Some Solar System Objects' Discoverers

Object	Type	Discovered by:
Mercury, Venus, Mars, Jupiter, Saturn	Planet	Prehistoric humans… planets visible to the unassisted eye.
Earth	Planet	Everybody!
Ceres (d)	Dwarf Planet	Giuseppe Piazzi, January 1, 1801
Asteroid Belt	Asteroids	First discovered was Ceres, now classified as a Dwarf Planet
Uranus	Planet	William Herschel, March 13, 1781
Neptune	Planet	First seen: Hohann Gottfried Galle, September 23, 1866; predicted by John Couch Adams, 1843 and Urbain Jean Joseph Le Verrier, 1846
Pluto (d)	Dwarf Planet	Clyde Tombaugh, February 18, 1930
Charon	Moon or possibly a Binary Dwarf Planetary System	James Christy, June 22, 1978 The center of mass (barycenter) of the Pluto–Charon system is outside either body. Some argue that Charon should be more than just a moon of Pluto.
Orcus	Possible Dwarf Planet	Chad Trujillo, Michael Brown and David Rabinowitz, February 17, 2004
Haumea (d)	Dwarf Planet	Ortiz et al., Michael Brown, December 28, 2004
Quaoar	Possible Dwarf Planet	Chad Trujillo, Michael Brown and David Rabinowitz, June 5, 2002
Makemake (d)	Dwarf Planet	Chad Trujillo, Michael Brown and David Rabinowitz March 31, 2005
Sedna	Possible Dwarf Planet	Chad Trujillo, Michael Brown and David Rabinowitz, November 14, 2003
2007 OR_{10}	Possible Dwarf Planet	M. E. Schwamb, Michael Brown and David Rabinowitz, July 17, 2007
Eris (d)	Dwarf Planet	Chad Trujillo, Michael Brown and David Rabinowitz, October 21, 2003
Kuiper Belt	Comets, Asteroids and other small mass objects	Kuiper Belt Objects (KBO) were suggested by Frederick C. Leonard in 1930; proposed by Kenneth Edgeworth in 1943; predicted by Gerard Kuiper in 1950; sometimes called the Edgeworth-Kuiper Belt.
Oort Cloud	Comets, Asteroids, and other small mass objects	Proposed in 1932 by Ernst Opik; predicted by Jan Oort in 1950 based on comet orbital calculations.

Tessmann Planetarium

Student Reference

Santa Ana College
Rancho Santiago Community College District

About Our Universe...

Our Solar System's Planets and Dwarf Planets

Planet or Dwarf Planet	Moons (#)	Mean Distance From Sun (kilometers)	Mean Distance From Sun (miles*)	Mean Distance From the Sun (AU**)	Mean Diameter (kilometers)	Mean Diameter (miles*)
Mercury	0	57,909,100	35,983,035	0.39	4,878	3,031
Venus	0	108,208,930	67,237,891	0.72	12,104	7,521
Earth	1	149,598,261	92,956,021	1.00	12,742	7,918
Mars	2	227,939,100	141,634,747	1.52	6,792	4,221
Ceres (d)	0	413,832,587	257,143,568	2.77	975	606
Jupiter	67	778,547,200	483,766,652	5.20	139,822	86,881
Saturn	62	1,433,449,370	890,703,868	9.58	120,536	74,898
Uranus	27	2,876,679,082	1,787,484,958	19.23	51,118	31,763
Neptune	13	4,503,443,661	2,798,309,291	30.10	49,528	30,775
Pluto (d)	5	5,873,826,120	3,649,825,210	39.26	2,306	1,433
Haumea (d)	2	6,452,472,193	4,009,379,099	43.13	1,436	892
Makemake (d)	0	6,850,253,969	4,256,549,159	45.79	1,500	932
Eris (d)	1	10,123,314,322	6,290,333,943	67.67	2326	1,445

* Converting kilometers to miles = 0.621371 x kilometers.

** 1 AU = 1 Astronomical Unit = Mean Distance Earth to Sun = 149,598,261 kilometers = 92,956,021 miles

More about Planets and Dwarf Planets

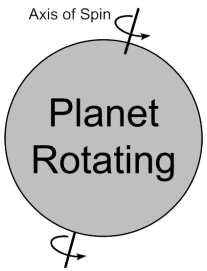
Planet or Dwarf Planet	Rings, Arcs, Ringlets, Divisions, Gaps (#)	Rotation Period (days)	Orbital Period (years)	Orbital Velocity (kilometers / hour	Orbital Velocity (miles / hour)	Earths (# based on volume)
Mercury	0	58.65	0.24	172,332	107,082	0.0562
Venus	0	-243.02	0.62	126,072	78,337	0.8659
Earth	0	1.00	1.00	107,208	66,616	1.0000
Mars	0	1.03	2.14	86,677	53,859	0.1506
Ceres (d)	0	0.38	4.60	64,375	40,001	0.0004
Jupiter	4	0.41	11.86	47,052	29,237	1321.3504
Saturn	33	0.44	29.46	34,884	21,676	763.5915
Uranus	19	-0.72	84.32	24,516	15,234	63.0810
Neptune	9	0.67	164.79	19,548	12,147	57.7358
Pluto (d)	0	-6.39	248.09	16,798	10,438	0.0059
Haumea (d)	0	3.92	283.28	16,142	10,030	0.0014
Makemake (d)	0	0.32	309.88	15,908	9,885	0.0014
Eris (d)	0	1.08	557.43	12,370	7,686	0.0061

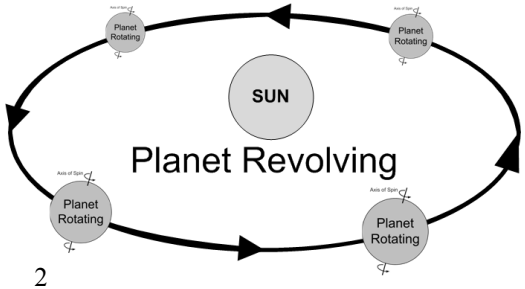
Our Sun, Our Star...

Equivalent to 1,295,240 Earths based on volume.	Mass = 2 x 10^{30} kg.
Diameter = 1,390,480 km or 864,000 miles.	Surface Temperature = 5,800^{o} K or 9,980^{o} F.
Rotation Period = 27-31 days depending on latitude	Core Temperature = 15,000,000^{C} K or 26,999,540^{0} F.
70% hydrogen; 28% helium; 2% other.	Luminosity = 3.8 X 10^{26}

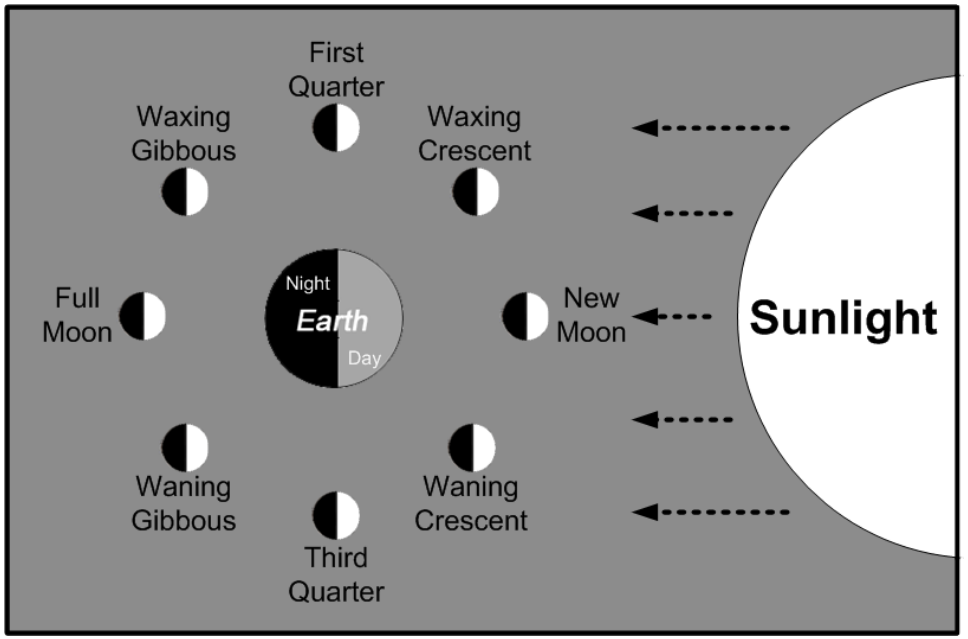
Why do they change?

WHEN	Neptune Position from Sun	Pluto Position from the Sun	Eris Position from Sun
1995	9th	8th	10th
NOW	8th	9th	10th
800 years from NOW	9th	10th	8th





Phases of Our Moon



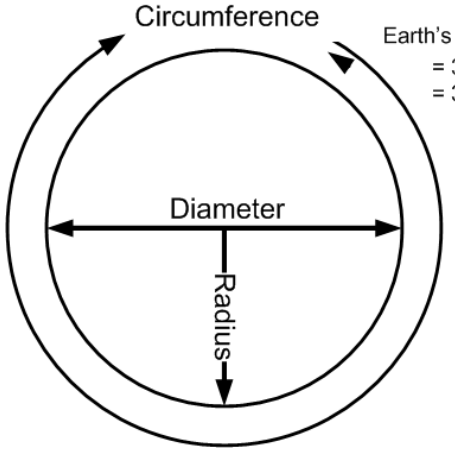
Newton's Laws of Motion

Newton's 1st Law of Motion or "The Law of Inertia" or Force = 0
A body tends to keep moving in a straight line and a stationary body tends to stay put unless it is compelled to change because of some force.

Newton's 2nd Law of Motion or "The Law of Force" or Force = mass x acceleration
A force acting on a body will change the momentum of the body in the direction of the applied force.

Newton's 3rd Law of Motion or "The Law of Reaction" or $Force_1$ = —$Force_2$
For every action, there is an equal and opposite reaction.

Measuring Planets, Moons and Other Round Things



Earth's Circumference is π times Diameter:
= 3.14159 x 12,756 kilometers = 40,074 kilometers
= 3.14159 x 7,926 miles = 24,900 miles

Earth's Diameter is 2 times Radius:
= 12,756 kilometers
= 7,926 miles

Earth's Radius is ½ Diameter:
= 6,378 kilometers
= 3,963 miles

Earth's Volume = 4/3 x π x Radius^3
= 4.189 x Radius^3
= 4.189 x 6378 kilometers^3
= 1.087 x 10^{12} kilometers^3
= 2.607 x 10^{11} miles^3