Units

$\text{arcsec} := \frac{\text{deg}}{60 \cdot 60}$	Definition of an arcsecond
$'' := \text{arcsec}$	Common abbreviation for an arcsecond
$M_{\oplus} := 5.9736 \cdot 10^{24} \cdot \text{kg}$	Mass of the Earth
$\text{AU} := 1.49597870700 \cdot 10^{8} \cdot \text{km}$	Definition of Earth-Sun Distance
$L_{\odot} := 3.846 \cdot 10^{26} \text{W}$	Luminosity of the Sun
$R_{♃} := 43441 \text{mi}$	Radius of Jupiter
$M_{♃} := 317.8 \cdot M_{\oplus}$	Mass of Jupiter
$\text{ly} := c \cdot \text{yr} = 9460528404879 \cdot \text{km}$	Definition of light-year
$\text{pc} := \frac{\text{AU}}{\text{arcsec}} = 3 \cdot \text{ly}$	Definition of parsec. Common unit of distance for astronomers.
$M_{\odot} := 1.989 \cdot 10^{30} \text{kg}$	Mass of the Sun

Constants

$G_U := 6.6742 \cdot 10^{-11} \cdot \frac{m^3}{\text{kg} \cdot \text{sec}^2}$	Universal gravitational constant
$\sigma := 5.670400 \cdot 10^{-8} \cdot \frac{\text{watt}}{m^2 \cdot K^4}$	Stefan-Boltzmann Constant

Link

Utility Functions

Period of an Exoplanet — Uses Kepler's Third Law

$$m_P \cdot \omega^2 \cdot d = G_U \cdot \frac{m_P \cdot M_S}{d^2} \;\Bigg|\; \begin{array}{l} \textbf{substitute}, \omega = \frac{2\cdot\pi}{T_P} \\ \textbf{assume}, \textbf{ALL} > 0 \\ \textbf{solve}, T_P \end{array} \rightarrow \frac{2\cdot\pi\cdot d^{\frac{3}{2}}}{\sqrt{G_U}\cdot\sqrt{M_S}}$$

$$\mathbf{T_P}(M_S, d) := \frac{2\cdot\pi\cdot d^{\frac{3}{2}}}{\sqrt{\mathbf{G_U}}\cdot\sqrt{M_S}}$$

Radius of a Exoplanet — Uses the Effective Temperature of the Exoplanet

$$L_{Star} = 4\cdot\pi\cdot R_P^2\cdot\sigma\cdot T_{eff}^4 \;\Bigg|\; \begin{array}{l} \textbf{assume}, \textbf{ALL} > 0 \\ \textbf{solve}, R_P \end{array} \rightarrow \frac{\sqrt{L_{Star}}}{2\cdot\sqrt{\pi}\cdot T_{eff}^2\cdot\sqrt{\sigma}}$$

$$R_P(L_{Star}, T_{eff}) := \frac{\sqrt{L_{Star}}}{2\cdot\sqrt{\pi}\cdot T_{eff}^2\cdot\sqrt{\sigma}}$$

Mass of an Exoplanet — Uses the Surface Gravity of the Exoplanet

$$g_P = \frac{G_U\cdot M_P}{R_P^2} \;\Bigg|\; \begin{array}{l} \textbf{assume}, \textbf{ALL} > 0 \\ \textbf{solve}, M_P \end{array} \rightarrow \frac{R_P^2\cdot g_P}{G_U}$$

$$\mathbf{M_P}(R_P, g_P) := \frac{R_P^2\cdot g_P}{\mathbf{G_U}}$$

Analysis

Measurements

$M_{CVSO30} := 0.39 \cdot M_{\odot}$ Mass of CV30 relative to our Sun.

$d_{CVSO} := 330\,\text{pc}$ Distance to CV30 from the Sun.

$L_{CVSO30c} := 10^{-3.78} \cdot L_{\odot}$ Luminosity of CV30c relative to the Sun.

$\theta_{CVSO30c} := 1.85 \cdot ''$ Maximum angular separation between the CV30c and CV30.

$T_{CVSOc} := 1600\,\text{K}$

$g_{CVSO30c} := 10^{3.6} \cdot \frac{\text{cm}}{\text{s}^2}$ Estimate of CV30c's surface gravity from spectral measurements.

Computation of Planet Characteristics

$T_{CVSOc} := T_P\left(M_{CVSO30}, d_{CVSOc}\right) = \blacksquare \cdot \text{yr}$ CVSOc Orbital Period. The published value is 27,100 years. ✓

$d_{CVSOc} := \theta_{CVSO30c} \cdot d_{CVSO} = 610 \cdot \text{AU}$ Compute distance of CVSO30c from CVSO30. The published value is 660 AU. ✓

$R_{CVSO30c} := R_P\left(L_{CVSO30c}, T_{CVSOc}\right) = 1.67 \cdot R_{♃}$ Radius of CVSOc. Published value is 1.63 times Jupiter's radius.. ✓

$M_{CVSOc} := M_P\left(R_{CVSO30c}, g_{CVSO30c}\right) = 4.3 \cdot M_{♃}$ Mass of CVSOc. Published value is 4.3 times Jupiter's mass. ✓