Position vector	$\vec{r}(t)=x(t)\hat{i}+y(t)\hat{j}+z(t)\hat{k}$
Displacement vector	$\Delta\vec{r}=\vec{r}(t_2)-\vec{r}(t_1)$
Velocity vector	$\vec{v}(t)=\lim_{\Delta t\to 0}\frac{\vec{r}(t+\Delta t)-\vec{r}(t)}{\Delta t}=\frac{d\vec{r}}{dt}$
Velocity in terms of components	$\vec{v}(t)=v_x(t)\hat{i}+v_y(t)\hat{j}+v_z(t)\hat{k}$
Velocity components	$v_x(t)=\frac{dx(t)}{dt}\quad v_y(t)=\frac{dy(t)}{dt}\quad v_z(t)=\frac{dz(t)}{dt}$
Average velocity	$\vec{v}_{avg}=\frac{\vec{r}(t_2)-\vec{r}(t_1)}{t_2-t_1}$
Instantaneous acceleration	$\vec{a}(t)=\lim_{t\to 0}\frac{\vec{v}(t+\Delta t)-\vec{v}(t)}{\Delta t}=\frac{d\vec{v}(t)}{dt}$
Instantaneous acceleration, component form	$\vec{a}(t)=\frac{dv_x(t)}{dt}\hat{i}+\frac{dv_y(t)}{dt}\hat{j}+\frac{dv_z(t)}{dt}\hat{k}$
Instantaneous acceleration as second derivatives of position	$\vec{a}(t)=\frac{d^2x(t)}{dt^2}\hat{i}+\frac{d^2y(t)}{dt^2}\hat{j}+\frac{d^2z(t)}{dt^2}\hat{k}$
Time of flight	$T_{tof}=\frac{2(v_0\sin\theta)}{g}$
Trajectory	$y=(\tan\theta_0)x-\left[\frac{g}{2(v_0\cos\theta_0)^2}\right]x^2$
Range	$R=\frac{v_0^2\sin 2\theta_0}{g}$
Centripetal acceleration	$a_C=\frac{v^2}{r}$
Position vector, uniform circular motion	$\vec{r}(t)=A\cos\omega t\hat{i}+A\sin\omega t\hat{j}$
Velocity vector, uniform circular motion	$\vec{v}(t)=\frac{d\vec{r}(t)}{dt}=-A\omega\sin\omega t\hat{i}+A\omega\cos\omega t\hat{j}$
Acceleration vector, uniform circular motion	$\vec{a}(t)=\frac{d\vec{v}(t)}{dt}=-A\omega^2\cos\omega t\hat{i}-A\omega^2\sin\omega t\hat{j}$
Tangential acceleration	$a_T=\frac{d\lvert\vec{v}\rvert}{dt}$
Total acceleration	$\vec{a}=\vec{a}_C+\vec{a}_T$
Position vector in frame *S* is the position vector in frame S' plus the vector from the origin of *S* to the origin of S'	$\vec{r}_{PS}=\vec{r}_{PS'}+\vec{r}_{S'S}$
Relative velocity equation connecting two reference frames	$\vec{v}_{PS}=\vec{v}_{PS'}+\vec{v}_{S'S}$
Relative velocity equation connecting more than two reference frames	$\vec{v}_{PC}=\vec{v}_{PA}+\vec{v}_{AB}+\vec{v}_{BC}$
Relative acceleration equation	$\vec{a}_{PS}=\vec{a}_{PS'}+\vec{a}_{S'S}$