

Homework 15

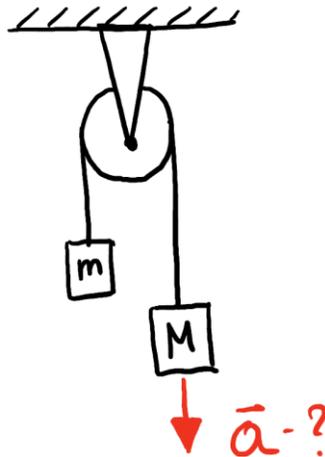
Ropes and pulleys.

Below are problems on weights and pulleys. We learned 2 important points, which will help you to solve the problems.

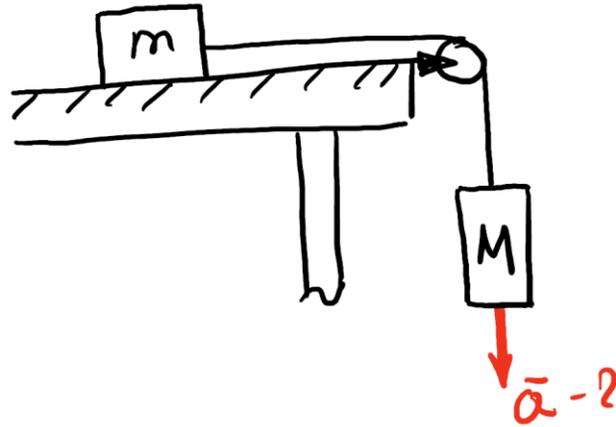
1. The rope is weightless, so the tension force is the same throughout the rope. For example, in problems below, the rope applies the same force to both weights.
2. The rope does not stretch, so the accelerations of both weights are related. For example, in problem 1, the acceleration of mass **M** down should be equal to that of mass **m** up, otherwise the rope will break.

Good luck!

1. There are two weights (masses m and M) attached to a rope which is placed on a pulley (See figure below). $M=4\text{kg}$; $m=1\text{kg}$. Find acceleration \mathbf{a} of the right weight (M) and tension force of the rope.



2. Now, the pulley is attached to the edge of the table (See figure below). There is no friction between weight m and the table. Find acceleration of weight "M" and tension force of the rope.



3. **Challenging problems for volunteers:** Now, same problem as 3, but there is friction between m and the table and the friction coefficient is μ . Find acceleration of weight "M" and tension force of the rope.