Intro to Astronomy Cheat Sheet

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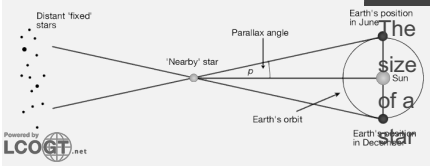
Keplar

The Law of Ellipses	The path of the planets around the sun is elliptical in shape, with the centre of the sun being located at one focus.
The Law of Equal Areas	An imaginary line drawn from the centre of the sun to the centre of the planet will sweep out equal areas in equal intervals of time.
The Law of Harmonies	The ratio of the squares of the periods of any two planets is equal to the ratio of the cubes of their average distances from the sun.

Parallax



Parallax is the apparent displacement of an object because of a change in the observer's point of view.
Equation is d = 1/p where;
d = distance measured in parsecs
p = parallax angle measured in arcseconds

Special Relativity

Definition	Mass and energy are the same physical entity and can be changed into each other.
E = mc^2	The increased relativistic mass (m) of a body times the speed of light squared (c^2) is equal to the kinetic energy (E) of that body.
The Sun	The nuclear fusion reactions that transform hydrogen to helium are part of the reason that the sun shines. The energy released from the rest energy of hydrogen atoms that are fused to form helium.

Star Luminosity and Distance

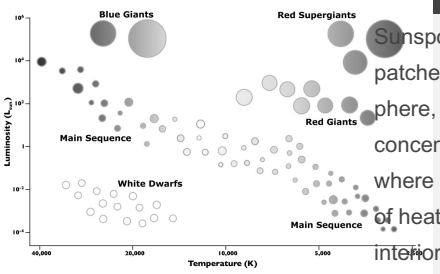
The size of a star

If two stars have the same effective temperature but differ in size then the larger star has a greater surface area and as it radiates the same amount of energy per unit surface area per second as the smaller star its total power output or luminosity will be greater.

Star Luminosity and Distance (cont)

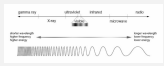
The distance to the star	The closer the star the brighter it will appear.
Luminosity	The intrinsic brightness of a celestial object.
Apparent Magnitude	The magnitude of a celestial object as it is actually measured from the Earth.
Absolute Magnitude	The magnitude (brightness) of a celestial object as it would be seen at a standard distance of 10 parsecs.

H-R Diagram



HR Diagram

EM Spectrum



Radio waves have the lowest frequency

Solar Time

Apparent Solar Time	Observed from Earth. Based on the apparent motion of the actual sun. It is based on the apparent solar day, the interval between two successive returns of the sun to the local meridian.
Mean Solar Time	Is the hour angle of the sun plus twelve hours.

Sun's Surface

Sunspots are visible as dark patches on the sun's photosphere, and correspond to concentrations of magnetic field where the convective transport of heat is inhibited from the solar interior to the surface. As a result, sunsports are slightly cooler than the surrounding photosphere, and, so, they appear dark.

Magnetosphere

Is the region around a planet dominated by the planet's magnetic field. Other planets in our solar system have magnetospheres, but Earth has the strongest one of all the rocky planets. It shields the planet from solar and cosmic particle radiation, as well as erosion of the atmosphere by the solar wind - the constant flow of charged particles streaming off the sun.

1. The main sequence stretching from the upper left (hot, luminous stars) to the bottom right (cool, faint stars) dominates the HR diagram. It is here that stars spend about 90% of their lives burning hydrogen into helium in their cores. 2. Red giant and supergiant stars (luminosity classes I through III) occupy the region above the main sequence. They have low surface temperatures and high luminosities which means they also have large radii. Stars enter this stage after they have exhausted the hydrogen fuel in their cores and have started to burn helium and other heavier elements. 3. White dwarf stars (luminosity class D) are the final evolutionary stage of low to intermediate mass stars, and are found in the bottom left of the HR diagram. These stars are very hot but have low luminosities due to their smaller size.

Basic Definitions

Displacement or Distance (d)	Change in position of an object. Measured in metres (m). Specified by difference in initial and final coordinates, d = xf - xi
Velocity	Distance travelled per unit time and the direction of motion. Measured in (m/s).
Speed	The magnitude of the velocity (no direction specified) v = d/t
Acceleration	A change in velocity per unit time and the direction of that change. Measured in metres per second per second (m/s^2). a = (vf - vi)/t (for constant a).

Basic Definitions (cont)

Mass	A property of matter that determines how resistant an object is to changes in motion and how strong a gravitational force it exerts and experiences in the presence of another object. Measured in kg.
Distance Equation	d = vit + (1/2)at^2

Newton's Laws

Inertia	The velocity of an object doesn't change unless you apply a force.
Momentum	p = mv. Impulse is the same as force.
Equal and Opposite Reactions	Force always comes in pairs. Equal in magnitude by opposite in direction.

Waves

Deinition	A propagating disturbance in a stable, extended medium. The properties of the medium determine the behaviour of the waves. The medium does not move. Waves carry energy and momentum.

Waves (cont)

Reflection	The incoming angle (incidence) equals the outgoing angle (reflection).
Refraction	When waves move between one medium and another and propagate at different speeds in the two media, the wave direction will bend. This is a direct conceqquence of the different speeds.
Doppler Effect	Wavelength changes if source is moving
Interference	Constructive or destructive
Resonance	Frequencies determined by structural properties and can be excited.

Seismic Waves

P WAVES	S WAVES
Primary	Secondary
Pressure (sound)	Shear
Longitudinal	Transverse
Faster	Slower
Least damage	Most damage
Can travel through both solid and liquid	Can travel through solid, not liquid