IPSH ACCELERATION PRACTICE PROBLEMS

Answer these questions in your science notebook (not on this page!). Show all of your math work including the equation you use, the values you plug-in for the variables, and box your answer.

For this practice assignment you will need:

- The equation for acceleration using velocity and time
- The equation for Newton's 2nd Law
- The equation for instantaneous velocity
- The equation to calculate weight
- An understanding of equilibrium

1. Nearly all physics problems will use the unit m/s^2 for acceleration. Explain why the seconds are squared. Why isn't the unit given as m/s, as it is for speed?

2. Does a car accelerate when it goes around a corner at a constant speed? Explain your answer.

3. A sailboat moves at 1 m/s. A strong wind increases its speed to 4 m/s in 3 seconds. Calculate the acceleration of the sailboat.

4. A roller coaster's velocity at the top of a hill is 10 m/s. Two seconds later it reaches the bottom of the hill with a velocity of 26 m/s. What is the acceleration of the roller coaster?

5. A car traveling at 10 m/s starts to decelerate steadily. It comes to a complete stop in 20 seconds. What is its acceleration?

6. You are running a race and you speed up from 3 m/s to 5 m/s in 4 seconds.
   a. What is your change in speed?
   b. What is your acceleration?

7. A stationary car with a mass of 1500 kg reaches a velocity of 15 m/s 5 seconds after starting.
   a. What is the car's acceleration?
   b. How much force was required to reach this acceleration?

THERE'S A SIDE TWO! TURN OVER FOR MORE PHYSICS PHUN!

8. A bicycle takes 8.0 seconds to accelerate at a constant rate from rest to a speed of 4.0 m/s. If the mass of the bicycle and rider together is 85 kg, what is the net force acting on the bicycle? (Hint: first, calculate acceleration.)

9. What is the upward acceleration of a helicopter with a mass of 5000 kg if a force of 10,000 N acts of it in an upward direction?

10. A girl on roller skates accelerates at a rate of 2 m/s^2 with a force of 100 N. What is her mass?

11. During a test crash, an air bag inflates to stop a dummy's forward motion. The dummy's mass is 75 kg. If the net force on the dummy is 825 N toward the rear of the car, what is the dummy's deceleration?

12. A 7000 kg plane is launched from an aircraft carrier in 2 seconds by a force of 350,000 Newtons.
    a. What is the plane's acceleration?
    b. What is the plane's velocity at exactly 2 seconds?

13. An elevator has a mass of 1000 kg.
    a. What is the elevator's weight in Newtons?
    b. What is the tension force on its cables when it isn't moving? What is the elevator's acceleration when it isn't moving?
    c. What force is needed to accelerate it upward at a rate of 2 m/s^2 against gravity? (Hint: Drawing a freebody diagram of upward and downward forces may help.)
    d. What force is needed to accelerate it downward at a rate of 2 m/s^2?