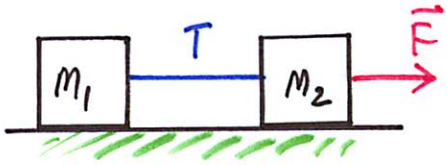
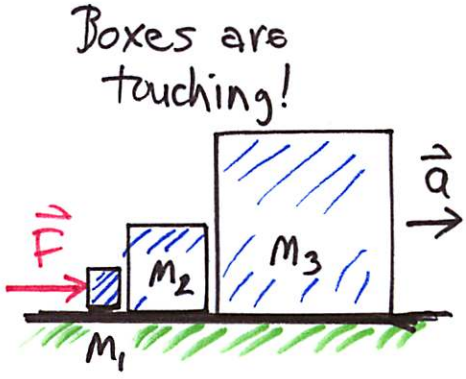
Some 2nd Law Examples:

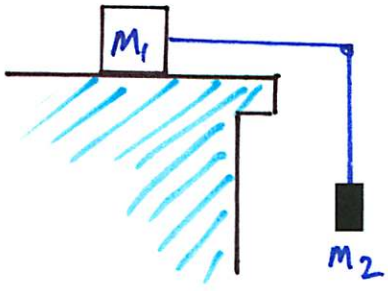
• Two boxes of masses m_1 and m_2 are connected by a string of negligible mass. Box 2 is pulled across a frictionless level table by a force $\mathbf{F}$ of constant magnitude and direction. What is the tension T in the string joining the two boxes as they accelerate across the tabletop?



• Three boxes of masses m_1, m_2 and m_3 are touching on a level, frictionless tabletop. A force $\mathbf{F}$ of constant magnitude and direction is applied to the trailing box, and the three boxes accelerate together. What force does box 2 exert backward on box 1 (the box to which the force $\mathbf{F}$ is applied) as the three boxes accelerate together.



• A box of mass m_1 slides on a level, frictionless tabletop, due to the force exerted by a string which runs over a peg to a hanging mass m_2. If the hanging mass is falling vertically, what is the tension T in the string joining the boxes?



• Two boxes of masses m and $3m$ are joined by a spring of negligible mass and force constant k. A constant horizontal force is applied to the leading box of mass m and the system of two boxes slides across a frictionless level tabletop due to this applied force. At a moment when the two boxes have the same acceleration **a**, by how much has the spring been stretched?