Name _____ Hour _____

Force Problems

____ pts. due_____   **Use the 1-D Equations to find "a" where needed!**

1. **Know Newton's 3 Laws:**

    Newton's 1st Law is the law of _____

    Newton's 2nd Law is the math equation F = _____

    Newton's 3rd Law states for every action there is an _____ and _____ reaction.

2. You are pulling your little sister on a sled with a force of 56 N at a 35˚ angle. Find the x and y components of your force. *(Make sure your calculator is in degree mode.)*

3. Bill Nye the science guy has a mass (100 kg) twice that of his sister (50 kg). They both start from rest and **accelerate at a rate of 5 m/s² for 5 sec.**
    a. Which one has a greater acceleration? _____
    b. Which one needs a **greater force** to get to that acceleration? Explain!

    c. If you apply the same force to a larger mass, what should happen to the acceleration?

4. It takes a force of 10.5 N to accelerate a 2.5 kg rock. What is the acceleration of the rock?

5. A rocket weighs 2.42 x 10⁷ **lbs** and the total force acting on the rocket is 2.5 x 10⁷ N.
    a. Find the mass of the rocket.

    b. Find the acceleration of the rocket. *(ans. 2.27 m/s²)*

    c. What velocity (**in mph**) will the rocket reach at the end of its 7-**minute** launch? *(ans. 2,133 mph)*

6. Show how the units cancel and what you are left with when you divide a Newton by a kg.

7. A high jumper, falling with an initial velocity of 4.0 m/s lands on a foam pit and comes to rest in a distance of 0.40 m. If the pit exerts a force of -1,200 N on the jumper, (the negative means it is in the opposite direction of the jumper) what is the jumper's mass? **Find a first!** *(ans. 60 kg)*

8. Define weight: _____

9. How are mass and weight different?

10. Find the weight of an object in lbs that has a mass of 65 kg.

11. A person performing karate chops on a block of wood has their hand go from 13.7 m/s to 0 m/s in 0.0021 seconds. The mass of the average forearm is about 0.7 kg. What is the force exerted on the hand by the block of wood? *(ans. approx. -4,567 N)*

12. A car moving initially at a speed of 50.1 **mph** and weighing 3001 **lbs**. is brought to a stop in a distance of 61.0 m.
    a. Calculate the time required to stop. **The a ≠ -9.8!** *(ans. 5.45 sec.)*

    b. Calculate the force acting on the car. **Why is it negative**? *(ans. approx. -5,579 N)*

    c. Find the **weight** of the car in Newtons. (-13368 N)

13. A 175 lb hockey player is traveling at **22 mph** and comes to a stop in 1.25 m. Find the force exerted by the ice. (-3076 N)