**Unit #2 Review – Dynamics**

**Key Terms**

Acceleration

Force

Force of friction

Force of gravity

Free Body Diagram

Gravity

Mass

Net force

Newton’s First Law

Newton’s Second Law

Newton’s Third Law

Normal force

Weight

**True or False**

1. An object must experience a force to keep it in motion.
2. Free body diagrams show all forces acting on the object.
3. At any one location, all objects, no matter how massive, fall with the same acceleration if air resistance is ignored.

**Multiple Choice**

1. If action and reaction forces are always equal and opposite, then why do objects move at all?
   1. One object has more mass than the other object.
   2. The forces act on different objects.
   3. The reaction forces take over since the action forces acted first.
   4. The reaction force is slower to react because of inertia.
   5. The action and reaction forces are not exactly equal.
2. A cable on an elevator exerts a 6 kN upward force. The downward force of gravity on the elevator is 4 kN. The elevator would be
   1. Moving upward with constant speed
   2. Moving downward with decreasing speed
   3. Moving upward with decreasing speed
   4. Moving downward with increasing speed
   5. Moving upward with increasing speed
3. An airplane is moving at a constant velocity in a straight level path. In what direction is the net force acting on the plane?
   1. Upward
   2. Downward
   3. In the direction of the motion
   4. Opposite to the direction of the motion
   5. There is no net force

**Short Answer**

1. What could happen in each of the following situations?
   1. A vehicle tries to come to a stop at a traffic light on an icy street.
   2. A passenger in a car does not have their seatbelt on when the driver must make a quick stop.
   3. A student has placed their textbook in the back window of a car. While driving they have to make a sudden stop to avoid driving through a stop sign.
2. When you stand on the Newton spring scale and you measure your weight. What will the scale show if you stand on it in an elevator at the moment when it begins to accelerate up? Down?

**Calculations**

1. A grocery cart has a mass of 32.0 kg. An applied force of 4.00 x 102 N [E] is used to move the cart. The cart starts from rest and the force is applied for 5.0 s.
   1. Draw a free body diagram for the cart while it is being pushed.
   2. Calculate the force of friction acting on the grocery cart if the coefficient of friction between the cart and the asphalt is 0.87.
   3. Calculate the acceleration of the grocery cart.
   4. How far does the cart move in 5.0 s?
2. A wagon is used to help deliver papers. There is an applied force that causes the wagon to move 15 m [N] in 10.0 s from rest. There is a force of friction of 3.1 N acting on the 27 kg wagon.
   1. What is the acceleration of the wagon?
   2. What is the net force acting on the wagon?
   3. Calculate the applied force.
3. A tug-of-war has started over a popular toy. One child pulls with a force of 20 N [W], a second child pulls with a force of 15 N [N] and a third child pulls with a force of 40 N [E]. Calculate the net force on the toy.
4. A parachutist jumps from a plane and falls faster and faster through the air. At one point in time, her acceleration is 8.0 m/s2 [down]. If she has a mass of 65 kg, calculate the force of air resistance that is acting opposite to her motion.

**Textbook:** p. 154 – 159, especially # 1 – 21, 25 – 27, 29, 31 – 37, 42 – 45, 49 – 52, 59, 56

**\*\* It is not expected that you will complete all of the textbook questions; instead, review them, and answer only the questions that you are struggling with \*\***