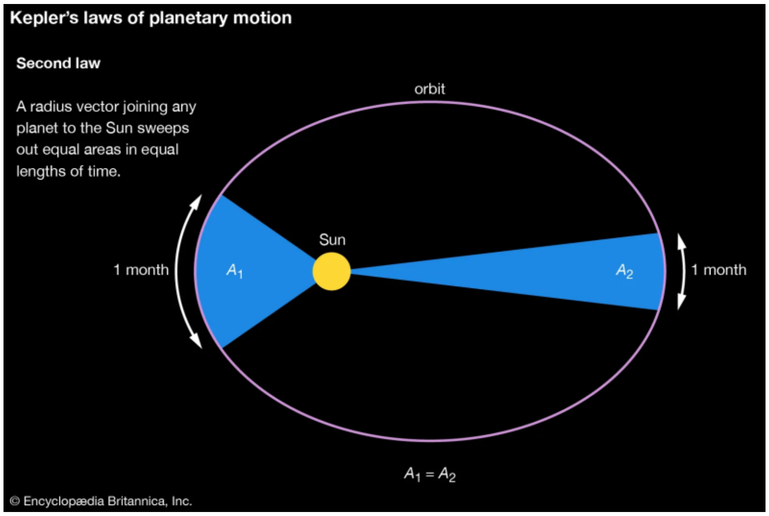
Examples	Size	Characteristics
Planetoid	100 to 1000 km	A small, rocky body that orbits the Sun.
Satellite	Varies depending on the planet orbited, but typically much smaller than the planet.	A celestial body that orbits a planet or minor planet.
Moon	3474 km	The Earth's only natural satellite.
Rocky planet	Varies depending on the planet, but typically smaller than gas giants.	A planet that is composed primarily of rock and metal.
Gas giant	Varies depending on the planet, but typically much larger than rocky planets.	A planet that is composed primarily of gas, such as hydrogen and helium.
Star	Varies depending on the star, but typically much larger than planets.	A celestial body that emits light and heat from nuclear fusion reactions in its core.
Asteroid belt	Varies depending on the asteroid, but typically much smaller than planets.	A region of space between the orbits of Mars and Jupiter that is populated by millions of asteroids.

Kepler's First Law: The Law of Ellipses

The orbit of a planet is an ellipse with the Sun at one of the two foci. An ellipse is a flattened oval shape, with two focal points, and the Sun occupies one of these focal points. This means that the path of a planet around the Sun is not a perfect circle, but rather an oval-shaped trajectory.

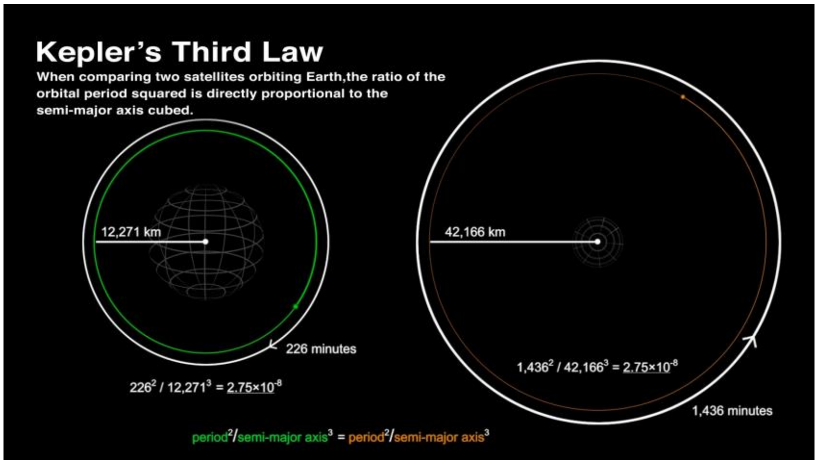
Kepler's Second Law: The Law of Equal Areas

A line segment joining a planet and the Sun sweeps out equal areas in equal intervals of time. This law implies that the planet moves faster when it is closer to the Sun and slower when it is farther away. The imaginary line connecting the planet to the Sun is called the radius vector. As the planet orbits the Sun, this radius vector sweeps out equal areas of space in equal amounts of time, regardless of the planet's position in its orbit.



Kepler's Third Law: The Law of Harmonies

The squares of the orbital periods of any planets are directly proportional to the cubes of their mean distances from the Sun. This law relates the time it takes for a planet to complete one orbit around the Sun (its orbital period) to its average distance from the Sun (its semi-major axis). The orbital period of a planet increases as its distance from the Sun increases. This means that planets farther away from the Sun take longer to complete a single orbit.



Parallax Effect

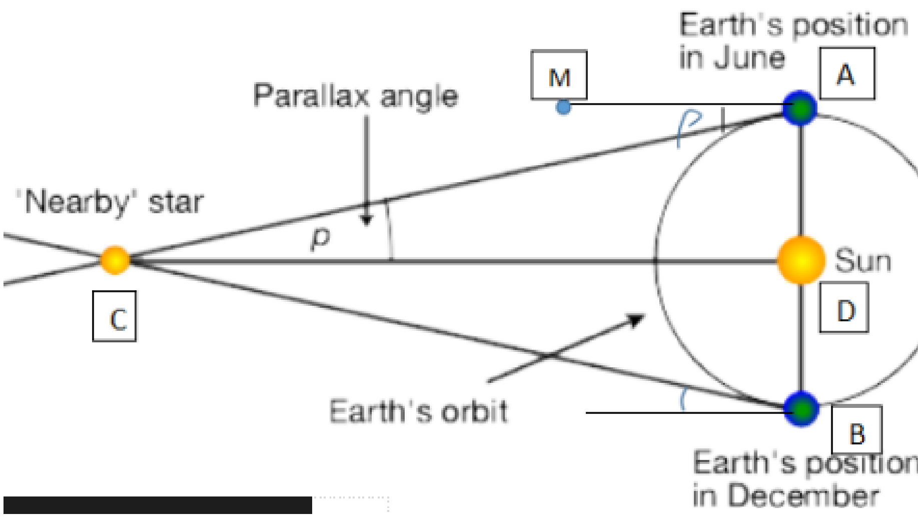
Parallax is a visual effect in which background elements move at a slower rate than foreground elements when viewed from a moving vantage point. This creates an illusion of depth and adds a sense of dimension to the scene. The effect is mostly seen in video games, but it is also used in web design, animation, and even physical environments.

In physical environments, parallax is used to create a sense of scale. For example, the stars appear to move across the sky at a slower rate than objects closer to the ground. This is because the stars are much farther away from us than the objects on the ground.

Stellar Parallax

Stellar parallax is the use of mathematical patterns in parallax to find the distance to nearby stars we can measure the difference in the apparent position of a star when earth is on either extreme end of its orbit around the sun.

Stellar parallax can be when earth is at the start of its orbit and a star is seen at a certain position, after six months the earth has completed half of its orbit, the stars position would change.



Good resource—> https://www.youtube.com/watch?v=21xoXdlt_n8&list=PLeveVE-rwOyJ0yW8jCUZCTTrWIe20202r&index=1

Tan(Parallax angle of a star)= Change in angular distance/2

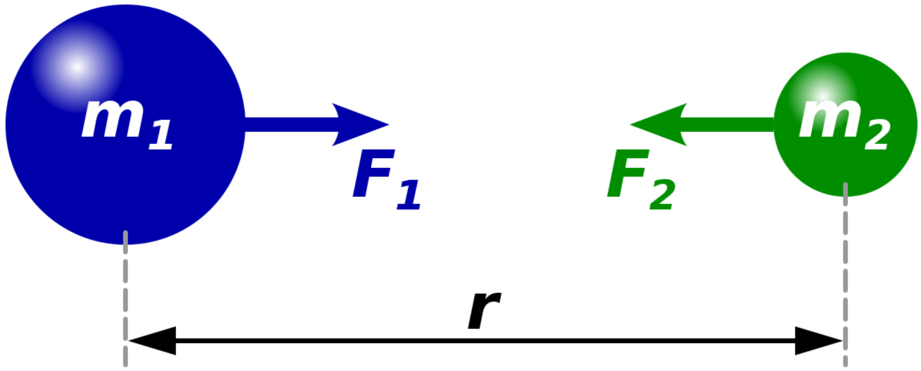
parallax angle =Distance from earth to sun(1AU)/distance to star

	Symbol	Fraction of 1 degree	Fraction of 1 circle	Radians
Degree	°	1	$\frac{1}{360}$	$\frac{\pi}{180}$
Arcminute (arcmin)	'	$\frac{1}{60}$	$\frac{1}{21600}$	$\frac{\pi}{10800}$
Arcsecond (arcsec)	"	$\frac{1}{3600}$	$\frac{1}{1296000}$	$\frac{\pi}{648000}$

1 parsec= distance from the sun to a point with a parallax angle of exactly one arcsecond.

1 parsec=2.09*10^16m=3.26 light years.

Newton's law of gravitation:



$$F_1 = F_2 = G\,\frac{m_1 \times m_2}{r^2}$$

G= 6.67*10^-11

M1 and M2 are masses of 2 given bodies, r^2 is the square of the distance between them.

(g)= GM/r^2

G unit is Nm^2/kg^2

Gravitational Constant=g

Universal Gravitational Constant= G

Mass of planet=M

Radius of planet= r