HW 4.1 Newton's Laws of Motion Per _____ Name_____

1. Does a 2-kilogram iron block have twice as much *inertia* as a 1-kilogram block of iron? Twice as much *mass*? Twice as much *weight* (when weighed in the same location)?

2. Does a 2-kilogram bunch of bananas have twice as much *inertia* as a 1-kilogram loaf of bread? Twice as much *mass*? Twice as much *weight* (when weighed in the same location)?

3. The speed of a ball increases as it rolls down an incline, and the speed decreases as the ball rolls up an incline. What happens to the speed on a smooth horizontal surface?

4. Galileo found that a ball rolling down one incline will pick up enough speed to roll up another. How high will it roll compared to its initial height?

5. The law of inertia states that no force is required to maintain motion. Why, then, do you have to keep pedaling your bicycle to maintain motion?

6. What is meant by the *net force* that acts on an object?

7. Suppose a cart is being moved by a certain net force. If a load is dumped into the cart so its mass is doubled, by how much does the acceleration change?

8. When a hammer exerts a force on a nail, how does the amount of force compare to that of the nail on the hammer?

9. As a ball falls, the action force is the pull of the Earth's mass on the ball. What is the reaction force?

10. If you hit a wall with a force of 200 N, how much force is exerted on you? What is exerting the force?

11. Why can you not hit a feather in mid-air with a force of 200 N?

12. A swimmer making a swimming turn pushes on the wall with a force of 500 N to the right. Describe the reaction force.

13. What is the weight of a 10 kg box of books on gazelles?

14. A typical male Thompson gazelle has a weight of 245 N. What is its mass?

15. A box **weighing** 20 N is to be pushed across a smooth floor with a horizontal force of 5 N. What acceleration will be produced?

16. A 6 kg object undergoes an acceleration of 2 m /s /s. (a) What is the force acting on it? (b) If this same force is applied to a 4 kg object, what acceleration will be produced?

For each of the following examples, indicate which law(s) is applicable.

17. To hold yourself up, you place your hand on the wall.

18. When making a right turn in your car, your body moves to the left.

19. Which would you rather experience: throwing your hand against the wall or throwing your hand against the wall while holding a 5 kg mass? Why?

20. A race car undergoes great accelerations because of this law.

21. Which law explains recoil when you fire a gun?

22. When coming to a stop in your car, your body lurches forward.