Formulae and Constants:

speed of light = \( c = 3 \times 10^8 \) meters / sec = 300,000 km/s

\( 1 \) lt-yr = \( 9.5 \times 10^{15} \) m \hspace{1cm} 3.26 lt-yr = 1 pc

\( \sigma = 5.7 \times 10^{-8} \) watts / (m\(^2\)K\(^4\))

angular size in degrees = (physical size / distance) \times 57.3\(^\circ\)

OR angular size (in seconds of arc) = \( 2.1 \times 10^5 \times \) (physical size / distance)

energy of photon = \( \frac{hc}{\lambda} \) = 1240 eV\(\cdot\)nm / \(\lambda\)

“blackbody” brightness per unit area = \( \sigma T^4 \)

Luminosity = \( L = \sigma T^4 \times 4\pi R^2 \)

\( \lambda_{\text{max}} \times T = 3 \times 10^6 \) nm \hspace{1cm} \text{(brightness ratio)} = \text{(distance ratio)}^2

\( L_1 / L_2 = \text{brightness ratio} = 100^{[(M_2 - M_1) / 5]} \)

apparent brightness = luminosity / (\(4\pi \times \text{distance}^2\))

Doppler effect: \( \Delta \lambda / \lambda = v / c \)

d (in pc) = \( 1 / p \) (in arc sec)

Lifetime on Main Sequence = \( 10^{10} \) years [\( \text{M}/\text{M}_{\odot} \)]\(^{-2.5}\)

For Black Hole:

\( R_{\text{Schwarzschild}} = 3 \) km [\( \text{M}/\text{M}_{\odot} \)]