

Definitions of Motion-Related Vectors

POSITION $\underline{\mathbf{r}} \equiv$ the vector location with respect to a selected origin

DISPLACEMENT $\underline{\Delta\mathbf{r}} \equiv$ the change in position $\equiv \underline{\mathbf{r}}_f - \underline{\mathbf{r}}_i$

VELOCITY

Average $\underline{\bar{\mathbf{v}}} \equiv \frac{\text{displacement}}{\text{elapsed time}} \equiv \frac{\underline{\Delta\mathbf{r}}}{\Delta t}$

Instantaneous $\underline{\mathbf{v}}(t) \equiv \lim_{\Delta t \rightarrow 0} \frac{\underline{\Delta\mathbf{r}}}{\Delta t}$

CHANGE IN VELOCITY $\underline{\Delta\mathbf{v}} \equiv \underline{\mathbf{v}}_f - \underline{\mathbf{v}}_i$

ACCELERATION

Average $\underline{\bar{\mathbf{a}}} \equiv \frac{\text{change in velocity}}{\text{elapsed time}} \equiv \frac{\underline{\Delta\mathbf{v}}}{\Delta t}$

Instantaneous $\underline{\mathbf{a}}(t) \equiv \lim_{\Delta t \rightarrow 0} \frac{\underline{\Delta\mathbf{v}}}{\Delta t}$