Answer on Question #42128-Physics-Mechanics-Kinematics-Dynamics

If a rope weighing 500g is tied to a box weighing 500kg, and the only force acting in the x-direction is T, what are the forces acting in the y-direction if there is no acceleration in y-direction. State if they have the same magnitude and direction.

Solution

If there is no acceleration in y-direction the net forces acting on a rope and a box are zero. The forces acting in the y-direction are weight of a rope $W_1 = m_1`g = 0.5\ kg \cdot 10\frac{m}{s^2} = 5\ N$ and reaction force $N_1 = W_1 = 5\ N$, which is directed oppositely to weight of a rope; weight of a box $W_2 = m_2`g = 500\ kg \cdot 10\frac{m}{s^2} = 5\ kN$ and reaction force $N_2 = W_2 = 5\ kN$, which is directed oppositely to weight of a box.