

and start taking derivatives; eventually you'll get back to

$$\mathbf{r}'' \times \hat{k} = \frac{c}{2h} \hat{l}'.$$

However, the acceleration is centripetal, so

$$\mathbf{r}'' \times \hat{k} = f \frac{r^2}{2h} \hat{l}' \Rightarrow \frac{c}{2h} = f \frac{r^2}{2h} \Rightarrow f = \frac{c}{r^2}$$