

## Definitions and Concepts for Edexcel Physics A Level

### Topic 10: Space

**Astronomical Unit:** Mean distance of the earth to the sun.

**Big Bang Theory:** The theory that the universe originated as a small, dense and hot region that expanded and cooled forming the structures in the universe we see today.

**Cosmic Microwave Background Radiation (CMBR):** After the big bang the hot dense state of the universe was full of photons which interacted with the matter in the universe. At a certain time this interaction stopped due to the lower temperature of the universe and these photons were allowed to propagate freely, at this point these photons were gamma rays. At present the universe has expanded, redshifting these photons so that they are microwaves.

**Doppler Effect:** The apparent change in the wavelength of a wave as the source moves relative to an observer. For a source moving away the wavelength increases, for a source moving towards the observer the wavelength decreases.

**Dark Energy:** An energy that is responsible for the acceleration in expansion of the universe which cannot be explained by any observable energy and so must be dark.

**Dark Matter:** Certain observations of galaxies and their dynamics shows that they are far more massive than they appear to be with just the matter we can observe. This has led to the theory of dark matter to make up the rest of the unobservable mass.

**Giant Star:** A large star with a higher luminosity than a main sequence star and a broad temperature range.

**Hertzsprung-Russell Diagram:** Visual representation of the lifecycle of a star. A plot of luminosity against temperature.

**Hubble's Law:** The speed of a galaxy moving away from ours is proportional to its distance away from us. The constant of proportionality is Hubble's constant.

**Light Year:** Distance travelled through space by a photon in a year.

**Luminosity:** The total power radiated by a star.

**Main Sequence Star:** A star that sits on the central band of stars on a Hertzsprung-Russell diagram where temperature increases with luminosity.

**Standard Candle:** Objects of known luminosity used as references to measure other stars and to measure the distance to stars.



**Parallax:** The change in position of an object depending on the viewing angle, this can be used to estimate the distance to a star based on how much it moves relative to the background of stars when the earth has moved half an orbit.

**Parsec:** Unit of distance. It is the distance to a star whose parallax angle is 1 arcsecond.

**Redshift:** The shift in light of distant galaxies. This redshift is due to all galaxies moving away from each other and the larger redshift of distant galaxies is due to these galaxies moving away at a faster rate.

**Supergiant Star:** Very large luminous stars with a large temperature range of 3,500-20,000K.

**White Dwarf:** A dense star, similar mass to the sun, similar size to the earth. A final stage of a low mass star's life with low luminosity.

