

Below we write the mathematical formulas we used to calculate various parameters of an exoplanet candidate with the name TIC-399665349 and it's mother star:

To calculate the radius of the planet Rp we used the formula:

$$Drop = r^2 / R^2$$

$(R_p/R_s)^2 = \Delta L/L$ = drop of the luminosity of the mother star. The drop was calculated from the light curve: drop=0.00045 and $R_s=1.37171 R_{sun}$, we have: $R_p=0.02909 R_{sun}$

$$\frac{Luminosity_{Star}}{Luminosity_{Sun}} = \left(\frac{Mass_{Star}}{Mass_{Sun}} \right)^{3.5}$$

To calculate the mass of the mother star we used the equation from the HR diagram: $(L/L_{sun}) = (M/M_{sun})^{3.5}$, so for $L_{sun}=1$ and $L=2.96$, we calculated the mass of the mother star to be: $M=1.36349 M_{sun}$

to calculate the average orbital radius we used the following formula in python:

$$a = \sqrt[3]{\frac{P^2}{\frac{4\pi^2}{GM}}}$$

```
import math
P = 12.987 * 24 * 60 * 60
G = 6.674 * 10 ** -11
M = 1.36349 * 1.98847 * 10**30
pi = math.pi
a = ((P**2)/((4*pi**2)/(G*M)))**(1/3)
print(a , 'm')
print(a/1000 , 'km')
print(a/1000 * 0.000000006684587, 'AU')
```

R_s and L were obtained from here: <https://www.universeguide.com/star/22449/tabit#related>

Star info obtained from here: <https://www.universeguide.com/star/22449/tabit#related>

Reference guide obtained from here:

<https://github.com/Simone-Dr/TIC-239332587-Exoplanet/blob/main/TIC-239332587-Exoplanet.ipynb>