100% sheet

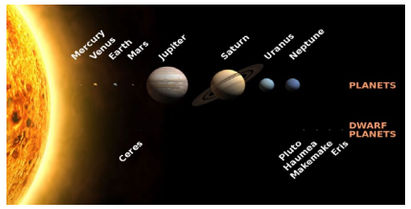
Year 11 SS
Space

AQA SPACE PHYSICS PHYSICS ONLY

Solar system

Milky Way our galaxy.

Planet	*A large body orbiting the Sun*
Moon	*A natural satellite orbiting a planet*
Dwarf planet	*A body large enough to have its own gravity which caused a spherical shape*
Solar system	*Any object orbiting the Sun due to gravity*
Galaxy	*Collection of billions of stars*
Universe	*Collection of galaxies*



Comets, asteroids, satellites.

Other objects.

The life cycle of a star.

Nebula	*A cloud of cold hydrogen gas and dust*	Cloud collapses due to gravity, particles move very fast colliding with each other, kinetic energy transfers into internal energy and the temperature increases.
Protostar	*The large ball of gas contracts to form a star*	High temperature causes Hydrogen nuclei to collide and nuclear fusion begins. A star is 'born'.
Main sequence	*Stable period of star*	Gravity tries to collapse the star but enormous pressure of fusion energy expands and balances the inward force.

Stars the same size as our Sun.

Red giant	*A large star that fuses Helium into heavier elements*	Hydrogen runs out, star becomes unstable, pressure inside drops causing star to collapse. Atoms now closer together results in atoms fusing and temperature increases. This increase in temperature causes the core to swell.
White dwarf	*Star collapses*	Nuclear fuel runs out, fusion stops, dense very hot core.
Black dwarf	*Cold dark star*	White dwarf cools down.

Stars larger than our Sun.

Red super giant	*Star swells greatly*	Nuclear fuel begins to run out and star swells (more matter = bigger size).
Supernova	*Gigantic explosion due to run away fusion reactions*	Rapid collapse, heats to very high temperatures causing run away nuclear reactions, star explodes, flinging remnants out into space. Large gravitational forces collapse the core into a tiny space. Remains of supernova form heavier elements (Iron and above)
Neutron star	*Very dense star*	Made out of neutrons.

OR if collapse is into a really tiny space.

Black hole	*No light escapes*	Gravitational forces so strong everything is pulled in.

Effect of gravity.

Gravity causes moons to orbit planets, planets to orbit the Sun, stars to orbit galaxy centres.

Force of gravity changes the moon's direction not its speed.

Gravity pulls objects towards the ground.

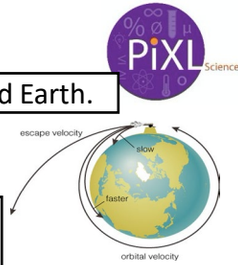
Orbital motions

Speed of Orbit.

Too fast = disappears into Space.

Correct speed = steady orbit around Earth.

Too slow = falls to Earth.



HIGHER: Circular orbits.

To calculate speed of Orbit: distance object moves in 1 orbit, Distance = 2∏r, then average speed = distance ÷ time.

Planets close to the Sun, gravity pull is strong. Planets move quickly.

Planets further away from the Sun, gravity pull is weaker. So speed of planet is slower.

HIGHER:

Velocity = a vector.

A planet's velocity changes but speed remains constant.

Due to the Sun's gravity, planets accelerate towards the Sun and so changes direction.

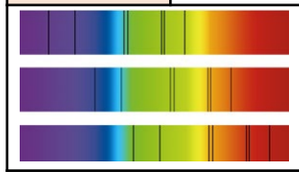
Red shift

When ambulances go past the sound changes from a high pitch to a low pitch.

Frequency of sound wave decreases, wavelength increases.

Understanding models.

Red-shift	*The observed increase in wavelength of light from most distance galaxies. Light moves towards the red end of the spectrum.*
Hubble (1929)	*He studied light from distant galaxies; found as frequency decreases, wavelength increases.*



Light from star in our galaxy.

Light from star in nearby galaxy.

Light from star in distant galaxy.

The Big Bang	*Universe began 13.8 billion years ago*
All matter and space expanded violently from a single point.	Red—shift provides evidence for expansion.

Galaxies are moving away from us in all directions.

Light from distant galaxies is red-shifted, so galaxy is moving away from us.

Galaxies further away have bigger red-shift so are moving faster away.

Aristotle (ancient Greek)	*Earth at the centre, other heavenly bodies move around the Earth.*
Copernicus (1473 - 1543)	*Sun at the centre, other heavenly bodies move around the Sun.*
Galileo (1610)	*Made a telescope, looked at Jupiter, found four moons rotating around planet.*

Planets and moons moved at different speeds to stars = reason for different positions.