

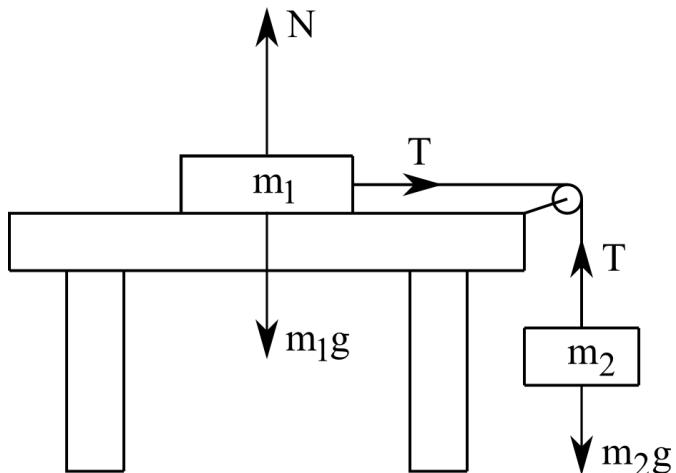
Answer on Question 62090, Physics, Other

Question:

Mass of 2.2 kg lies on a frictionless table, pulled by another mass of 4.9 kg under the influence of Earth's gravity. The acceleration of gravity is 9.8 ms^{-2} . What is the magnitude of the net external force (gravitational) acting on the two masses? Answer in units of N .

Solution:

Let's first draw the free-body diagram of the pulley system that consists of mass m_1 , string and mass m_2 :



There are three forces that act on the first mass: the weight of the first mass, m_1g ; the normal force, N ; the force of tension in the string, T . On the second mass act two forces: the force of tension in the string, T ; the weight of the second mass, m_2g . As we can see from the FBD, the two tension forces are internal to our pulley system, so we can ignore them. Therefore, the net external force acting on the system is the weight of the second mass m_2g (because the weight of the first mass m_1g is balanced by the normal force on it):

$$F_{net} = m_2g = 4.9 \text{ kg} \cdot 9.8 \text{ ms}^{-2} = 48.02 \text{ N.}$$

Answer:

$$F_{net} = 48.02 \text{ N.}$$