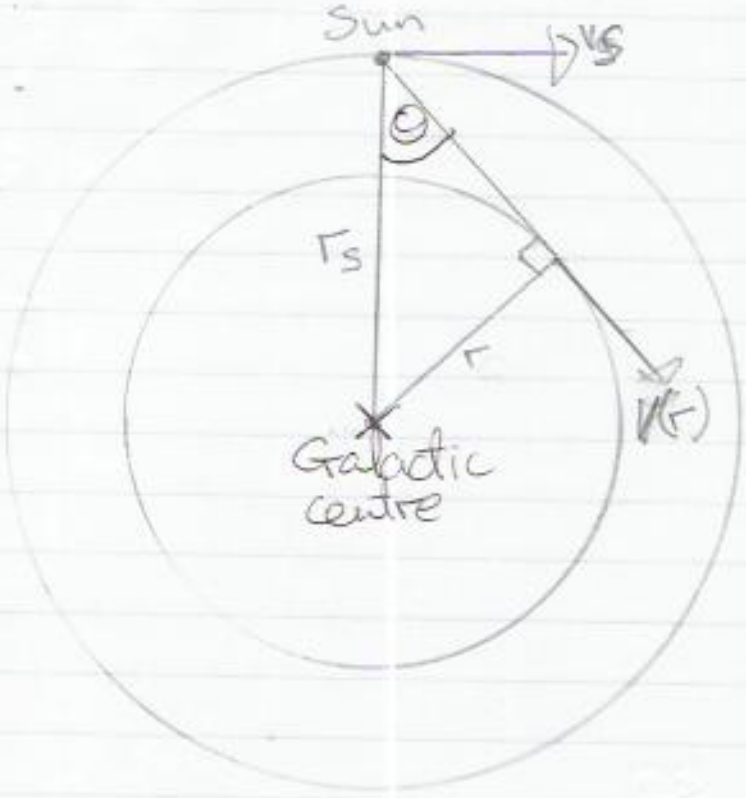
$r < r_s$

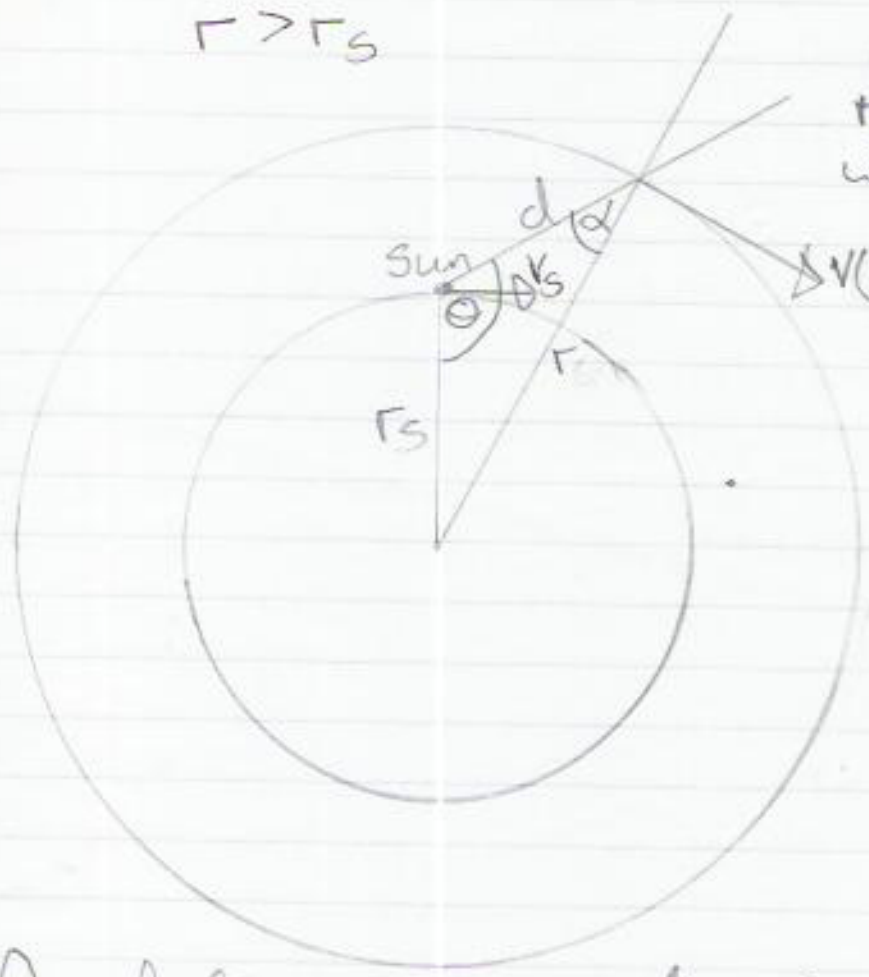


$r = r_s \sin\theta$

and

$v(r) = \frac{c\Delta\lambda}{\lambda} + v_0 \sin\theta$

$r > r_s$



$r^2 = r_s^2 + d^2 - 2r_s d\cos\theta$

where d is found by some other method. Then

$\sin\alpha = \frac{r_s \sin\theta}{r}$

and

$v(r)\sin\alpha = v_s \sin\theta + \frac{c\Delta\lambda}{\lambda}$

A rotation curve can then be drawn of orbital velocity against radial distance.

NB TMAs should be in ink