30 a) i) The star will be seen to have a periodic orbit which occurs in 6 months. The binary will looks as though it has a periodic change in brightness.

ii) Total mass of a binary star is calculated by the equation $M = m - 5\log\left(\frac{d}{10}\right)$ where 'd' is the diameter of the orbit. With this equation both the mass of the whole binary and the mass of the secondary star can be found. Providing having enough data eg. the diameter of orbit.

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b.) Proxima Centauri is the most blue in colour out of all the stars in the table.

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

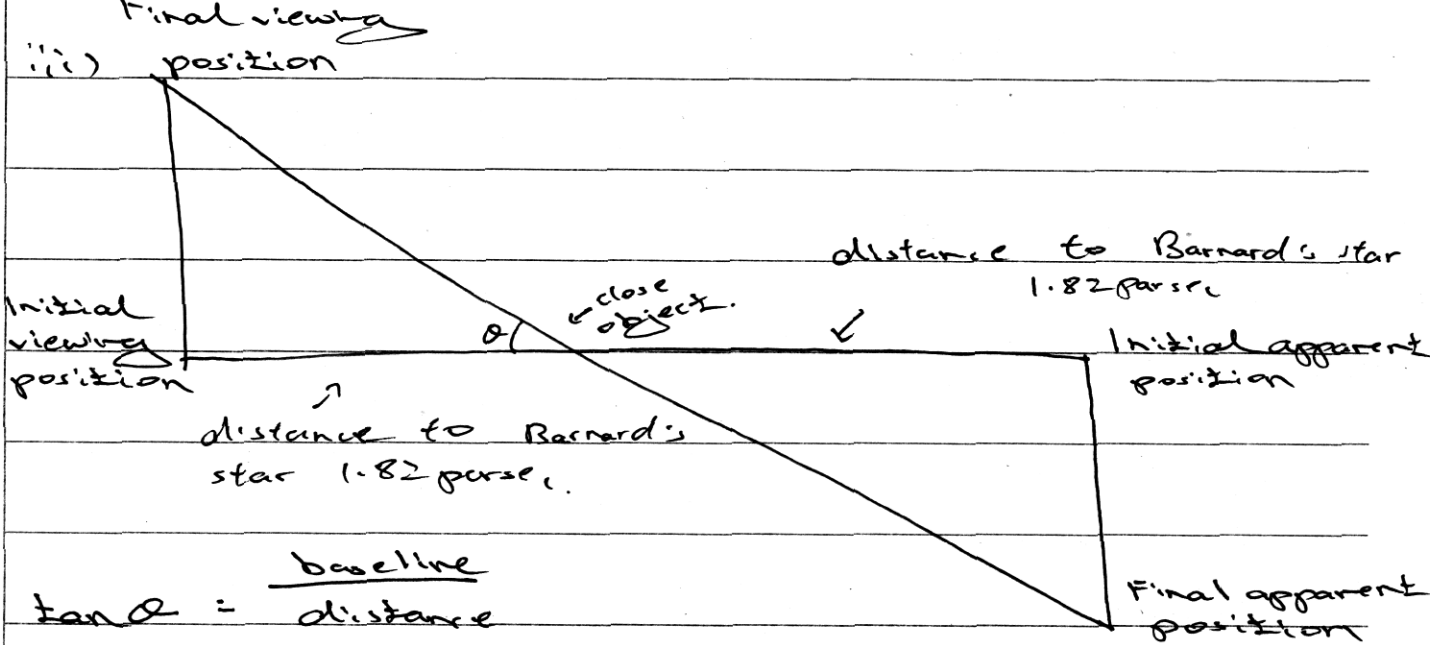
$= 100^{(10.37 - 11.01)/5}$

$\therefore = 0.554625713$

$\doteq 0.55$

∴ Ross 154 is 0.55 time brighter than Proxima Centauri.

iii)




$\tan\theta = \frac{\text{baseline}}{\text{distance}}$

∴ to work out distance to Barnard:

$\text{distance} = \frac{\text{baseline}}{\tan\theta}$

~~distance~~ $1.82 = \frac{\text{baseline}}{\tan\theta}$.

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c.i) S is where white dwarfs can be found as studied from HR diagram. It has a surface temperature of between 30000 to 10 000 K. It lies below the main sequence as well.

ii) White dwarfs are made of dense degenerate matter/material. It does not continue to shrink because the luminosity is relatively low as well as the surface temperature no very high. If the star is not bright therefore the fuel burns longer. Since this is the case, that is why white dwarfs tends not to shrink.

iii) A star in the main sequence. Fusion is one of the nuclear reaction where an violent & uncontrolled nuclear explosion occurs.

d) Adaptive ~~obj~~ optics is a method attempts to use slow feed back technique in a ~~his~~ telescope. The image pass through the primary and slowly being sampled in attempt to eliminate ~~any~~ any atmospheric turbulance before reaching the final lense.

Anther method which is used to improve the resolution & sensitivity of ground base is by interfermetry. Where number of satellite dishes are layed out in a particular pattern to combine radio signals together to improve resolution & sensitivity.

An example would be the Very Large Array which contains 27 dishes laying out in a 'y' pattern. ~~Each~~ across 37 km. Each dish has 25m in diameter. This is a form of interfermetry in attempt to improve resolution & sensitivity.

Another method which is use is quite the opposite to adaptive optics where it attempts to sends signal as quickly as posible in order to provide accurate image. Viewing can often by disturbed by atmospheric turbulence. However, the HIPPARCOS can overcome the problem of atmospheric turbulence.

A new generation of telescope is being thought & experimenting as well eg. Advanced X-ray astrophysics facility. or Infrared tele facility etc. All of the methods ~~method~~ mentioned above all have contributed to improve resolution & sensitivity of ground based astronomy.