

IMPORTANT TERMS:

- Air resistance
- Fluid
- Free-body diagram
- Inversely
- Newton's Second Law
- Pascal
- Pressure
- Terminal speed
- Terminal velocity

UNIT I: MECHANICS

Chapter 6: Newton's Second Law of Motion-Force and Acceleration

I. Force Causes Acceleration (6.1)

A. Force causes _____

1. Acceleration depends on _____

2. Objects acceleration is _____
to the net force acting on it.

(the symbol \propto stands for "is directly proportional to.")

II. Mass Resists Acceleration (6.2)

A. **Acceleration** depends on _____

1. **acceleration** produced is _____

to the _____

2. **Inversely**– means that the two values change in
_____ directions

III. Newton's Second Law (6.3)

A. Newton's Second Law states:

The _____ produced by a **net force**
on an object is _____ proportional to the
_____ **of the net force**, is in the same
direction as the net force, and is _____
proportional to the _____ of the object

In equation form:

1. Using units of **newtons** (N) for force, **kilograms** for mass (kg), and **meters per second squared** (m/s²) for acceleration, we get the new equation

2. If we let **a** = acceleration, **F** = force, and **m** = mass:

IV. Friction (6.4)

A. Friction is a force

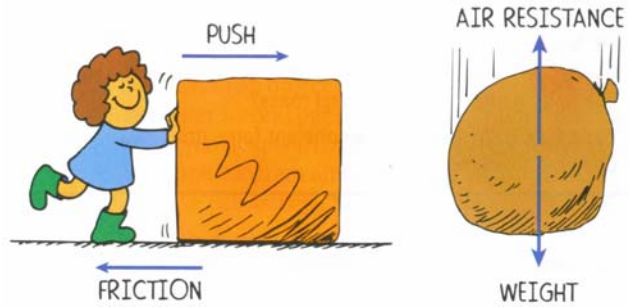
1. Acts on materials that are in _____ with each other
2. **friction** acts IN _____ direction to oppose motion
3. friction mainly due to _____ in the two surfaces.

B. Friction not restricted to solids sliding over one another

1. Occurs in _____ and _____
 - a. both called _____
 - b. Friction of liquids appreciable even at low speeds.
2. _____ (friction acting on something moving through air) is common form of fluid friction
3. When **friction is present**, an object may move with a _____ even when outside force is applied to it.

a. In such case, friction force _____
applied force

b. Can diagram using a _____
diagram



V. Applying force– Pressure

A. **Pressure**–

B. In equation form:

(Pressure is measured in Newton’s per square meter, or **pascals**)

VI. Free Fall Explained (6.6)

A. _____ showed falling objects accelerate equally, regardless of their masses

1. strictly true if air resistance is _____

2. approximately true when air resistance is very small

B. _____ believed that an object weighing tens times as much would fall ten times faster (disproved by Galileo and others– Galileo’s famous demonstration at Leaning Tower of Pisa)

C. Use equation for weight:

$$F_g = mg \text{ or}$$

Rearrange and get

(when _____ is also considered, the acceleration of any object is the _____)

VII. Falling and Air Resistance (6.7)

A. **Air resistance** _____ the net forces acting on a falling object

1. When **air resistance** _____ **downward force** on falling object (force of gravity– also called _____) then **net force** is _____ and no further _____ occurs.

2. _____ **speed**– when acceleration terminates

3. When consider direction (which is down for falling objects) we call this maximum speed **terminal**

B. Air resistance is often _____ at low speeds, but very noticeable at _____ speeds