

<b>Position</b>	$\vec{r} = r_x \vec{i} + r_y \vec{j} + r_z \vec{k}$
<b>Instantaneous velocity</b>	$\vec{v} = \frac{d\vec{r}}{dt}, \quad \vec{v} = v_x \vec{i} + v_y \vec{j} + v_z \vec{k}$
<b>Instantaneous acceleration</b>	$\vec{a} = \frac{d\vec{v}}{dt}$ $\vec{a} = a_x \vec{i} + a_y \vec{j} + a_z \vec{k} \quad \text{Extrinsic components}$ $\vec{a} = a_t \vec{\tau} + a_n \vec{\eta} \quad \text{Intrinsic components}$
<b>Average velocity</b>	$\vec{v}_a = \frac{\Delta \vec{r}}{\Delta t} = \frac{\vec{r}_F - \vec{r}_I}{t_F - t_I}$
<b>Average acceleration</b>	$\vec{a}_a = \frac{\Delta \vec{v}}{\Delta t} = \frac{\vec{v}_F - \vec{v}_I}{t_F - t_I}$
<b>Tangential and normal acceleration components</b>	$a_t = \frac{d \vec{v} }{dt}, \quad a_n = \frac{v^2}{R}$
<b>Total acceleration</b>	$a^2 = a_x^2 + a_y^2 + a_z^2 \quad \text{Extrinsic components}$ $a^2 = a_t^2 + a_n^2 \quad \text{Intrinsic components}$
<b>Unit conversion</b>	<b>km / h</b> $\times 1000 / 3600$ $\rightarrow$ <b>m/s</b> <b>rpm</b> $\times 2\pi / 60$ $\rightarrow$ <b>rad/s</b>

Symbol	Magnitude	SI unit
$r$	Position	m
$v$	Velocity, Speed	m/s
$a$	Acceleration (total)	m/s <sup>2</sup>
$t$	Time	s
$R$	Curvature radius	m
$\vec{i}, \vec{j}, \vec{k}$	Unitary vectors for x, y and z components	
<b><i>Intrinsic components of acceleration:</i></b>		
$a_t$	Tangential acceleration	m/s <sup>2</sup>
$a_n$	Normal acceleration	m/s <sup>2</sup>
$\vec{\tau}$	Unitary vector <i>tau</i> for tangential component	
$\vec{\eta}$	Unitary vector <i>eta</i> for normal component	
<b><i>Extrinsic components of acceleration:</i></b>		
$a_x$	x component	m/s <sup>2</sup>
$a_y$	y component	m/s <sup>2</sup>
$a_z$	z component	m/s <sup>2</sup>