

Chapter 5 Study Guide

5.1 Newton's Laws of Motion

Forces

A force is a _____ or a _____. Because a force is a vector quantity, it has both magnitude and _____. Physicists group all forces into four kinds. They are _____, _____, _____, and _____. The weakest of the four forces is _____. Charged particles cause the _____ force to be exerted. The _____ force is the strongest of the four forces, but only acts over small distances. The _____ force is involved in the radioactive decay of some nuclei. This force has been linked with the _____ force.

Newton's First Law of Motion

Forces acting on an object can be _____ to produce the net force on the object. If all the forces acting in one direction are _____ all the forces acting on the object in the opposite direction, the net force is zero. According to _____ law, if there is no net force on an object, the object remains at rest, or moves with _____ velocity in a _____ line.

Newton's Second Law of Motion

If there is a net force on an object, the object will be accelerated, or change _____. The amount of acceleration caused depends on the _____ of the force and the _____ of the object. Newton's second law can be written as an equation, _____. This equation means that acceleration is _____ proportional to force and _____ proportional to mass. The direction of the force and the direction of the acceleration are _____.

The Unit of Force

The unit of force is defined in terms of Newton's _____ law. The unit of force is the _____ abbreviated as _____. The amount of force that causes a mass of _____ to accelerate at a rate of _____ is equal to one newton.

Newton's Third Law of Motion

Newton's third law describes pairs of forces called _____ forces. These two forces are _____ in magnitude and _____ in direction. According to this law, if a book pushes downward on a table, the table pushes _____ against _____.

5.2 Using Newton's Law

Mass and Weight

An object's weight is the _____ force acting on the object. The unit used to express measurements of weight is the _____. Newton's _____ law can be used to find the weight of an object. The acceleration caused by gravity is equal to _____, and is represented by the symbol _____. The equation used for calculating weight is _____. According to the equation, an object's weight is proportional to its _____. An object's weight may vary from one location to another, because _____ may change from one place to another. However, the object's _____ does not change.

Two Kinds of Mass

One way to determine mass is to measure the amount of _____ needed to accelerate the object. This is called _____ mass. The other way to determine mass is to use a balance to compare the effects of _____ force on two objects. This is called _____ mass. In experiments, these two determinations of mass have been shown to be _____.

Friction

If you push on an object and slide it across a surface, the force of friction will _____ the motion. Friction acts in a direction that is _____ to the surface on which the object slides, and _____ to the direction in which the object slides. _____ friction opposes the start of an object's motion and _____ friction opposes continuing the motion when the object is already in motion. Of these two forces, _____ friction is greater. The amount of friction can be calculated using the equation _____. The constant in the equation is called the _____.

The Net Force Causes Acceleration

If more than one force acts on an object, the amount of acceleration can be calculated using Newton's _____ law. However, before the equation in Newton's law is used, the net force, which is the _____ of the forces, must be found. The positive and negative signs on the forces are important because they indicate the _____ of the forces.

The Fall of Bodies in the Air

Without any air, all objects fall with the same _____. When air is present, a friction-like force called the _____, acts on the object. This force depends on the _____ and _____ of the object, the _____ of the air, and the _____ of motion. When this force is equal to the force of gravity, the net force on the object is _____, and the object has reached its _____ velocity.