

Quiz.

1. Newton's Second Law states
 - a) every applied force has an equal and opposite reaction force
 - b) objects in motion continue in motion in a straight line until acted upon by a net external force
 - c) $f=ma$
 - d) objects at rest remain at rest until acted upon by a net external force
2. Which of these is a force?
 - a) weight
 - b) mass
3. The amount of matter an object contains is its _____.
 - a) weight
 - b) mass
4. Kilograms are a unit of weight.
 - a) True
 - b) False
5. When an object is in free fall
 - a) it may feel weightless
 - b) gravity is zero
6. Air resistance on an object depends on the object's _____. (Circle all that apply.)
 - a) frontal surface area
 - b) weight
 - c) speed
 - d) height
7. At terminal speed, what goes to zero?
 - a) acceleration
 - b) gravity
 - c) velocity
 - d) speed
8. At terminal speed,
 - a) an object continues to fall without increasing speed
 - b) an object continues to fall at an increasing speed
 - c) an object is no longer falling
9. You have less _____ in outer space. (Circle all that apply.)
 - a) weight
 - b) mass
 - c) inertia

Answer Key.

1. c)

Newton's Second Law is also known as the Force Law. It tells us that the acceleration of an object is directly proportional to the net external force acting on it and inversely proportional to its mass.

2. a)

Newton's law tells us that a force is equal to a mass times an acceleration. Therefore, a mass alone cannot be a force. Weight, on the other hand, is equal to mass times the acceleration due to gravity, 9.8 m/s^2 , and it is a force.

3. b)

The amount of matter an object contains does not depend on the acceleration of the object.

4. b)

Kilograms are a unit of mass. Force is measured in newtons, which are kilogram-meters per second squared. Since we know force is equal to mass times acceleration, these units make sense.

5. a)

The physical definition of free fall states that the object is subject only to gravity, therefore gravity cannot equal zero.

6. a) & c)

Although an object's terminal velocity is affected by air resistance and may be affected by the object's height and weight, air resistance itself does not. The faster an object falls in the presence of air and the greater the frontal area of the object, the greater the air resistance.

7. a)

At terminal velocity the object is experiencing dynamic equilibrium. Gravity does not "switch off;" its effect is merely balanced by the air resistance acting on the object. Since the object is still moving, the speed and velocity cannot be zero, either.

8. a)

At terminal velocity there is no net external force acting on the object, and it is moving solely under the influence of its inertia with constant velocity in a straight line.

9. a)

The amount of matter you contain does not change in space, so your inertia does not change, either. What changes is the strength of gravity acting on your mass.