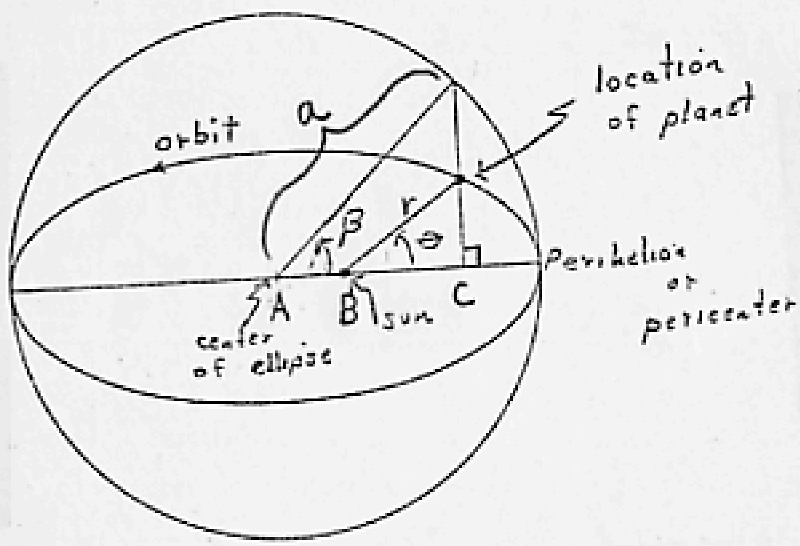
Dragt 57 cont

This obviously gives $\left(\frac{\xi}{a}\right)^2 + \left(\frac{y}{b}\right)^2 = 1.$ Using these definitions, we get $y = b\sin\beta \Rightarrow \boxed{r\sin\theta = b\sin\beta}$ which agrees with hand out notes.

We also get

$$\xi = x + \frac{\epsilon r_0}{(1-\epsilon^2)} = a\cos\beta, \quad \text{or} \quad \boxed{r\cos\theta + \frac{\epsilon r_0}{(1-\epsilon^2)} = a\cos\beta}.$$

We use this equation to show that β is the angle shown in the sketch in the hand out notes.



From the picture we see

$\overrightarrow{AC} = a\cos\beta$

$\overrightarrow{BC} = r\cos\theta$

$\overrightarrow{AB} = a - \frac{r_0}{1+\epsilon} = \frac{r_0}{1-\epsilon^2} - \frac{r_0(1-\epsilon)}{1-\epsilon^2}$

$= \frac{\epsilon r_0}{1-\epsilon^2}$. From the picture,

$\overrightarrow{AB} + \overrightarrow{BC} = \overrightarrow{AC}$, or

$\boxed{\frac{\epsilon r_0}{1-\epsilon^2} + r\cos\theta = a\cos\beta}$ which is what we w( ). QED.