Section 5-1

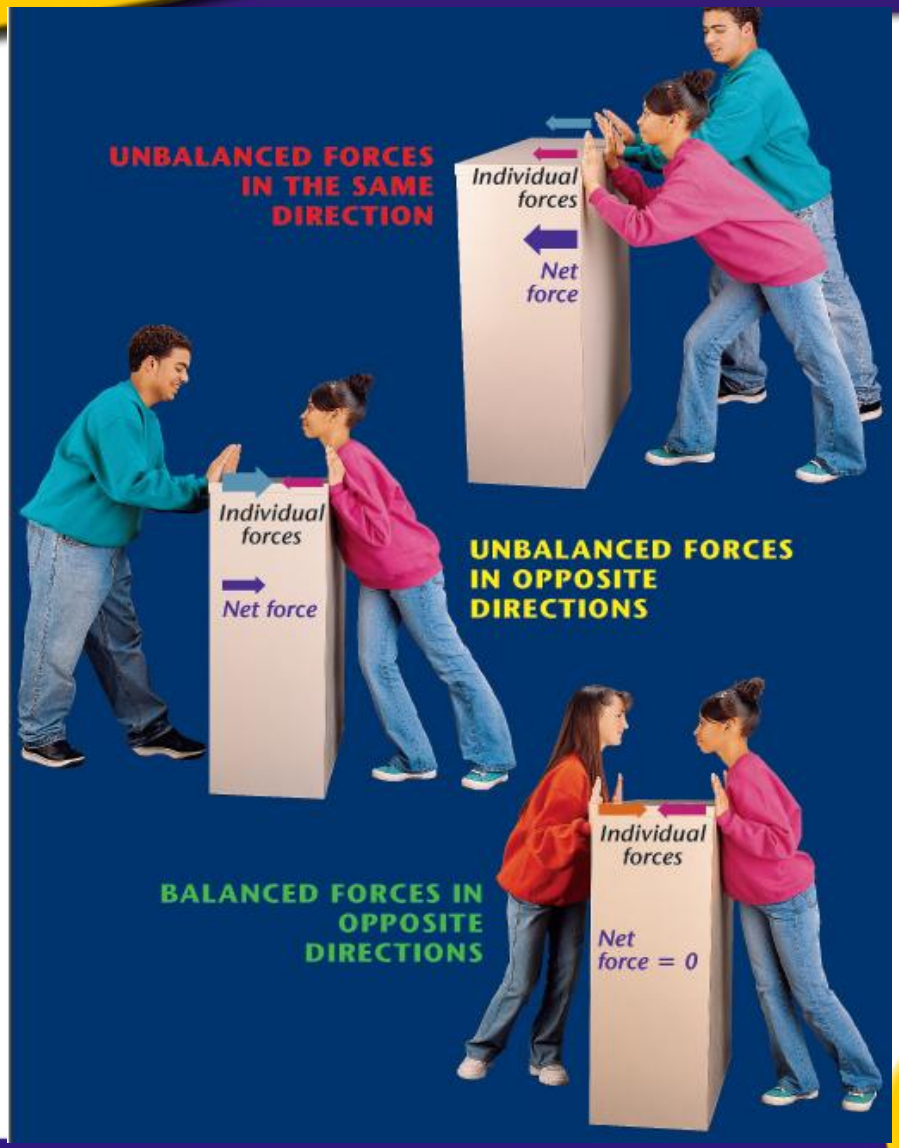
The Nature of Force

What is a force?

- A push or a pull

Forces may:

- Be added
- Be subtracted
- Cancel each other out



Unbalanced forces acting on an object will change the objects motion.

Balanced forces acting on an object will not change the objects motion.

Newton's first law of motion:

- An object at rest will remain at rest, and an object that is moving at constant velocity will continue moving at constant velocity unless acted upon by an unbalanced force.

What is Inertia?

- The tendency of an object to resist change in its motion.

What is Mass?

- The amount of matter in an object.

Section 5-2

Force, Mass, and Acceleration

How are force and mass related to acceleration?

$$Acceleration = \frac{Force}{Mass}$$

Newton's 2nd Law of Motion:

- **The net force on an object is equal to the product of its acceleration and its mass.**

What is the net force on a 1000-kg elevator accelerating at 2 m/s^2?

- **2,000 N**

What net force is needed to accelerate a 55-kg cart at 15 m/s^2?

- **825 N**

Section 5-3

Friction and Gravity

Friction and Gravity

SCIENCE EXPLORER

Hold an eraser about head high. Drop it.

Hold a sheet of paper about head high. Drop it.

Why did the paper take longer to hit the floor than the eraser?

Friction and Gravity

SCIENCE EXPLORER

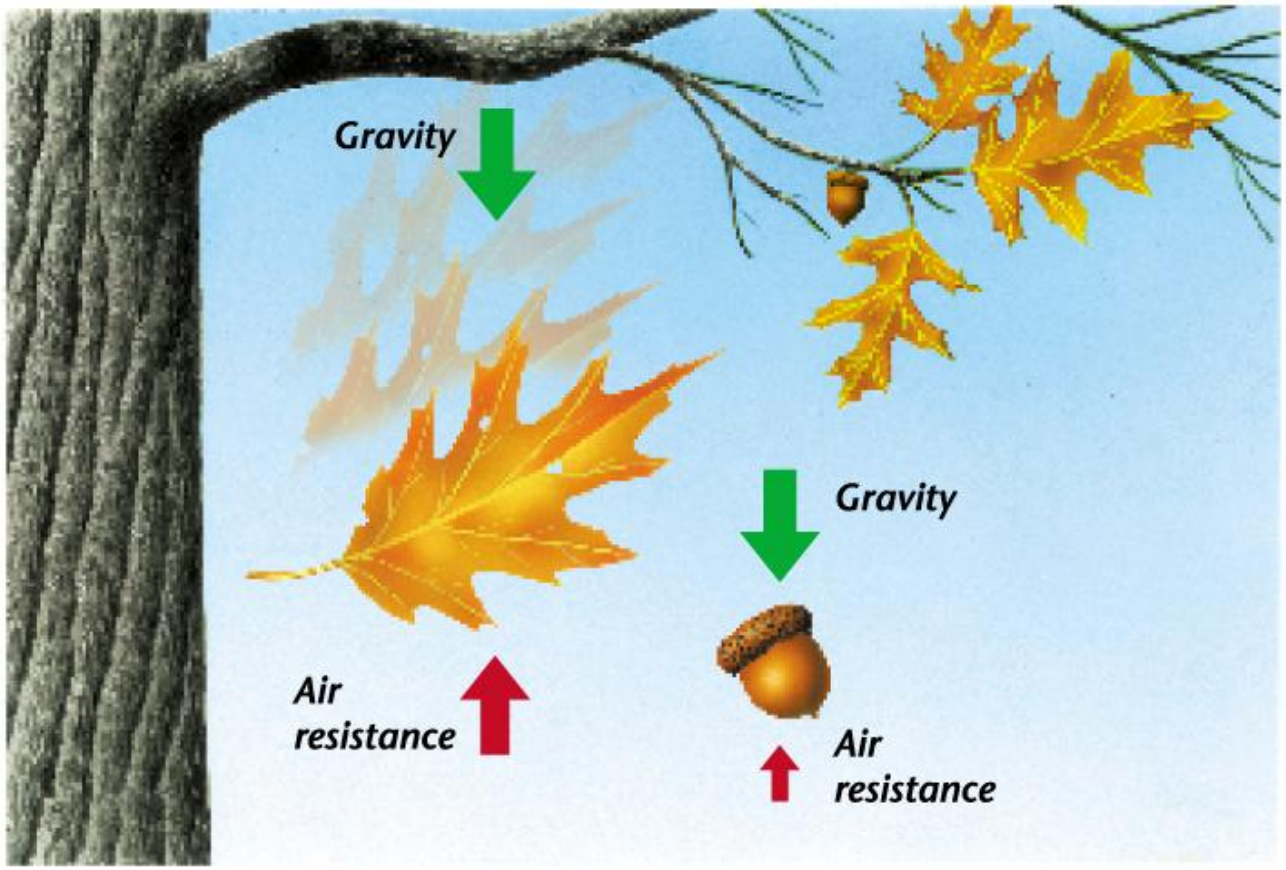
Friction:

- The force that one surface exerts on another when the two rub together.

Types of Friction:

1. sliding friction
   - when solid surfaces slide over each other
2. rolling friction
   - when an object roles over a surface
3. fluid friction
   - when an object moves through a liquid or gas

Friction and Gravity



The law of universal gravitation:

- The force of gravity acts between all objects in the universe.

Friction and Gravity

Mass doubled: force increases

Friction and Gravity

Mass doubled: force increases

Distance doubled: force decreases

Friction and Gravity

Mass doubled: force increases

Distance doubled: force decreases

Distance halved: force increases

Friction and Gravity

Force	Direction of Force	Force Depends Upon
Friction	Opposite to the direction of the motion	Types of surfaces involved and how hard the surfaces push together
Gravity	Between any two objects	Masses and distances