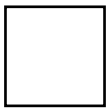
Newton's Laws – Sample Problems

- A 25 kg box is sitting on a table. A 50 N force is applied to the box while a frictional force of 12 N is acting on it.
    - Draw a FBD for the box
    - Write the equation for the net force in the vertical direction on the box:
        - $F_{net(y)}$=
    - What is the gravitational force (weight) of the box?
    - Is there a net force acting on the box in the vertical direction? How do you know?
    - Use the equation you wrote above to find the normal force (F_n) acting on the box
    - Write the equation for the net force in the horizontal direction on the box:
        - $F_{net(x)}$=
    - What is the net force acting on the box in the horizontal direction?
    - What is the acceleration of the box?

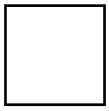
- Victoria and George are fighting to get the last Playstation 5 (mass = 1.2 kg) on Black Friday. Victoria pulls with a force of 14 N that causes the Playstation to accelerate toward her at a rate of 2.3 m/s^2.
    - Draw a FBD for Playstation
    - What is the net force acting on the Playstation in the horizontal direction?
    - Write the equation for the net force in the horizontal direction on the Playstation:
        - $F_{net(x)}$=
    - What is the George's applied force?

- An 1500 kg elevator moved upward by its motor. The acceleration of the elevator is 1.7 m/s^2.
  - Draw a FBD for elevator
  - What is the net force acting on the elevator in the horizontal direction?



  - What is the gravitational force (weight) on the elevator?
  - What is the net force acting on the elevator in the vertical direction?
  - Write the equation for the net force in the vertical direction on the elevator:
    - $F_{net(y)}=$
  - What is the tension in the cable pulling the elevator upward?

- A crane is lowering a 1200 kg air conditioning unit from the top of the school. The unit is accelerating at a rate of 0.45 m/s^2.
  - Draw a FBD for air conditioning unit
  - What is the tension in the crane's cable?



- A 1 N force pushes a 1 kg mass. What is the acceleration of the mass?
  - What would happen to the acceleration if you tripled the force?
  - What would happen to the acceleration if you doubled the the mass?
  - What would happen to the acceleration if you doubled the force and doubled the mass?