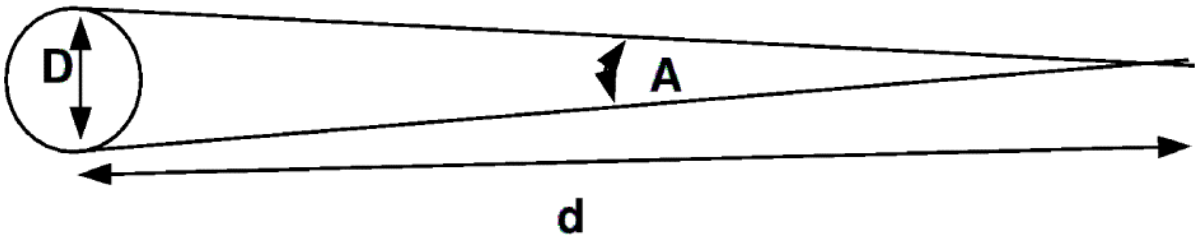
PHAS1511 – problem sheet 1 4 November 2008

Please hand this in by 18th November if possible.

1. The small angle formula that relates angles to physical distances is this:



A=(D/d)x206,263 arc sec

If the Hubble Space Telescope can measure angles as small as 0.05 arcseconds, and the Moon is 384,000km away, then what would be the smallest object that you could detect on the Moon using the Hubble Space Telescope? (2)

2. The largest crater on the Moon's surface is called Bailley, and it has a diameter of 295km. The human eye can resolve objects as small as one arcminute across. Can you see Bailley with the naked eye? (2)

3. The distance between the Earth and the Sun is 150,000,000km (an Astronomical Unit). How far away from the Solar System would you have to be for the Earth and Sun to appear one arcsecond apart? (2)

4. Give two reasons why collisions between stars are extremely rare. Explain why these two reasons don't apply to galaxies. (4)

5. Give three pieces of evidence that suggest that the universe began with a Big Bang. (3)

6. The positions of astronomical objects on the sky are measured in Right Ascension and Declination. Define what these terms mean. (4)

7. Why do we have to specify what year a given Right Ascension is valid in? (2)

8. What is the definition of a Solar day? What is the definition of a sidereal day? Why are these days not the same length? (3)

9. Why do solar and lunar eclipses not occur at every new moon and full moon respectively? Why are total solar eclipses much less frequently seen from a given place on the Earth's surface than total lunar eclipses? (5)

10. Why will total solar eclipses eventually stop occurring as seen from Earth? (3)