Forces

Force: a push or pull on an object

Forces can be divided into two categories:

- **Contact Forces**
- **Forces resulting from action-at-a-distance**

Forces

Contact Forces

Applied Force

Normal Force

Frictional Force

Air Resistance Force

Tensional Force

Spring Force

Action-at-a-Distance Forces

Gravitational Force

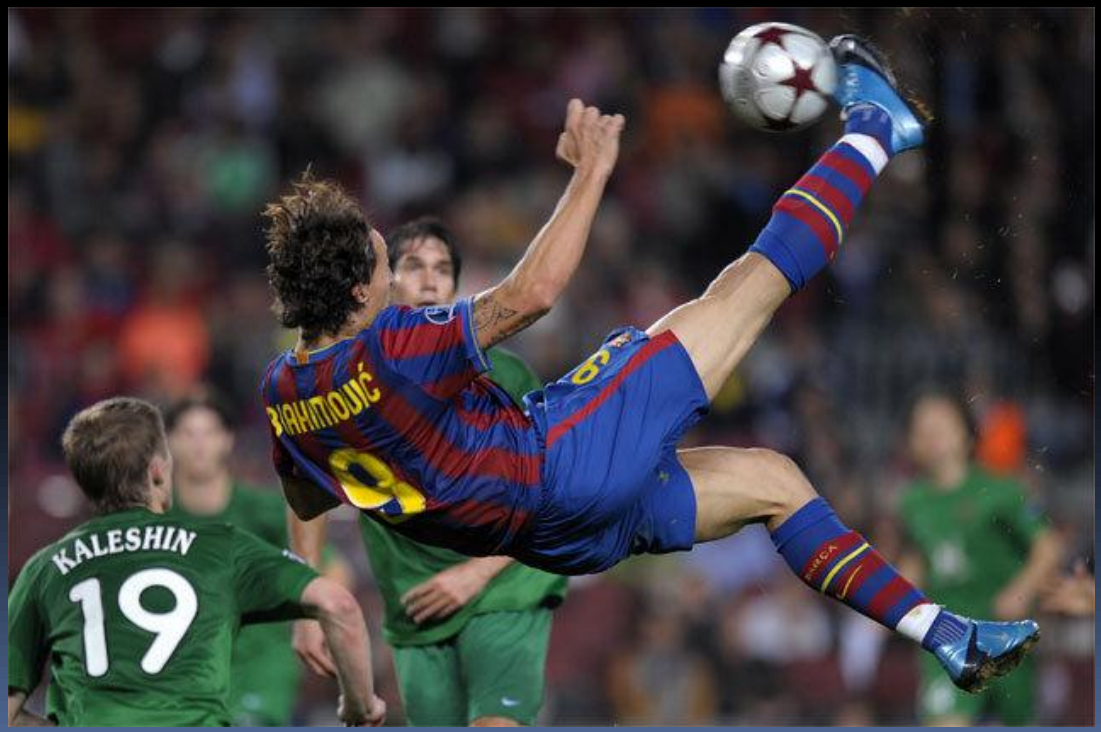
Electrical Force

Magnetic Force

Forces

An applied force is a force which is applied to an object by another object or by a person.

F_{app}



Forces

The force of gravity is the force with which the earth, moon, or other massive body attracts an object towards itself. By definition, this is the weight of the object.

$$F_{grav} = mg$$

Forces

The normal force is a contact force that is perpendicular to the surface of contact.

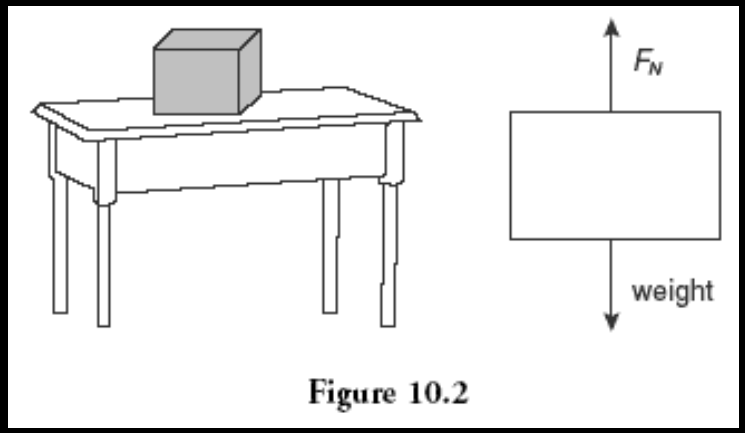
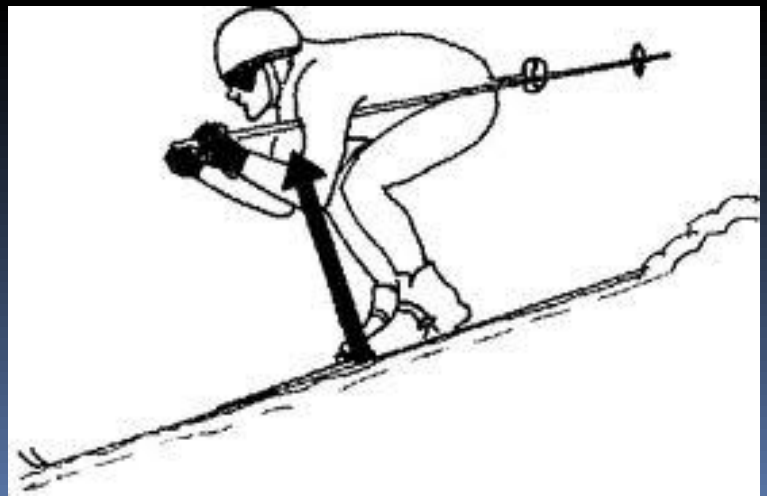


Figure 10.2

F_{norm}



Forces

The friction force is the force exerted by a surface as an object moves across it or makes an effort to move across it. The friction force opposes the motion of the object.

F_{fr}

Forces

Air resistance is a special type of frictional force which acts upon objects as they travel through the air.

F_{air}

Forces

Tension is the force which is transmitted through a string, rope, or wire when it is pulled tight by forces acting at each end.

F_{ten}

Forces

The spring force is the force exerted by a compressed or stretched spring upon any object which is attached to it.

F_{spring}

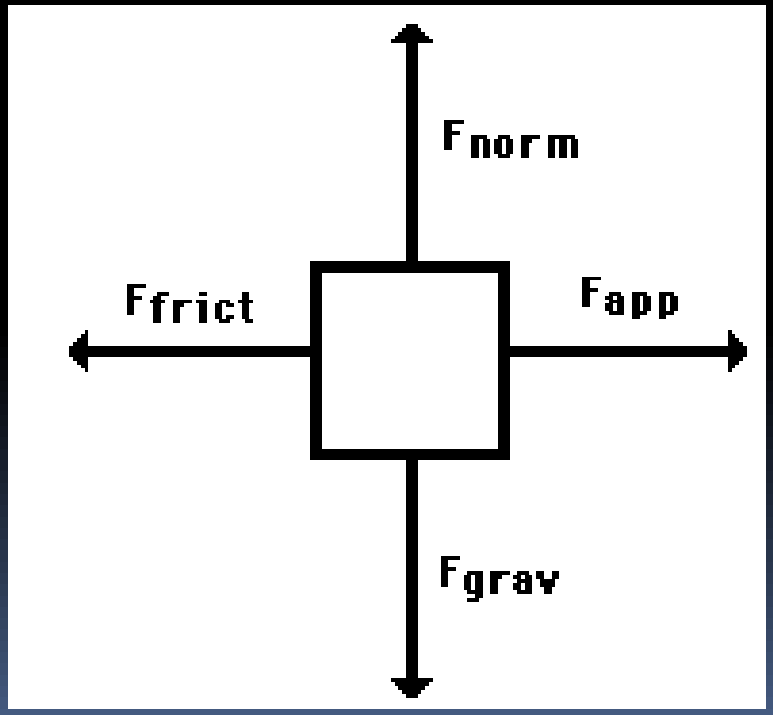
Forces

Force is a quantity which is measured using a standard metric unit known as the **Newton**

$$1\,\text{Newton} = 1\frac{kgm}{s^2}$$

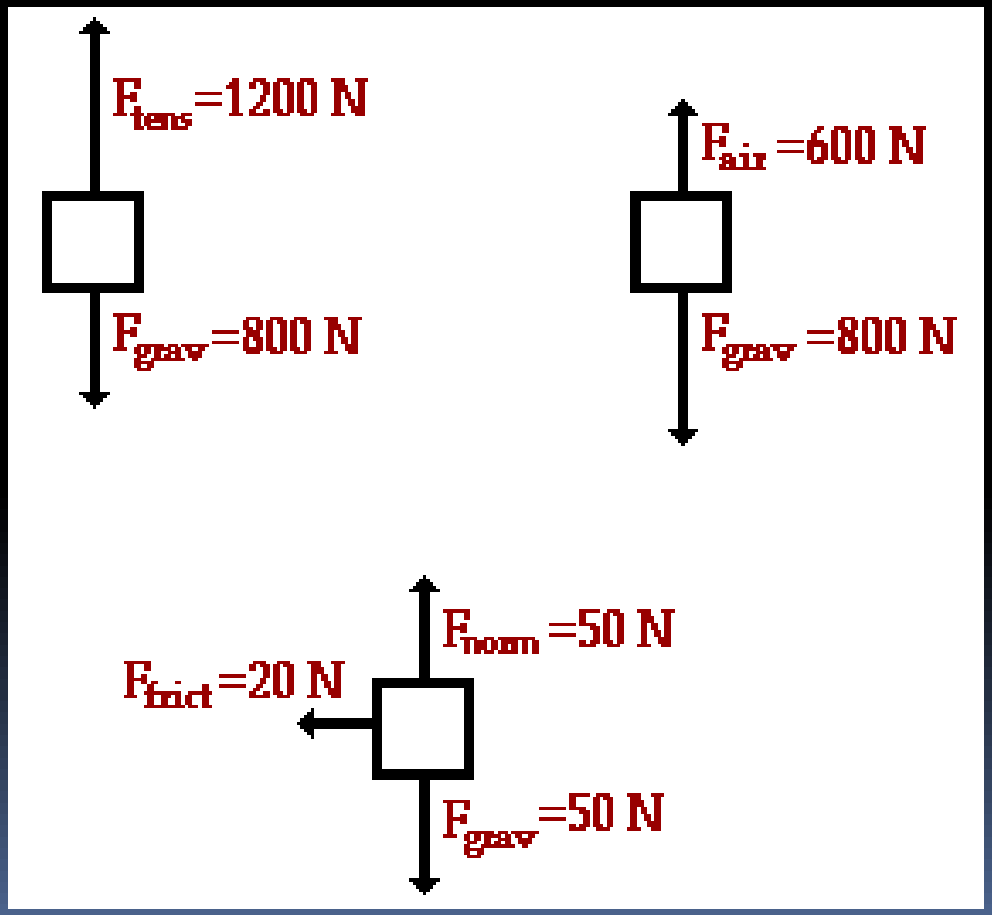
Drawing Free-Body Diagrams

Free-body diagrams (FBD) are diagrams used to show the relative magnitude and direction of all forces acting upon an object in a given situation.



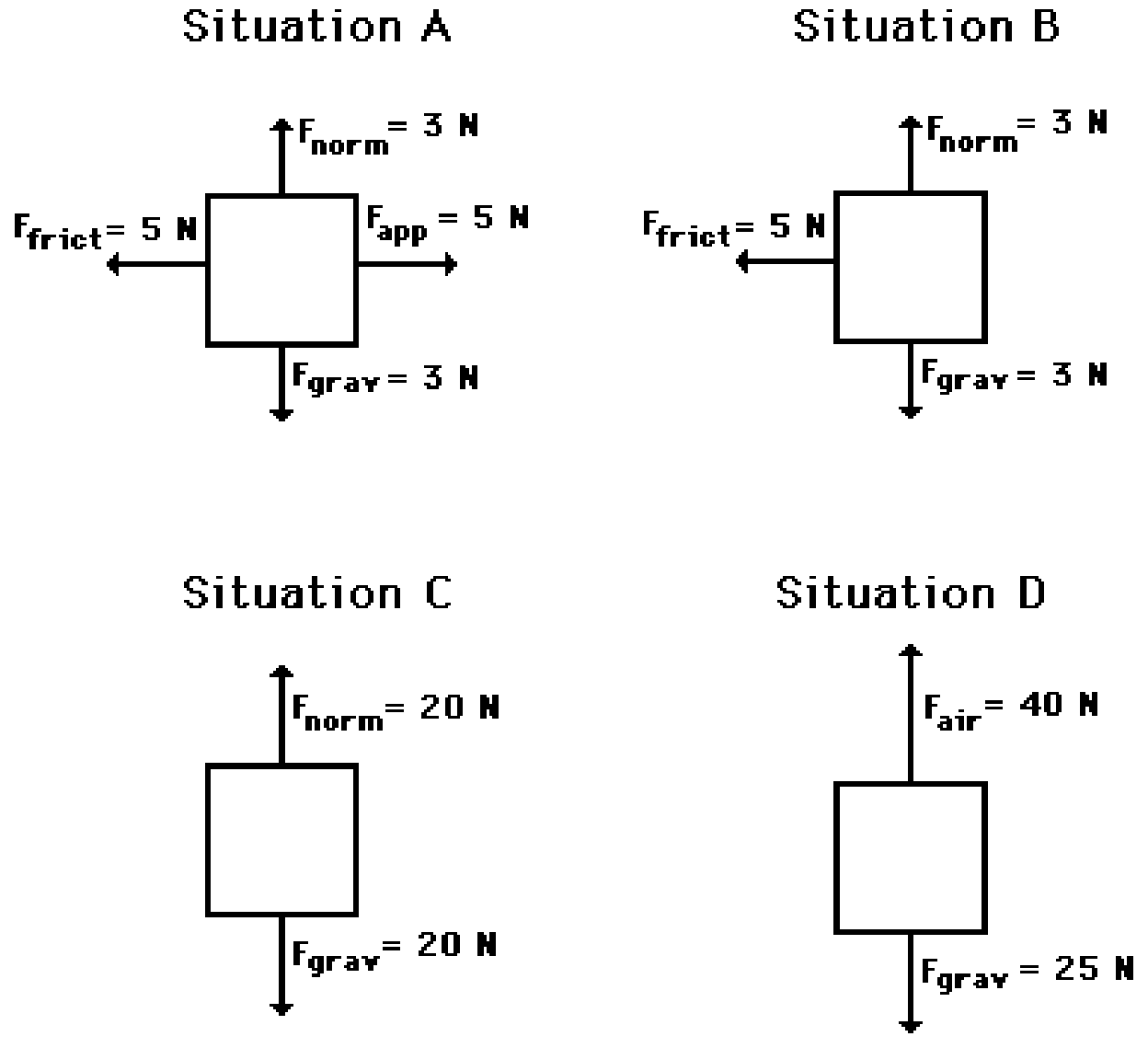
4.6 Net Force

Net Force is the combination of all forces acting on an object.



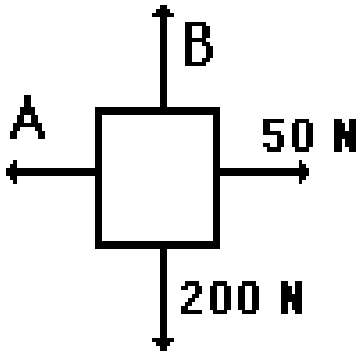
4.6 Net Force

What is the Net Force on these four objects?

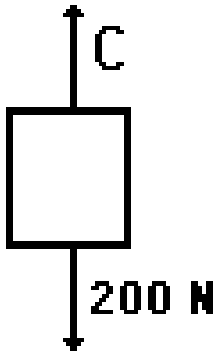


4.6 Net Force

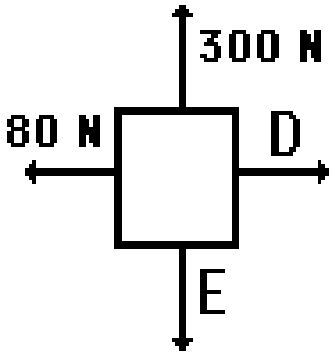
What are the unknown Forces if you know the Net Force on these four objects?



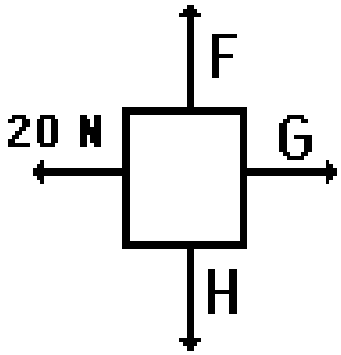
F_{net} = 0 N



F_{net} = 900 N, up



F_{net} = 60 N, left



F_{net} = 30 N, right