Notes: Forces Part 1: Forces & Free Body Diagrams

We know that a force can be a _____ or a _____ acting on an object.

There is a good chance that 2 forces can be acting on an object at any one time
Examples:

- _____ something
- _____ something
- See Free-Body Diagrams Worksheet for types of forces and their notation.

Balanced Forces
If two _____ are applied to an object in opposite directions, the object does not move, or moves at a _____. This is called _____ forces.

Unbalanced forces
If two _____ are applied to an object in opposite directions, the object _____ _____. This is called _____ forces.

If the forces acting on an object are _____ then the object will either:

-
-
-
-

Free-body diagrams
Free-body diagrams are used to show the relative _____ and _____ of all forces acting _____.

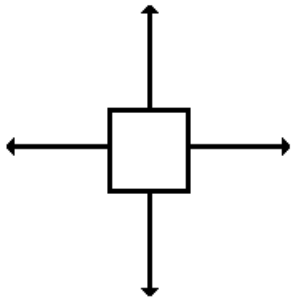
The length of the arrow in a free-body diagram reflects the _____ of the force.

The direction of the arrow shows the _____ which the force is acting.

Each force arrow in the diagram is labeled to indicate the _____.

It is generally customary in a free-body diagram to represent the object by a _____ and to draw the _____ from the center of the point outward in the _____ which the force is acting.

Consider a person pushing a refrigerator. There would be four forces acting on the refrigerator. The diagram to the right shows four forces acting upon an object. There aren't always four forces, For example, there could be one, two, or three forces. Label the four forces.



These diagrams are called force diagrams, aka free-body diagrams (FBD).

FBD problem 1
A book is at rest on a table top. Diagram the forces acting on the book.

FBD Problem 2
An egg is free-falling from a nest in a tree. Neglect air resistance. Draw a free-body diagram showing the forces involved.

FBD Problem 3
A flying squirrel is gliding (no wing flaps) from a tree to the ground at constant velocity. Consider air resistance. A free body diagram for this situation looks like…

FBD Problem 4
A rightward force is applied to a book in order to move it across a desk. Consider frictional forces. Neglect air resistance. Construct a free-body diagram. Let's see what this one looks like.

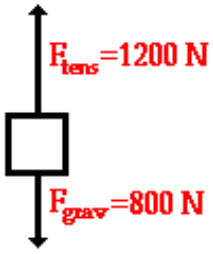
FBD Problem 5
A man drags a sled across loosely packed snow with a rightward acceleration. Draw a free-body diagram.

Net Force
Now let's take a look at what happens when unbalanced forces do not become completely balanced (or cancelled) by other individual forces.

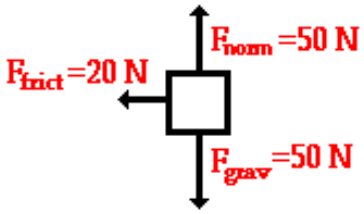
An unbalanced force exists when _____

_____.

Example 1
Notice the upward force of 1200 Newtons (N) is more than gravity (800 N).
The net force is _____.



Example 2
Notice that while the normal force and gravitation forces are balanced (each are 50 N) the force of friction results in unbalanced force on the horizontal axis. The net force is _____.



Another way to look at balanced and unbalanced forces