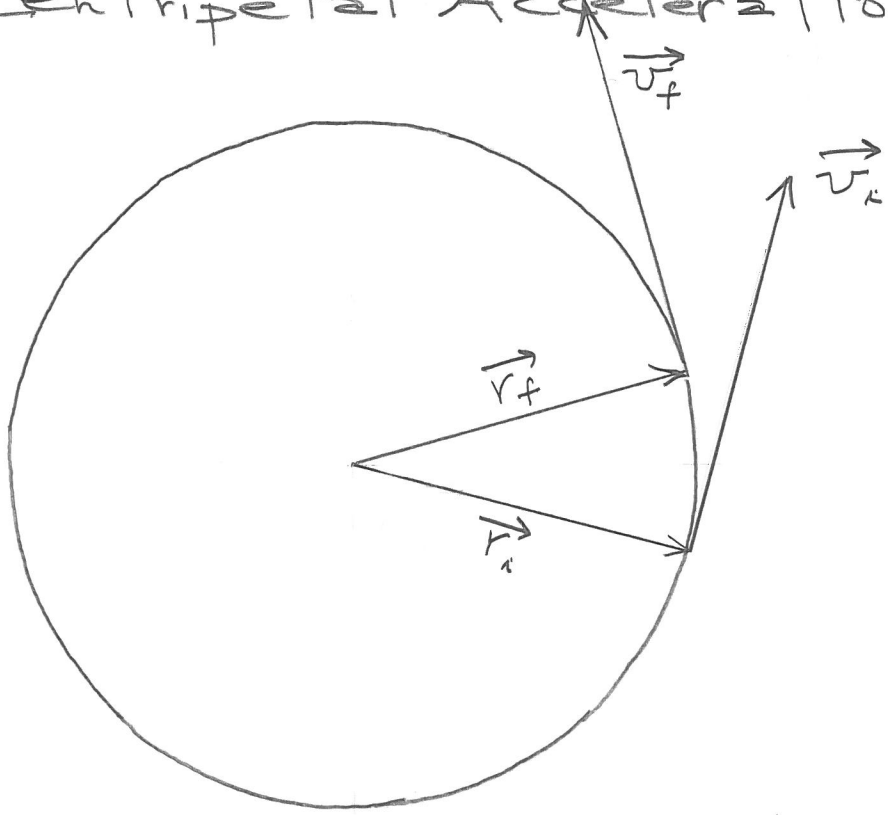
Centripetal Acceleration

$$\vec{v} \equiv \frac{d\vec{r}}{dt}$$

$$\vec{a} \equiv \frac{d\vec{v}}{dt}$$



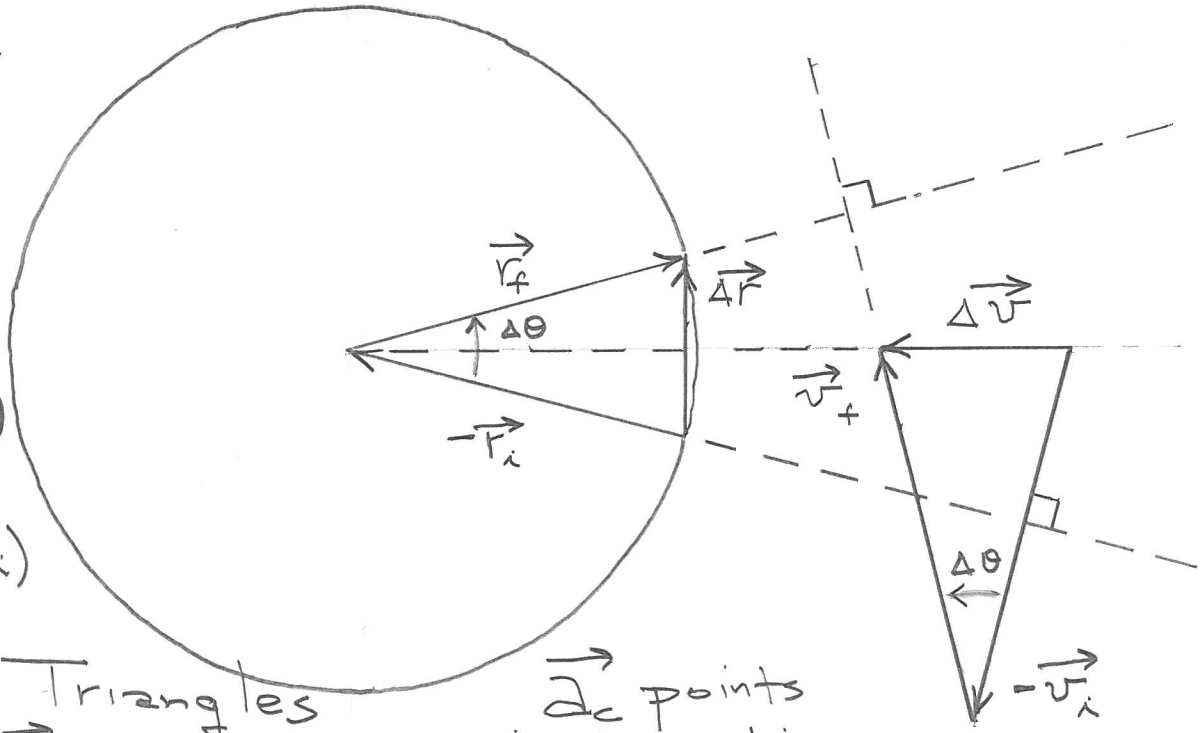
$\Delta\vec{r} \to d\vec{r}$ $\Delta\vec{v} \to d\vec{v}$ $\Delta\theta \to d\theta$ $\Delta t \to dt$

$$\frac{|\Delta\vec{r}|}{\Delta t} \to v$$

$$\frac{|\Delta\vec{v}|}{\Delta t} \to a$$

$$\Delta\vec{r} = \vec{r}_f - \vec{r}_i = \vec{r}_f + (-\vec{r}_i)$$

$$\Delta\vec{v} = \vec{v}_f - \vec{v}_i = \vec{v}_f + (-\vec{v}_i)$$



Similar Triangles

$$\frac{|\Delta\vec{r}|}{r} = \frac{|\Delta\vec{v}|}{v}$$

$\vec{a}_c$ points in direction of $\Delta\vec{v} \to d\vec{v}$ to center

$$\Rightarrow a = \frac{|\Delta\vec{v}|}{\Delta t} = \frac{|\Delta\vec{r}|}{\Delta t}\frac{v}{r} = \frac{v^2}{r} = a_c$$