Astronomy 120: Assignment 1, the sky and moon

1. If the light from the star Vega takes 240 months to reach the earth, how far away is it in lightyears? In kilometres? How many kilometres are there in 1.27 lightseconds (which corresponds to the distance between the earth and the moon)? Use c = speed of light = 3×10^5 km/s.

2. Which is the faintest star ϵ Perseus or γ Perseus, and why? Is it possible to know, just from their names, whether β Tauri is fainter than α Canoris? If Sirius has a magnitude of -2 and Procyon has a magnitude of $+3$, which is brighter and by what factor?

3. Draw a horizon diagram showing the path of a circumpolar star for an observer in Victoria (latitude 49 degrees North). Indicate the position of the zenith, the north celestial pole, the celestial equator and the compass points (N, S, E, W) as well as the star's apparent motion.

4. Which lunar phase would be visible if the moon is seen (a) on the eastern horizon just after sunset (b) at the zenith just after sunrise? If a solar eclipse occurs on Sept 13, why can't there be a lunar eclipse on Sept 23? Investigation from the web: what is a blue moon?

5. What causes solar prominences? During solar eclipses, large solar prominences are often seen extending 5 minutes of arc from the edge of the sun's disk. How far is this in kilometres? In earth diameters? (Assume that 1 AU = 1.5×10^8 km and that the earth's diameter is 13,000 km).