PHY105 Problems 1

1. Explain, with the aid of diagrams,
   1. why it is warmer in summer than in winter;
   2. why some stars rise and set, but other stars (such as the stars of the Plough) do not set;
   3. why the Moon has phases;
   4. why it is wrong to talk about “the dark side of the Moon”.
2. Briefly explain the following terms as they relate to lenses and telescopes:
   1. focal length;
   2. aperture;
   3. focal ratio;
   4. plate scale.
3. A refracting telescope advertised in a catalogue has an objective lens of diameter 80 mm and a focal ratio of *f*/10.
   1. What is the focal length of the telescope?
   2. About how long do you expect the telescope to be?
   3. What is the image scale (plate scale) of the telescope in arc-seconds per mm?
   4. Another telescope from the same catalogue (a Newtonian reflector, in fact, but this is not important), has a focal ratio *f*/4 and a similar objective diameter (76 mm, actually). How would this instrument differ from the *f*/10 telescope?