Dynamics Review

Name: _____   Date: _____

Concept and Knowledge Review

1. What is a force? What are the four fundamental forces (use your notes)? Rank the four forces in order of increasing strength. Which of the forces is the weakest?
2. What is Newton's 1st Law? Explain it and give at least 2 examples. How does inertia relate to the mass of an object?
3. What three variables does Newton's 2nd Law relate? What is the formula used for Newton's 2nd Law?
4. What is Newton's 3rd Law? Give at least 2 examples of Newton's 3rd Law.
5. What is the unit of force?
6. Define the term "net force" or "unbalanced force."
7. What happens if the forces acting on an object are balanced? What happens if the forces acting on an object are unbalanced?
8. What is the acceleration of gravity on Earth? Do all objects accelerate at the same rate? Explain. What factor affects the rate at which objects fall?
9. What is the difference between mass and weight?
10. How is the weight of an object calculated?
11. Explain the concept behind a crumple zone. Explain what is necessary to reduce the acceleration of objects during collisions.
12. Explain the concept of terminal velocity. Explain how terminal velocity is reached and why. Also state the three variables that affect the terminal velocity.
13. What does friction tend to do to the motion of an object?
14. What is the normal force?
15. What two factors does the value of the frictional force depend on? What is the formula?

Review Problems:

1. A 3 kg mini-tank has the following forces acting on it. Determine the Net/Unbalanced/Sum of the forces acting on this mini-tank. Also determine the acceleration of the tank.

$F_1=4N$ $F_2=7N$

$F_3=3N$

2. A mini-tank (4 kg) is accelerating to right with an acceleration of 1.5 m/s/s. What is the value of the unknown force, F_3?

F_1=8N F_2=17N

F_3=?
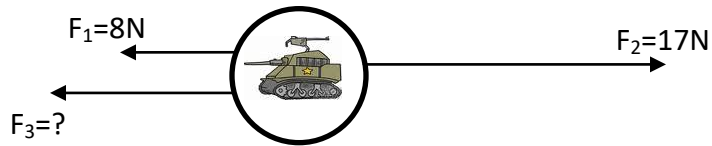
3. A force of 500 N to the right is applied to an object and another force of 100 N is applied on the object to the left, causing its velocity to change from 10 m/s to 30 m/s in 5.0s.
   a) Calculate the object's acceleration?
   b) Draw the F.B.D. for the situation and then calculate the net force on the object?
   c) Calculate the mass of the object?

4. A 6000 kg transport truck is on the highway. Friction (2000 N) from the tires and air resistance (500N) are acting on the truck. The truck was travelling at 18 m/s and the driver presses the gas pedal down (F_E – Force of Engine) and accelerates the truck for exactly 2.0 seconds to a speed of 28 m/s. Determine the force of the engine, F_E.

5. Calculate the weight of the following objects in Newtons
   a) 130 kg b) 245 g

6. Calculate the mass (kg) of the following objects whose weights are given
   a) 897 N   b) 0.679 N   c) 230 lbs