Lecture 3.1 Light and Telescopes

Light
In vacuum light travels at a speed of _______________ m/s. This is the fastest speed possible for matter or energy to travel.

Light is an electromagnetic wave. The range of wavelengths available is called a spectrum. The full electromagnetic spectrum can conveniently be split up into certain ranges. They are (from shortest wavelengths to longest wavelengths):

1. _______________
2. X-Ray
3. _______________
4. Visible
5. _______________
6. _______________
7. Radio

The visible wavelengths occupy from about 400 nm to 700 nm. The order of colors can be remembered with the mnemonic _________________.

A particle of light is called a _________________.

The speed of light is constant and equal to the product of wavelength and frequency. As an equation this can be written as:

The energy of a photon of light is equal to a constant (Planck’s constant) times the frequency of the photon. As an equation this can be written as:

Telescopes
Two main categories of telescopes are _______________ and _______________. The most common choice for modern telescopes tends to be _________________.

The focal length is defined as the distance from the _______________ to the _________________.

The law of reflection states that the angle of _______________ is equal to the angle of _______________ _____________.

Light changes speed and direction when it moves from one medium to another. This phenomena is called _ _________________.

**Telescope Properties**
The ability of a telescope to gather/detect light is know as ________________ power. It is proportional to the diameter of the objective squared. As an equation this can be written as:

The ability of a telescope to see fine detail (once the light is gathered) is dependent on the size of the objective and called ________________. Specifically, the angular resolution is proportional to the inverse of the diameter.

The ability of a telescope to make an image larger (though not more resolved) is called ________________

**Atmosphere**
The earth’s atmosphere tends to block much of the electromagnetic spectrum. There are, however, two important “optical windows”. They are the ________________ and ________________ windows. There are smaller windows for the infrared and a small UV tail too.

The atmosphere tends to “jiggle” the light as it comes down blurring images. This effect is known as _____ ________________

The atmosphere tends to reflect some of the light emitted from the surface of the earth making it hard to see very faint objects. This is known as ________________.