Newton's Laws and Motion

Inertia-The First Law

"An object at rest or in uniform motion will continue at rest or in uniform motion unless acted upon by an external force."

Examples:

Nov 2-8:24 PM

Newton's Second Law and Forces

"An unbalanced force will produce an acceleration in an object that is directly proportional to the net force and inversely proportional to the mass the force is acting upon"

Consider three equal size and strength children, (the evil Jocelyn and her hitherto unknown twin sisters perhaps?) and a sled on frictionless snow.

Nov 2-8:27 PM

In mathematical form, Newton's second law is $\vec{F} = m\vec{a}$

where $\vec{F}$ is the net force applied
$\vec{a}$ is the objects acceleration
m is the objects mass

Example
A man is riding in an elevator. The combined mass of the man and the elevator is 700kg. Calculate the magnitude and direction of the elevators acceleration if the tension (F_T) in the supporting cable is 7500N

-sketch a 'free-body diagram'
-analyse the forces to determine 'net' force (watch out for up and down)
-apply Newtons Second Law to determine acceleration

Nov 2-8:31 PM

A man is riding in an elevator. The combined mass of the man and the elevator is 7.00×10^2 kg. Calculate the magnitude and direction of the elevator's acceleration if the tension ($\vec{F}_T$) in the supporting cable is 7.50×10^3 N ($\vec{F}_T$ is the applied force).

Nov 9-8:55 PM

Kinematics and Dynamics

Picture tubes emit light when the surfaces are bombarded with high energy electrons. These electrons have a mass of 9.1×10^{-31} kg and are accelerated from rest by the electron "gun" at the back of the picture tube. Find the velocity of the electron when it exits the gun after experiencing an electric force of 5.8×10^{-15} N over a distance of 3.5mm

Hint: find v_f

Nov 2-8:35 PM