Physics 11
M. Lam   <u>Dynamics Cooperative Group Review</u>

In groups of 3, solve the following problems on a separate sheet of paper. The paper used to solve the problems will be handed in at the end of the class.

For each question, each team member should take one of the following roles:
1. **The Problem Solver**: Their job is to read the question aloud. Following this, they attempt to solve the problem while verbalizing their thoughts.
2. **The Motivator**: their job is to motivate the problem solver by giving positive and constructive feedback. They are not to solve the problem for the problem solver nor are they to give big hints but they may say things that can help the problem solver find the right path.
3. **The Scribe**: Their job is to write down **everything** the problem solver says. When the problem solver has solved the problem, the scribe should have all the steps the problem solver took to determine the answer. **The scribe does not talk**.

Following each question, rotate roles.

1. A 873 kg dragster, starting from rest, attains a speed of 26.3 m/s in 0.59 s.
   a. Find the average acceleration of the dragster during this time interval.
   b. What is the magnitude of the average net force on the dragster during this time?

2. A 4500 kg helicopter accelerates upward at 2.0 m/s². What lift force is exerted by the air on the propellers?

3. The maximum force a grocery sack can withstand and not rip is 250 N. If 20.0 kg of groceries are lifted from the floor to the table with an acceleration of 5.0 m/s², will the sack hold?

4. If you use a horizontal force of 30.0 N to slide a 12.0 kg wooden crate across a floor at a constant velocity, what is the coefficient of kinetic friction between the crate and the floor?

5. A force of 40.0 N accelerates a 5.0 kg block at 6.0 m/s². along a horizontal surface.
   a. How large is the frictional force?
   b. What is the coefficient of friction?

6. A 225 kg crate is pushed horizontally with a force of 710 N. If the coefficient of friction is 0.20, calculate the acceleration of the crate.

7. A boy exerts a 36 N horizontal force as he pulls a 5.5 kg sled across a cement sidewalk at a constant speed.
   a. What does the sled weigh?
   b. What is the coefficient of kinetic friction between the sidewalk and the metal sled runners? Ignore air resistance.

8. A sled of mass 50.0 kg is pulled along flat snow-covered ground. The static friction coefficient is 0.30, and the kinetic friction coefficient is 0.10.
    a. What force will be needed to start the sled moving?
    b. Once moving, what total force must be applied to the sled to accelerate it at 3.0 m/s^2.

9. A 970 kg car starts from rest on a horizontal roadway and accelerates eastward for 5.00 s until it reaches a speed of 25 m/s. What is the average force exerted on the car during this time?

10. A 5.0 g bullet leaves the muzzle of a rifle with a speed of 320 m/s. What force (assumed constant) is exerted on the bullet while it is travelling down the 0.82 m long barrel of the rifle?