Characteristics of Forces

Forces are Vector Quantities

Since a force is a push or pull this means a force will have both magnitude and direction, requiring a vector to quantitatively describe.

Forces Occur in Pairs

One of the most important characteristics of forces is that they occur in pairs.

- This is the basis of Newton's Third Law.
- Any time two objects are in contact there may be a force between the two objects.
- Even if two objects are not in contact the fields produced by two objects could be in contact and this interaction between the fields will result in a force existing between the two objects.

Classifying Forces

Surface Forces

Normal Force (F_N)

- Force exerted by a surface that is perpendicular to the surface.

Friction (F_f)

- Force exerted by a surface that is parallel to the surface.

Gravitational Forces

Gravity (F_g)

- Force exerted by mass that always points toward the center of the mass.
- This is usually, but not limited to, the Earth's effect on an object.

Cable, Chain, Rope, String Forces

Tension (F_T)

- Force exerted by a chain, rope, string, or cable.
- This force is always a pulling force directed parallel to the cable, chain, rope, or string.

Contact vs. Non-contact

Contact Force

A contact force is a force that requires two objects to be in contact to exist. Every force except gravity that is listed above is considered a contact force because contact is required for the force to exist.

Non-contact Force

A non-contact force is a force that does not require two objects to be in contact for the force to exist. Gravity will be our only example for a while.

- One way to think of a non-contact force is the interaction between a field and an object. Gravity acts upon an object near the Earth because Earth has a gravitational field generated by its mass.