a) i) Eclipsing binaries are detected by their periodic change in apparent magnitude. If the two stars are a small bright star and a large dim star then ~~it~~ when the large star is infront of the ~~di~~ small star it would block out much of the light and astronomers could notice. a sharp decrease in the binary's apparent magnitude. And when the small star is infrom of the large the binary would appear much brighter. due to the addition of both the stars' brightness.

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(ii) If we know the period of the ~~binar~~ binary then the radius of their orbit can be found.

Then using this equation:

$$m_1 + m_2 = \frac{4\pi^2 r^3}{GT^2}$$

The total mass of the system can be determined.

b) (i) Lalande 21185 is the most blue

(ii) Ross 154: $M = m - 5\log\left(\frac{d}{10}\right)$

$= 10.37 - 5\log(6.297)$

$= 13.01$

let Ross 154 be I_A and m_A

let Proxima Centauri be I_B and m_B

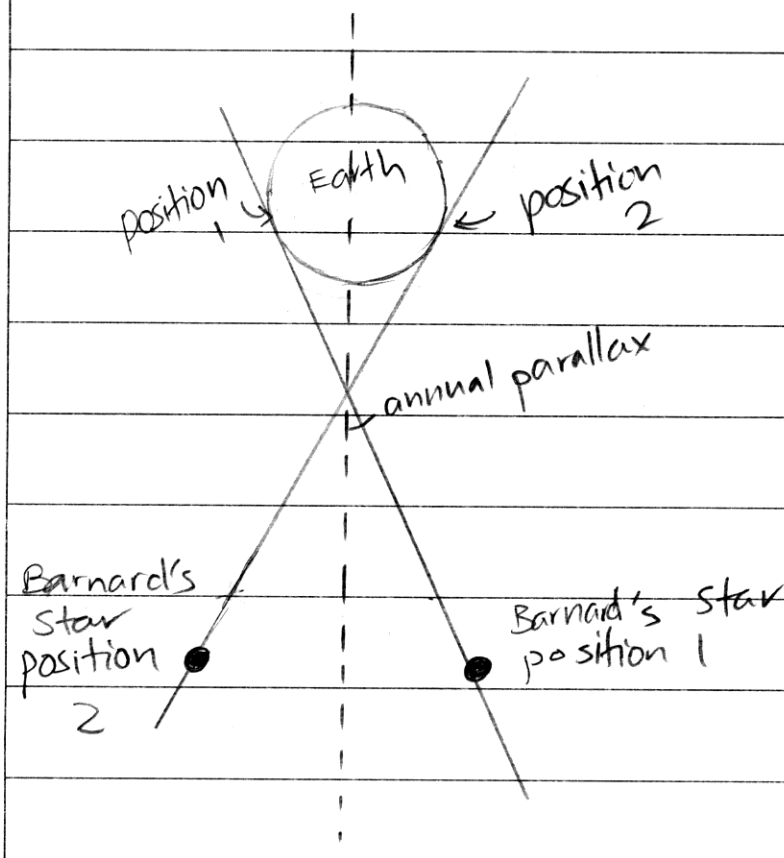
$\frac{I_A}{I_B} = 100^{(m_B - m_A)/5}$

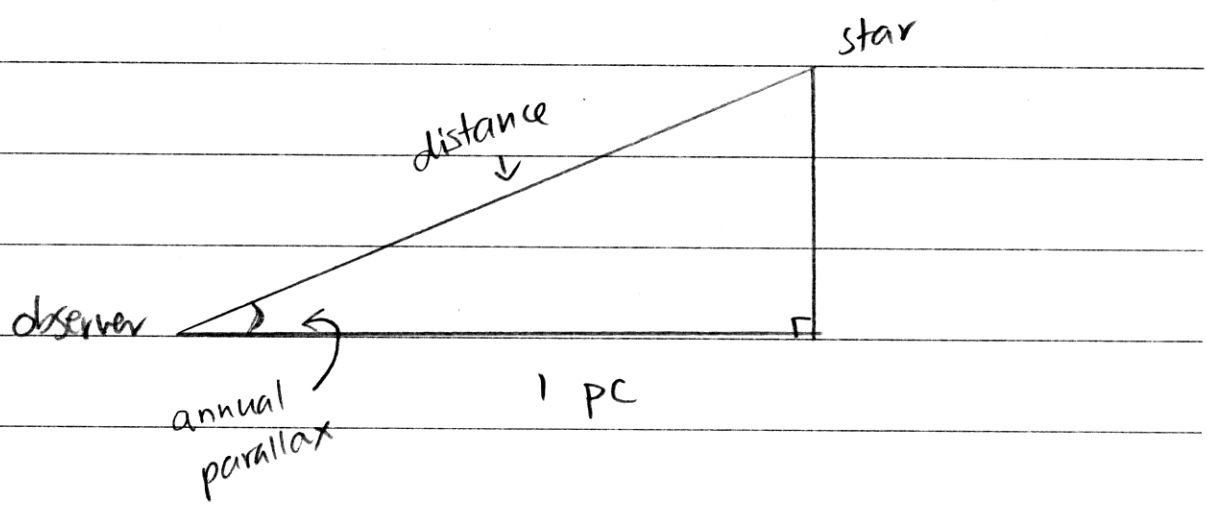
$= 100^{0.64/5}$

$= 1.80$

Therefore Ross 154 is brighter by a factor of 1.80

(iii)


position 1
Earth
position 2
annual parallax
Barnard's star position 2
Barnard's star position 1


star
distance
observer
annual parallax
1 pc

c) (i) White dwarfs are found in position S on the H-R diagram. White dwarfs are near the end of a star's life, all the energy source has been used up so no more nuclear reactions are taking place. This would been that white dwarfs are not as ~~bum~~ luminous as other stars. White dwarfs are the cores of a planetary nebula and this would mean that its surface temperature is quite high.

(ii) White dwarfs are considered stable because they are extremely dense and this prevents any more gravitational collapse that will make a star unstable.

(iii) Hydrogen burning exists in main sequence stars. One nuclear reaction taking place is the proton-proton chain. Two hydrogens combine to make a heavier hydrogen. The heavier hydrogen combine to create a light helium. This process repeats so that there a two light heliums and they reaction to become one helium and 2 hydrogens.

d) Adaptive optics is a fast feedback system that corrects ~~ad~~ atmospheric distortion with the use of mirrors. This improves the resolution of the ground based telescopes because by the time the light ~~rec~~ from the star reaches the observer the adaptive optics system would have corrected any distortion and the image would be much clearer and brighter.

Interferometry has also improved the resolution and sensitivity of ground based astronomy. With the use of many radio telescopes the information gathered about a stellar object can be multiplied. This is like using one very large telescope

with a great radius to gather information and will increase the resolution and sensitivity.

Photoelectric photometry has also improved sensitivity and resolution because it digitally stores information which can be multiplied and manipulated. Photoelectric photometry does not require a reference star and is much more effective than photographic photometry.