A 20kg box and a 30kg crate are attached to the two ends of a massless string that passes over a massless frictionless pulley. The system is released from rest.

Without performing a calculation, rate, smallest to largest, the magnitudes of the tension in the string and the weights of box and crate, respectively.

Calculate the acceleration of the system and the tension in the string.
Coupled objects: ropes and pulleys

We make the following approximations:

- **massless, un-stretchable rope**
  → tension is constant throughout the rope

- **massless, frictionless pulley**
  → tension remains constant as rope passes over pulley

**Caution:**
If mass and spatial extension of the pulley are taken into account, the tension does **not** remain constant! We will study this with Rotational Motion in lectures 24+25.