and the ramp is $\mu_k = 0.12$. Over a sliding distance of 1.2 m along the ramp,

- by how much does the kinetic energy of the box change?
- If the box started at rest, what is the speed of the box after sliding the 1.2 m?

Problem 3

A 68 kg skydiver drops off of a stationary hovering hot-air balloon. After falling 1000 m, the skydiver is falling with terminal speed of 59 m/s (and has been for some time).

- What is the change in the diver’s gravitational potential energy?
- How much thermal energy from air drag was generated along the way?