Soluciones Tarea 2

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$$'' = \text{arcsec}$$

$$1mas = 10^{-3}\,\text{arcsec}$$

Pregunta 1

Cumulos abiertos	Cumulos globulares
10^2 – 10^4 estrellas	10^4 – 10^6 estrellas
joven	viejo
distribuidos	denso
Forma irregular, a veces con gas	Esferico, sin gas

Pregunta 2

Temperatura: espectro del cuerpo negro, ley de Wien

Luminosidad: magnitud aparente y distancia

Masa: 3.ley de Kepler en sistemas binarios

Pregunta 3

Betelgeuse: m_V = 0.50 mag, p = 4.51 mas

Bellatrix: m_V = 1.64 mag, p = 12.92 mas

Rigel: m_V = 0.13 mag, p = 3.78 mas

$$d[\mathrm{pc}] = \frac{1}{p[''] }$$

$$M_V = m + 5 + 5\log_{10} p$$

Solucion:

Betelgeuse: $d = \frac{1}{4.51 \cdot 10^{-3}}\, pc = \underline{\underline{222\, pc}}$

$M_V = 0.50 + 5 + 5\log_{10} 4.51 \cdot 10^{-3} = \underline{\underline{-6.23 mag}}$

Bellatrix: $d = \frac{1}{12.92 \cdot 10^{-3}}\, pc = \underline{\underline{77.4\, pc}}$

$M_V = 1.64 + 5 + 5\log_{10} 12.92 \cdot 10^{-3} = \underline{\underline{-2.80 mag}}$

Rigel: $d = \frac{1}{3.78 \cdot 10^{-3}}\, pc = \underline{\underline{265\, pc}}$

$M_V = 0.13 + 5 + 5\log_{10} 3.78 \cdot 10^{-3} = \underline{\underline{-6.98 mag}}$

Pregunta 4

Solucion:

Enana blanca = white dwarf (WD) 1P

Pregunta 5

Betelgeuse: m_V = 0.50 mag, p = 4.51 mas

Bellatrix: m_V = 1.64 mag, p = 12.92 mas

Rigel: m_V = 0.13 mag, p = 3.78 mas

$$d[\mathrm{pc}] = \frac{1}{p[''] }$$

$$M_V = m + 5 + 5\log_{10} p$$

Solucion:

Betelgeuse: $d = \frac{1}{4.51 \cdot 10^{-3}}\, pc = \underline{\underline{222\, pc}}$

$M_V = 0.50 + 5 + 5\log_{10} 4.51 \cdot 10^{-3} = \underline{\underline{-6.23 mag}}$

Bellatrix: $d = \frac{1}{12.92 \cdot 10^{-3}}\, pc = \underline{\underline{77.4\, pc}}$

$M_V = 1.64 + 5 + 5\log_{10} 12.92 \cdot 10^{-3} = \underline{\underline{-2.80 mag}}$

Rigel: $d = \frac{1}{3.78 \cdot 10^{-3}}\, pc = \underline{\underline{265\, pc}}$

$M_V = 0.13 + 5 + 5\log_{10} 3.78 \cdot 10^{-3} = \underline{\underline{-6.98 mag}}$

Pregunta 6

- Obtener distancias

$$M_V = -2.78 \log_{10}(P) - 1.35$$

Pregunta 7

- $L_* = 5 \times 10^{-5}\ L_{sun}$ $R_* = 0.1542\ R_{sun}$ $T_{eff,sun} = 5778\ K$

$$L_*[L_\odot] = \left(\frac{R_*}{R_\odot}\right)^2 \left(\frac{T_{\mathrm{eff},*}}{T_{\mathrm{eff},\odot}}\right)^4$$

$$T_{eff,*} = \sqrt[4]{L_*\left[L_\odot\right]}\sqrt{\frac{1}{R_*\left[R_\odot\right]}} \cdot T_{eff,\odot} = \sqrt[4]{5 \cdot 10^{-5}}\sqrt{\frac{1}{0.1542}}5778K = 1237K$$

Pregunta 8

Solucion:

Diagrama Hertzsprung-Russel 1P