Astro Calculator 3.0.0

Complete Usage Guide

First off: please only use this if you have full understanding of the concepts and usage of Astrophysical formulas by hand. For more information, please refer to Volume 4: Astrophysics.

As I mentioned in the preface, this code is very inefficient and contains antiquated and unused architecture from past versions. If you want to make an improved version, I highly encourage it.

1) This program does calculations for at most two astronomical bodies and their interactions. Every value that you input or calculate corresponds to either body 1, body 2, or both objects.

2) You must have Python 2.7 downloaded on your computer. I also suggest getting numpy, a library that includes many tools for matrix calculations (you need to download it separately).

3) This program takes in a txt file with each line in the file corresponding with a value. The format is presented below:

3 1 45.53 au

First number: object 1, object 2, both (Enter 1, 2, 3)

Second Number: valType Codes: see below

Value: Enter value

Units: Enter units, see below

For example, the above line would translate to “distance between both objects is 45.54 au”

4) Below are the valType Codes for each type of value:

Distance to Star 0

Stellar Radius 1

Maximum Wavelength 2

Semi-Major Axis 3

Parallax Angle 0

Angular Size of Object 1

Mass 0

Escape Velocity 0

Orbital Velocity 2

Luminosity 0

Brightness 0

Apparent Magnitude 1

Absolute Magnitude 2

Surface Temperature 3

Gravitational Acceleration 5

Kinetic Energy 6

Angular Momentum 8

Flux 9

Total Mass of System 0

Distance Between Objects 1

Period of Orbit 2

Force of Gravity between Objects 3

Potential Energy of System 4

5)

Acceptable Length Units: m, au, ly, pc, a (angstroms), nm, rs (solar radii)

Acceptable Angle Units: deg, as, rad

Acceptable Time Units: s, min, hr, day, yr

Acceptable Mass Units: kg, sm (solar masses)

Acceptable Power Units: w, sl

Acceptable Flux Units: w/m2

Acceptable Magnitude Units: magnitudes

Acceptable Temperature Units: K

Acceptable Force Units: N

Acceptable Acceleration Units: m/s2

Acceptable Energy Units: J

6)

Assumptions in all calculations of the program:

Circular Orbits (No vis-viva)

When you need to use Kepler’s 3rd Law, use total Mass, not mass 2 or mass1

Main Sequence Star (For Mass Luminosity Relation)

7) Once you input your information into the txt file. Save the txt file and run the python program by pressing F5