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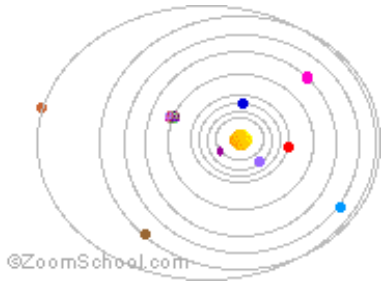
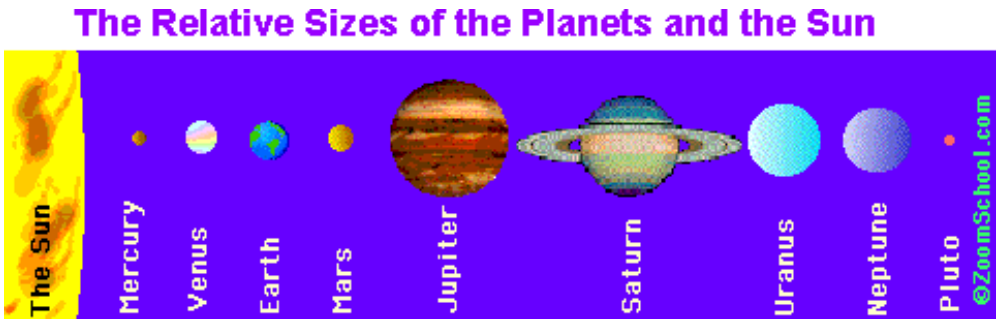
The Planets (plus the Dwarf Planet Pluto)



Our solar system consists of the sun, eight planets, moons, many dwarf planets (or plutoids), an asteroid belt, comets, meteors, and others. The sun is the center of our solar system; the planets, their moons, a belt of asteroids, comets, and other rocks and gas orbit the sun.

The eight planets that orbit the sun are (in order from the sun): Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune. Another large body is Pluto, now classifies as a dwarf planet or plutoid. A belt of asteroids (minor planets made of rock and metal) lies between Mars and Jupiter. These objects all orbit the sun in roughly circular orbits that lie in the same plane, the ecliptic (Pluto is an exception; it has an elliptical orbit tilted over 17° from the ecliptic).

Easy ways to remember the order of the planets (plus Pluto) are the mnemonics: "My Very Excellent Mother Just Sent Us Nine Pizzas" and "My Very Easy Method Just Simplifies Us Naming Planets" The first letter of each of these words represents a planet - in the correct order.



The largest planet is Jupiter. It is followed by Saturn, Uranus, Neptune, Earth, Venus, Mars, Mercury, and finally, tiny Pluto (the largest of the dwarf planets). Jupiter is so big that all the other planets could fit inside it.

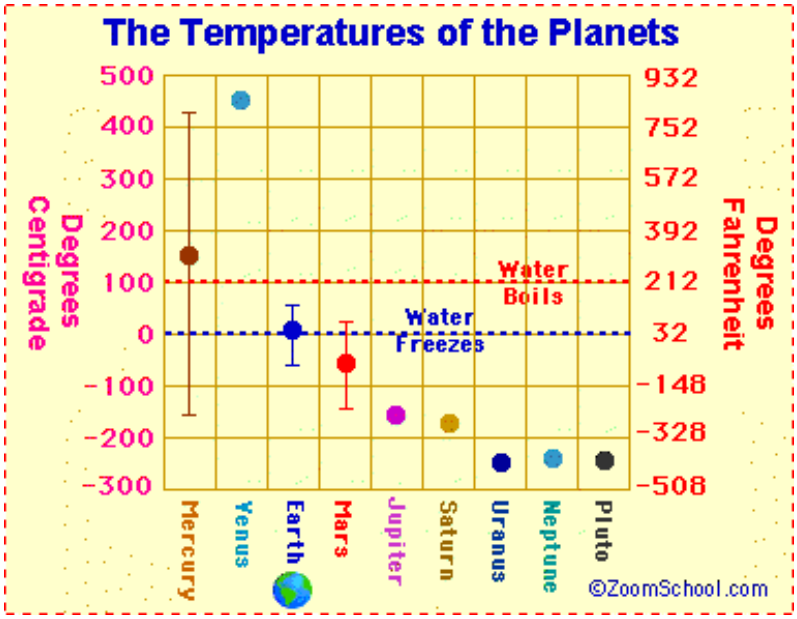
The Inner Planets vs. the Outer Planets

The inner planets (those planets that orbit close to the sun) are quite different from the outer planets (those planets that orbit far from the sun).

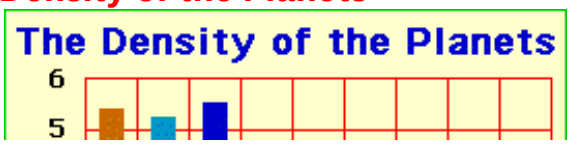
- The inner planets are: Mercury, Venus, Earth, and Mars. They are relatively small, composed mostly of rock, and have few or no moons.
- The outer planets include: Jupiter, Saturn, Uranus, Neptune, and Pluto (a dwarf planet). They are mostly huge, mostly gaseous, ringed, and have many moons (again, the exception is Pluto, the dwarf planet, which is small, rocky, and has one large moon plus two tiny ones).

Temperatures on the Planets

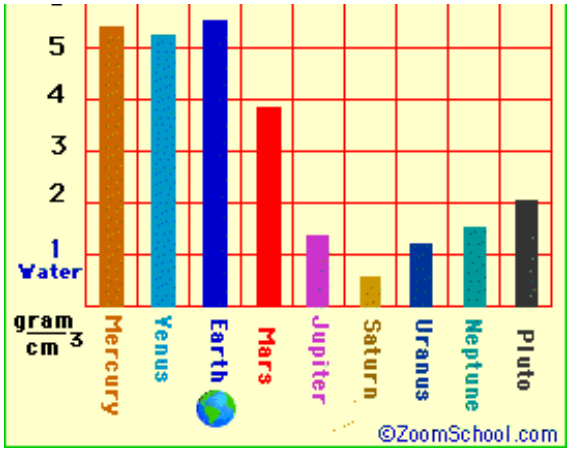
Generally, the farther from the Sun, the cooler the planet. Differences occur when the greenhouse effect warms a planet (like Venus) surrounded by a thick atmosphere.



Density of the Planets

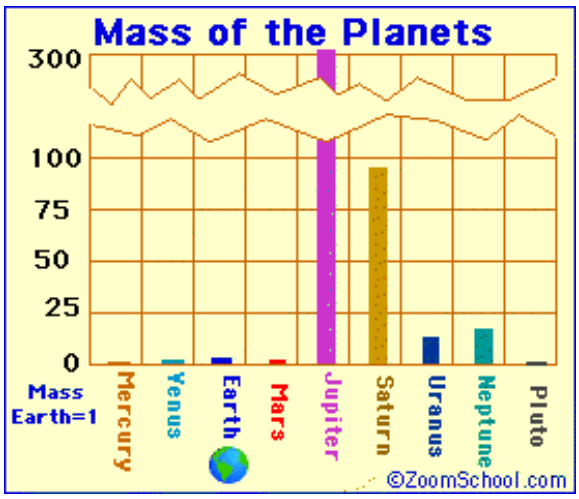


The outer, gaseous planets are much less dense than the inner, rocky planets.



The Earth is the densest planet. Saturn is the least dense planet; it would float on water.

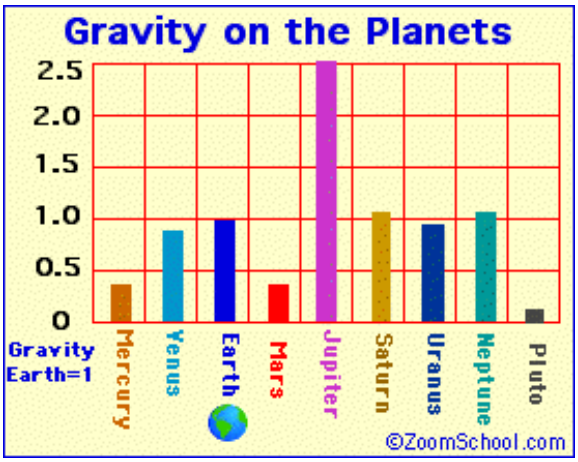
The Mass of the Planets



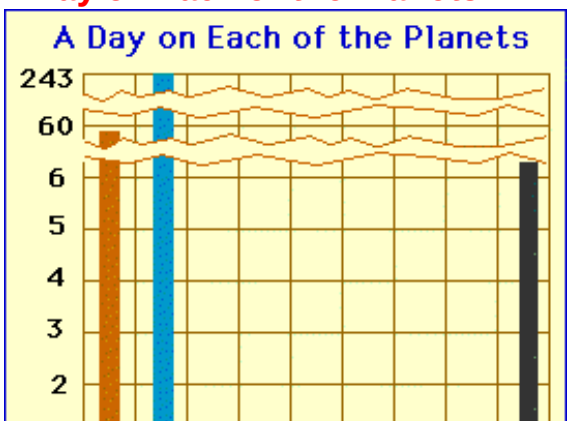
Jupiter is by far the most massive planet; Saturn trails it. Uranus, Neptune, Earth, Venus, Mars, and Pluto are orders of magnitude less massive.

Gravitational Forces on the Planets

The planet with the strongest gravitational attraction at its surface is Jupiter. Although Saturn, Uranus, and Neptune are also very massive planets, their gravitational forces are about the same as Earth. This is because the gravitational force a planet exerts upon an object at the planet's surface is proportional to its mass and to the inverse of the planet's radius squared.



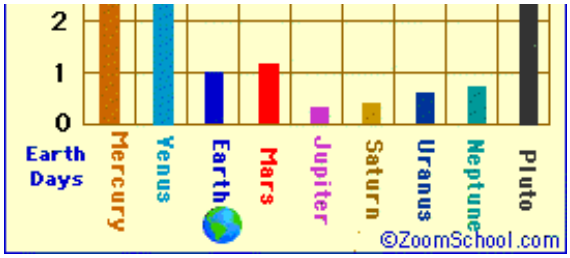
A Day on Each of the Planets



A day is the length of time that it takes a planet to rotate on its axis (360°). A day on Earth takes almost 24 hours.

The planet with the longest day is Venus; a day on Venus takes 243 Earth days. (A day on Venus is longer than its year; a year on Venus takes only 224.7 Earth days).

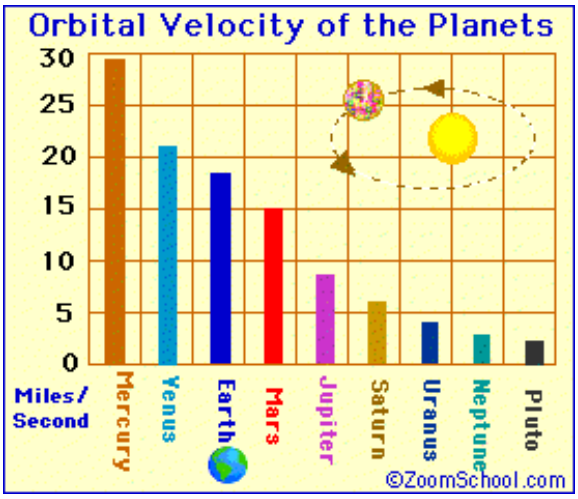
The planet with the shortest day is Jupiter; a day on Jupiter only takes 9.8 Earth hours! When you observe



Jupiter from Earth, you can see some of its features change.

The Average Orbital Speed of the Planets

As the planets orbit the Sun, they travel at different speeds. Each planet speeds up when it is nearer the Sun and travels more slowly when it is far from the Sun (this is Kepler's Second Law of Planetary Motion).



The Planets in Our Solar System

Planet (or Dwarf Planet)	Distance from the Sun (Astronomical Units miles km)	Period of Revolution Around the Sun (1 planetary year)	Period of Rotation (1 planetary day)	Mass (kg)	Diameter (miles km)	Apparent size from Earth	Temperature (K Range or Average)	Number of Moons
Mercury	0.39 AU, 36 million miles 57.9 million km	87.96 Earth days	58.7 Earth days	3.3×10^{23}	3,031 miles 4,878 km	5-13 arc seconds	100-700 K mean=452 K	0
Venus	0.723 AU 67.2 million miles 108.2 million km	224.68 Earth days	243 Earth days	4.87×10^{24}	7,521 miles 12,104 km	10-64 arc seconds	726 K	0
Earth	1 AU 93 million miles 149.6 million km	365.26 days	24 hours	5.98×10^{24}	7,926 miles 12,756 km	Not Applicable	260-310 K	1
Mars	1.524 AU 141.6 million miles 227.9 million km	686.98 Earth days	24.6 Earth hours =1.026 Earth days	6.42×10^{23}	4,222 miles 6,787 km	4-25 arc seconds	150-310 K	2
Jupiter	5.203 AU 483.6 million miles 778.3 million km	11.862 Earth years	9.84 Earth hours	1.90×10^{27}	88,729 miles 142,796 km	31-48 arc seconds	120 K (cloud tops)	18 named (plus many smaller ones)
Saturn	9.539 AU 886.7 million miles 1,427.0 million km	29.456 Earth years	10.2 Earth hours	5.69×10^{26}	74,600 miles 120,660 km	15-21 arc seconds excluding rings	88 K	18+

Uranus	19.18 AU 1,784.0 million miles 2,871.0 million km	84.07 Earth years	17.9 Earth hours	8.68 x 10^{25}	32,600 miles 51,118 km	3-4 arc seconds	59 K	15
Neptune	30.06 AU 2,794.4 million miles 4,497.1 million km	164.81 Earth years	19.1 Earth hours	1.02 x 10^{26}	30,200 miles 48,600 km	2.5 arc seconds	48 K	2
Pluto (a dwarf planet)	39.53 AU 3,674.5 million miles 5,913 million km	247.7 years	6.39 Earth days	1.29 x 10^{22}	1,413 miles 2,274 km	0.04 arc seconds	37 K	1 large (plus 2 tiny)
Planet (or Dwarf Planet)	**Distance from the Sun (Astronomical Units miles km)**	**Period of Revolution Around the Sun (1 planetary year)**	**Period of Rotation (1 planetary day)**	**Mass (kg)**	**Diameter (miles km)**	**Apparent size from Earth**	**Temperature (K Range or Average)**	**Number of Moons**

Another Planet?

In 2005, a large object beyond Pluto was observed in the Kuiper belt.

A few astronomers think that there might be another planet or companion star orbiting the Sun **far** beyond the orbit of Pluto. This distant planet/companion star may or may not exist. The hypothesized origin of this hypothetical object is that a celestial object, perhaps a hard-to-detect cool, brown dwarf star (called Nemesis), was captured by the Sun's gravitational field. This planet is hypothesized to exist because of the unexplained clumping of some long-period comet's orbits. The orbits of these far-reaching comets seem to be affected by the gravitational pull of a distant, Sun-orbiting object.

Planet Activities and Quizzes

Planet Coloring pages

An interactive puzzle on the Solar System.

Find It!, a quiz on the planets.

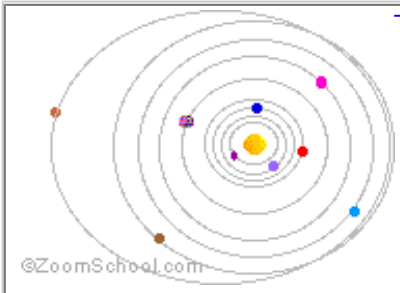
A fill-in-the-blank (cloze) activity on the Solar System - or go to the answers.

Solar System Model to make.

Solar System calendar to print out and color.

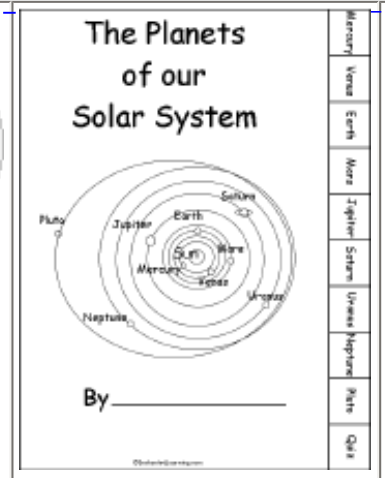
Solar System Crafts

How to write a report on a planet - plus a rubric.



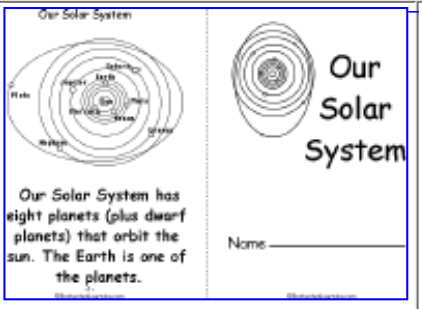
Astronomy: K-3 Theme Page

Activities, quizzes, books to print, and printouts.



The Planets A Book With Tabs

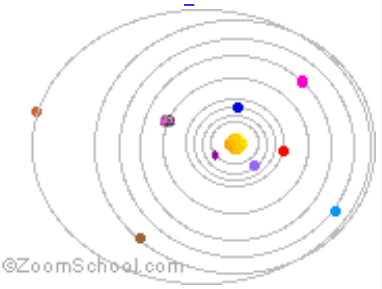
An activity book on the Solar System to print for fluent readers. The book contains information, pictures, and questions to answer.



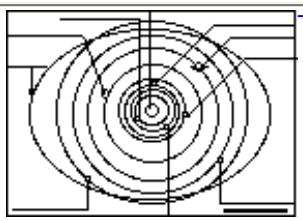
The Solar System Book

A simple printable coloring book about the Solar System to print (for early readers). Pages on the Solar System, the sun, Mercury, Venus, the Earth, Mars, Jupiter, Saturn, Uranus, Neptune, and Pluto.

Solar System Coloring Book

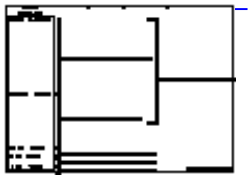


Color and learn about our Solar System, the Sun, the planets, asteroids, comets, and our moon.



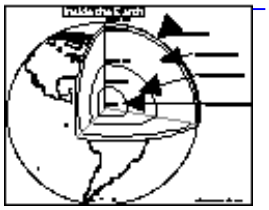
Solar System Diagram

Label the Sun and planets.
Answers



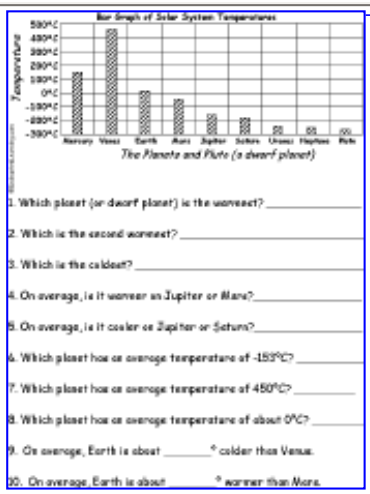
Earth's Atmosphere

Label the atmospheric layers of the Earth.
Answers



Earth Diagram

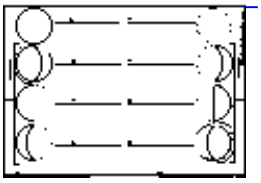
Label the inside of the Earth.
Answers



Celsius Bar Graph Questions #2: Printable Worksheet

A printable activity worksheet in which the student reads a bar graph of the average temperatures of the planets to answer questions, for example, "On average, is it warmer on Jupiter or Mars?" Or go to the

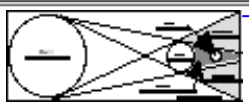
answers. Go to a pdf version of the worksheet.



Moon Phases Diagram

Label the phases of the waxing and waning moon.

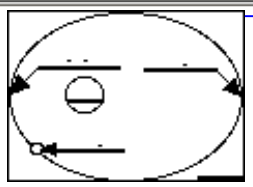
Answers



Lunar Eclipse Diagram

Label the lunar eclipse.

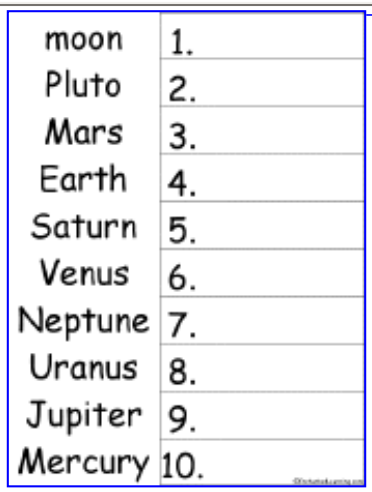
Answers



Planet-Sun Orbital Diagram

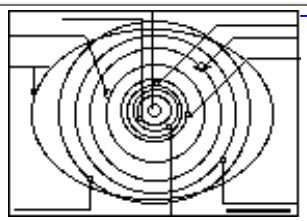
Label the aphelion (farthest point in orbit) and perihelion (closest point in orbit) of a planet in orbit.

Answers



Put 10 Planet Words in Alphabetical Order - Worksheet

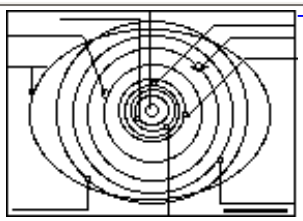
Put 10 planet words in alphabetical order. The words are: Earth, Jupiter, Mars, Mercury, moon, Neptune, Pluto, Saturn, Uranus, Venus. Go to the answers.



The Planets in English A Label Me! Printout

Label the Solar System in English.

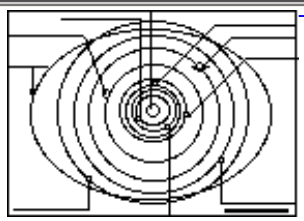
Answers



The Planets in French A Label Me! Printout

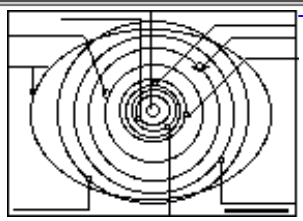
Label the Solar System in French.

Answers



The Planets in German A Label Me! Printout

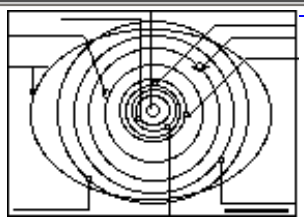
Label the Solar System in German.



The Planets in Italian A Label Me! Printout

Label the Solar System in Italian.

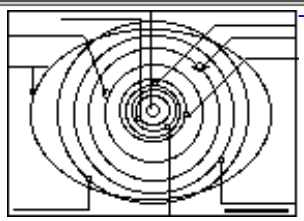
Answers



The Planets in Portuguese

Label the planets in Portuguese.

Answers



The Planets in Spanish A Label Me! Printout

Label the Solar System in Spanish.

Answers			Answers

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