**Physics Department, Bingham University  
Part B: Introductory Classical Mechanics**

**Assignments**

1. A shopper pushes a grocery cart 20.0 m at constant speed on level ground, against a 35.0 N frictional force. He pushes in a direction 25.0° below the horizontal. (a) What is the work done on the cart by friction? (b) What is the work done on the cart by the gravitational force? (c) What is the work done on the cart by the shopper? (d) Find the force the shopper exerts, using energy considerations. (e) What is the total work done on the cart?

2. A centrifuge used in DNA extraction spins at a maximum rate of 7000 rpm, producing a “g-force” on the sample that is 6000 times the force of gravity. If the centrifuge takes 10 seconds to come to rest from the maximum spin rate: (a) What is the angular acceleration of the centrifuge? (b) What is the angular displacement of the centrifuge during this time?

3. A uniform seesaw is balanced on a fulcrum located 3.0 m from the left end. A smaller boy on the right has a mass of 40 kg and a bigger boy on the left has a mass 80 kg. What is the mass of the board?

4, A mass is placed on a frictionless, horizontal table. A spring (k = 100 N/m), which can be stretched or compressed, is placed on the table. A 5.00-kg mass is attached to one end of the spring, the other end is anchored to the wall. The equilibrium position is marked at zero. A student moves the mass out to x = 4.0cm and releases it from rest. The mass oscillates in SHM. (a) Determine the equations of motion. (b) Find the position, velocity, and acceleration of the mass at time t = 3.00 s.

**Attention**

Due date: 23rd of February, 2021

Time: 12.30 pm

Submit through your **Class representative**. Individual submission **will be penalized** if accepted.