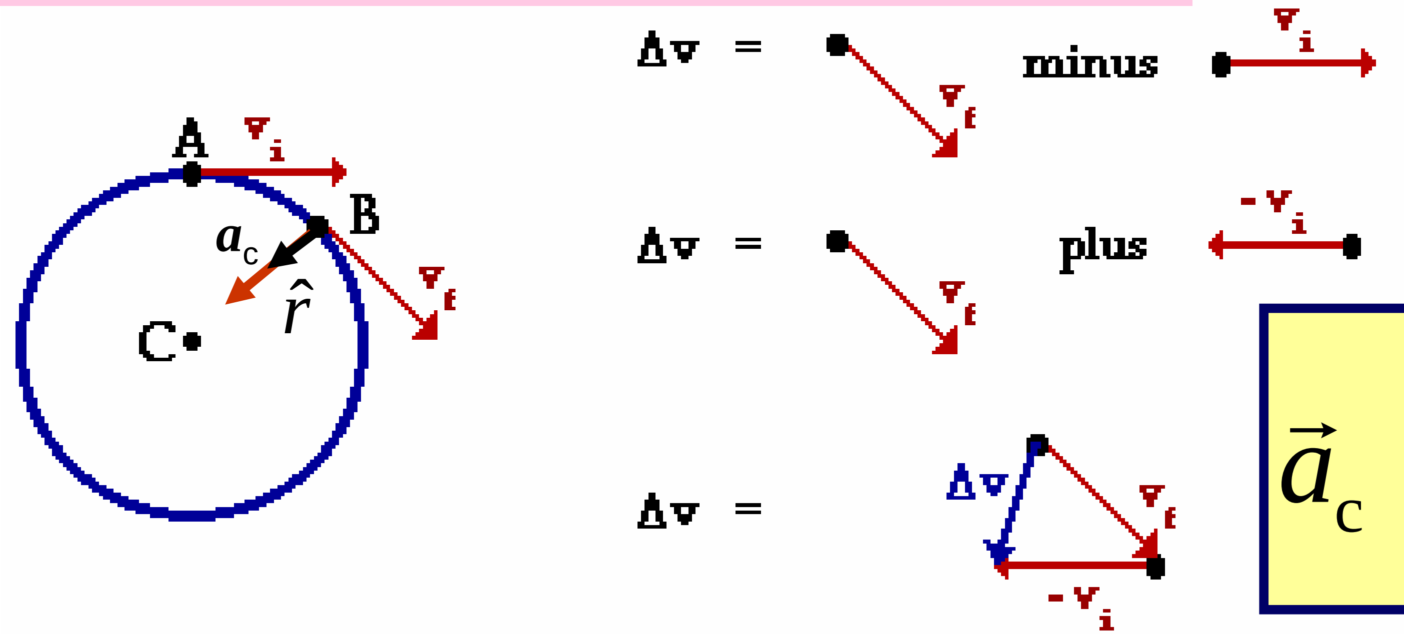
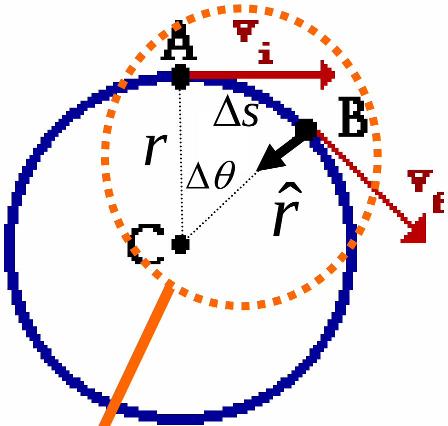
Centripetal Acceleration

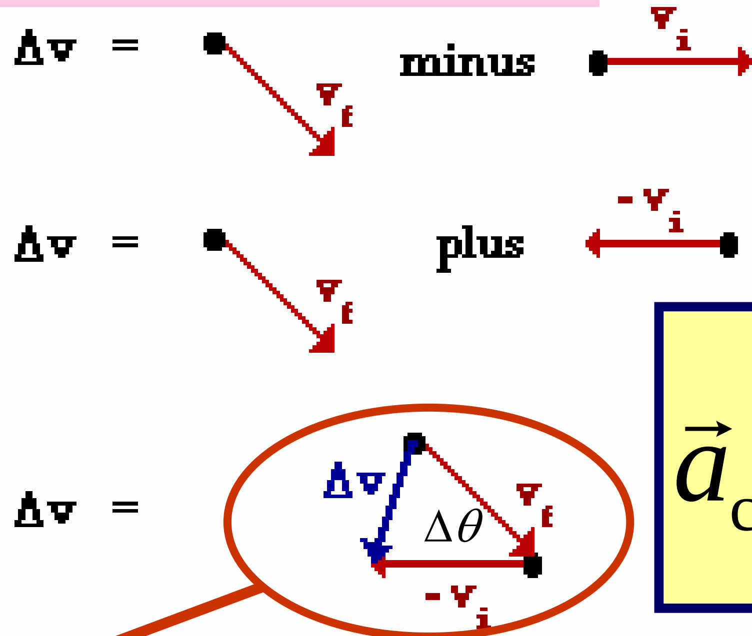


$$\vec{a}_c = \frac{v^2}{r}\hat{r}$$

- **The acceleration is directed *toward the center* of the circle** ➡ ***Centripetal*** acceleration
- **Centripetal means "*center seeking*."**
- ***NOT* a constant acceleration, since its *direction* $\hat{r}$ is continuously *changing*.**

Centripetal Acceleration





$$\vec{a}_c = \frac{v^2}{r}\hat{r}$$

$$\Delta v \approx \left|\vec{v}_f\right|\Delta\theta = v\frac{\Delta\theta}{\Delta t}\Delta t$$

$$\Delta s = r\Delta\theta = r\frac{\Delta\theta}{\Delta t}\Delta t \Rightarrow v = \frac{\Delta s}{\Delta t} = r\frac{\Delta\theta}{\Delta t} \Rightarrow \frac{\Delta\theta}{\Delta t} = \frac{v}{r}$$

$$\Delta v \approx v\frac{\Delta\theta}{\Delta t}\Delta t = v\left[\frac{v}{r}\right]\Delta t \Rightarrow \left|\vec{a}_c\right| = \frac{\Delta v}{\Delta t} = \frac{v^2}{r}$$