

Name \_\_\_\_\_

Force Problems - Answer on another sheet of paper - **DRAW A PICTURE!**

Period \_\_\_\_\_

$$F = ma$$

$$F = mg$$

$$g = 10 \text{ m/s}^2$$

$$N = \text{kgm/s}^2$$

WS 1

Newton's 1<sup>st</sup> and 2<sup>nd</sup> Law Problems

1. What is the mass of a dog that weighs 75-N?

$$F = mg$$

$$75 \text{ N} = m (9.8 \text{ m/s}^2)$$

$$= 7.7 \text{ kg} \quad (\text{or } 7.5 \text{ kg if you used } g = 10 \text{ m/s}^2)$$

2. An astronaut with all her equipment has a mass of 95-kg.

- a. How much will she weigh on the Earth?

$$931 \text{ N (downward)}$$

- b. How much will she weigh on the moon where acceleration to gravity is  $1.67 \text{ m/s}^2$ ?

$$159 \text{ N (downward)}$$

3. Many automobile passengers suffer neck injuries when struck by cars from behind. How does Newton's law of inertia apply here? How do headrests help to guard against this type of injury?

4. A net force of 200-N acts on an object with a mass of 40-kg on. How much does the object accelerate?

$$5 \text{ m/s}^2$$

5. An object is observed to accelerate at  $14 \text{ m/s}^2$  while under the influence of 270-N net force. What is the object's mass?

$$19.3 \text{ kg}$$

6. A common malady in runners who run too hard on a surface is shin splints. If a runner's 7.0-kg leg hits the pavement so that it comes to rest with an acceleration of  $-200.0 \text{ m/s}^2$  on each hit, how much force must the runner's leg withstand on each step?

$$-1400 \text{ N}$$