Name _____ Date _____ Class _____

Newton's First and Second Laws

Understanding Main Ideas

Answer the following question in the space provided.

1. Newton's second law of motion describes the relationship of force, mass, and acceleration. Write the equation.

_____

Write the letter of the correct answer on the line at the left.

____ 2. If you increase the force on an object, its acceleration
- **a.** decreases.
- **b.** stays the same.
- **c.** also increases.
- **d.** stops.

____ 3. If you increase the mass on an object, its acceleration
- **a.** decreases.
- **b.** stays the same.
- **c.** also increases.
- **d.** stops.

____ 4. How much force is needed to accelerate a 3 kg skateboard at 5 m/s^2?
- **a.** 8 N
- **b.** 0.6 N
- **c.** 1.6 N
- **d.** 15 N

____ 5. A resistance to a change in motion is
- **a.** acceleration
- **b.** inertia
- **c.** gravity
- **d.** velocity

____ 6. The amount of inertia an object has depends on its
- **a.** speed
- **b.** volume
- **c.** mass
- **d.** length

Building Vocabulary Skills

Answer the following question in the space provided.

7. Define the term *inertia.*

_____

_____

Name_____

Force and Acceleration

A **force** is a push or a pull. To calculate force, we use the following formula:

$F = ma$ where F = force (N)
m = mass (kg)
a = acceleration (m/s^2)

Example: With what force will a rubber ball hit the ground if it has a mass of 0.25 kg?

$F = (0.25\ kg)(9.8\ m/s^2)$

$F = 2.45\ N$

Solve each problem.

1. With what force will a car hit a tree if the car has a mass of 3,000 kg and it is accelerating at a rate of 2 m/s^2?

2. A 10-kg bowling ball would require what force to accelerate it down an alleyway at a rate of 3 m/s^2?

3. What is the mass of a falling rock if it hits the ground with a force of 147 N?

4. What is the acceleration of a softball if it has a mass of 0.50 kg and hits the catcher's glove with a force of 25 N?

5. What is the mass of a truck if it is accelerating at a rate of 5 m/s^2 and hits a parked car with a force of 14,000 N?