

Algorithm of finding the limiting magnitude that the lens can reach to:-

1. Define the depth of transit in magnitude = $\left(\frac{r_{Jup}}{r_{Sun}}\right)^2 = .01$
 2. Define the orbital radius (a) in AU = $(r_s \times p^2)^{\frac{1}{3}}$, where p in years
 3. Define the transit duration = $\left(\frac{p \times r_s}{\pi \times a}\right) \times \left(\text{seconds/day} \times \left(\frac{r_{Sun}}{AU}\right)\right)$, where p in days.
 4. Define number of transits = $\frac{\text{observational period in days}}{\text{orbital period in days}}$
 5. Calculating the sky counts :-
 - Vega star count per sec. = sky counts per sec \times transit duration time
 - Sky count per sec. = Vega count per sec. $\times 10^{\left(\frac{-\text{sky mag}}{2.5}\right)}$
 - Total sky counts over the transit duration = sky counts per sec \times transit duration time
 6. you start iterate using do while loop to find the star magnitude that would give S/N = 10
 7. initialize these values :- star mag = sky mag , error = 999, eps = .00001 , Iter = 0
 8. while (absolute error > eps)do the following :-
 - Star counts per sec. = star counts per sec \times transit duration time
 - Star counts = Vega counts per sec $\times 10^{\left(\frac{-\text{star mag}}{2.5}\right)}$
 - Total counts = star counts + sky counts
 - $S/N = \frac{\text{star counts}}{\sqrt{\text{Total counts}}}$
 - S/N for 1 transit = (S/N) \times .01
 - S/N over all the transit
- = S/N for 1 transit $\times \sqrt{\text{total number of transit over the observational period}}$
- Error = S/N over all the transit - 10
 - $\Delta S/N \text{ to } \Delta \text{ mag} = S/N \text{ over all transit} \times \frac{\text{sky counts}}{\text{total counts}}$
 - $\text{add} = \frac{\text{error}}{\Delta S/N \text{ to } \Delta \text{ mag}}$
 - star mag = star mag + add
 - come back again to iterate until you meet the above condition.