1 $V_{esc} = \sqrt{\frac{2GM}{r}} = \sqrt{\frac{2(6.7x10^{-11}m^3kg^{-1}s^{-2})(6x10^{24}kg)}{7.15x10^6\ m}}$

=1.1 x10⁴ ms⁻¹

2. The laws of physics are the same on a planet with gravitational strenghth, g, as in a spaceship with the same acceleration.

3. $m_s = \sigma_s V_s = \sigma_s \frac{4}{3}\pi r_s^3 = (2.7\ x\ 10^3\ kgm^{-3})(\frac{4}{3}\pi)(7.0\ x10^8 m)^3$

Where 7.0 x 10^8m is the radius of the Sun (Answers.com)

$$m_s = 3.9\ x\ 10^{30} kg$$

$$r_{sch} = \frac{2GM}{c^2} = \frac{2(6.7x10^{-11}m^3kg^{-1}s^{-2})(3.9x10^{30}kg)}{(3.0x10^8 m)^2}$$

=5.8 x10^3 m

4. $Apparent\ (b)rightness\ of\ star\ on\ Earth = \frac{(L)uminosity}{4\pi d^2}$

Where d is the distance to the star from the earth and $L = 4\pi r^2 \sigma T^4$ where r is the radius of the star and

σ = Stefan - Boltzman constant – 5.7×10^{-8} W·m^{-2}·K^{-4}

$$d = 42\ ly = 42(365\frac{dy}{yr}x24\frac{hr}{dy}x60\frac{min}{hr}x60\frac{s}{min})(3\ x\ 10^8\frac{m}{s})$$
$$= 4.0x10^{17}\frac{m}{yr}$$

$$b = \frac{4\pi r_{st}^2\sigma T^4}{4\pi d^2} = \frac{r_{st}^2\sigma T^4}{d^2} = \frac{(8.5\ x\ 10^9 m)^2\ (5.7\times10^{-8}Wm^{-2}K^{-4})(6100K)^4}{(4.0x10^{17}m)^2}$$

$$= 3.6\ x\ 10^{-8} Wm^{-2}$$