What is the gravitational force?	An attractive force that exists between any two objects; it acts along a line between the two objects. The formula for the gravitational force exerted by object 1 on object 2 is: $\vec{F}_{2,1}=-G\frac{(m_1 m_2)}{\|\vec{r}\|^2}\hat{r}$. $\vec{r}$ represents the distance between the two objects; when determining the force exerted by object 1 on object 2 it is evaluated as $\vec{r}=\vec{r}_2-\vec{r}_1$. The direction of the gravitational force is $-\hat{r}$ because this is an attractive force; the force is in the opposite direction of $\vec{r}$. The gravitational force is proportional to the inverse square of $\vec{r}$; if $\vec{r}$ is doubled, the entire force is reduced by 4. *G* is the gravitational constant; it is applicable to any objects in any location. It is equal to $6.7\cdot10^{-11}\frac{N\cdot m^2}{kg^2}$. It is often easier to evaluate gravitational force like this: $\vec{F}_{grav}=\|\vec{F}_{grav}\|\hat{F}_{grav}$ $where\|\vec{F}_{grav}\|=G\frac{(m_1 m_2)}{\|\vec{r}\|^2}, \hat{F}_{grav}=-\hat{r}$
What is Newton's third law?	The law of reciprocity. This means that $\vec{F}_{2,1}=-\vec{F}_{1,2}$ Because of this, we can know that all internal forces within a system cancel each other out (because they are all equal and opposite to one another).
What is conservation of momentum?	Momentum cannot be destroyed; it is "conserved". The momentum gained by a system is lost by the surroundings, or vice versa: $\Delta\vec{p}_{sys}+\Delta\vec{p}_{surr}=0$. When evaluating an isolated system, the momentum inside the system does not change: $\Delta\vec{p}_{sys}=0=\Delta\vec{p}_1+\Delta\vec{p}_2+\Delta\vec{p}_3+\Delta\vec{p}_n...$ This helps apply the momentum principle to a system with more than one component. If the momentum of the system is the sum of the momentums of the components of the system ($\vec{P}_{sys}=\vec{P}_1+\vec{P}_2+\vec{P}_3+...$) and the net force of the system is the sum of all external forces acting on components of the system (internal forces always add up to zero) ($\vec{F}_{Net}=\vec{F}_1+\vec{F}_2+\vec{F}_3+...$), then $\Delta\vec{P}_{sys}=\vec{F}_{net}\Delta t$. This idea tells us that $\vec{p}_{(total,f)}=\vec{p}_{(total,i)}$ $\vec{p}_{1f}+\vec{p}_{2f}=\vec{p}_{1i}+\vec{p}_{2i}$ within a system.
What is the center of mass?	A point representing the average position of a system's mass. $\vec{r}\,CM=\frac{(m_1\vec{r}_1+m_2\vec{r}_2+m_3\vec{r}_3+...)}{M_{total}}$ The velocity of the center of mass is $\vec{v}\,CM=\frac{(m_1\vec{v}_1+m_2\vec{v}_2+m_3\vec{v}_3+...)}{M_{total}}$. The momentum of a system is equal to the product of the total mass and the velocity of the center of mass (really, just the sum of the momentums of the components). This can be applied to the momentum principle: $\Delta\vec{P}_{sys}=\vec{F}_{net}\Delta t=M_{total}\Delta\vec{v}_{CM}$; also, $M_{total}\vec{a}_{cm}=\vec{F}_{net}$.