***U3A-GROUP ASTRONOMY* (23-2-2007)**

VENUS & MARS

	VENUS	**x Earth**	**MARS**	**x Earth**
Diameter	12,104 km	0.95	6,792 km	0.53
Mass		0.81		0.10
Volume		0.86		0.15
Distance to the Sun	105 million km	0.7	225 million km	1.5
Rotation period	243 days	243	24 hours 37 minutes	1.03
Orbit around Sun	224 days	0.6	687 days	1.9
Number of satellites	0		2	
Escape velocity	10.4 km/sec	0.9	5.0 km/sec	0.45

Venus

Very bright Morning-/Evening-star. Closer to the Sun than Earth → phases and solar transits.
Venus looks in many respects like the Earth (size, mass, etc.) and for a long time people thought life to exist on Venus in a pleasant, warm climate. Now we know how great the differences are:
Venus rotates around its axis in 243 days ('day' lasts longer than 'year' = 224 days!), it is the only planet that rotates clockwise, its atmosphere consists for 96% of CO2 and 3.5% of N., the pressure at the surface is c. 90 atmosphere, clouds consist mainly of sulphuric acid, as the result of an extreme greenhouse effect the average temperature on Venus is c. 460 degrees C., Venus has no seasons and no moon, and its landscape is always dusky with an orange sky.
In brief: Venus is more like hell than like paradise!

Space research

In the 1960's and 70's US Mariners flew by Venus and discovered how dense the atmosphere and how hot the surface was. Between 1961 and 1983 the Soviet Union sent 10 Venera probes to Venus. Several failed, but some of them managed to land and to produce the first photographs of the surface. Between 1978 and 1992 the US probes Pioneer Venus and Magellan orbited Venus and mapped 98% of the surface by using radar.
In Oct. 2005 ESA launched the Venus Express, which came into orbit in April 2006.

Mars

Our other nearest neighbour is totally different. It is much smaller (diameter about half of that of Venus and Earth, volume 15% and mass 10% of Earth), it has a 'normal' length of day (24.5 hrs) while the year lasts 3 x as long as on Venus, it has seasons (year and seasons 2x as long as on Earth), it has a very thin atmosphere, mainly CO_2 (95%) and N (=Venus) and the pressure at the surface is a mere 6 mb (=0.006 atm).
Mars has very large geomorphological phenomena, such as the largest volcano in the SS: *Olympus Mons* (25 km high) and the canyon *Vallis Marineris* (4500 km long and max. 10 km deep).
For a long time people believed that life existed on Mars, even with human-like beings, who would have dug *canals* for irrigation purposes.

Space research

On a much larger scale than in relation to Venus: Easier and more interesting because of much bigger chances to find water and signs of life. Not always successful: since 1960 no less than 34 spacecrafts have been sent to Mars, of which 23 failed.
It began with US *Mariners*: M's-4, 6 and 7 flew by Mars and obtained pictures in the1960's.
M-9 was the first to enter orbit in 1971; it discovered that the atmosphere was much thinner than it had been thought to be until then. In 1976 two *Viking landers* were the first probes to land on Mars and to produce pictures of the landscape.
In 1996 the 6-wheel *Sojourner* landed on Mars. It saw sedimentary rocks = proof that water had deposited the material. In 1997 the *Mars Global Surveyor* came in orbit around Mars. It produced some 240,000 very good images. NASA lost contact with the probe in November 2006, but just before that happened it produced proof that *nowadays* water may be flowing on Mars!

In 2003 ESA launched the *Mars Express*, in orbit since Dec. '03 and looking for water under the surface.
In January 2004 two *Mars Exploration Rovers* named *Spirit and Opportunity* landed on Mars, robots destined to travel about one kilometre each in 90 days of their active life. Now, more than 3 years later, they both still function. *Spirit* travelled c. 7 km, *Opportunity* more than 10 km. They found more proof that water existed on Mars.
In August 2005 the 2,200 kg *Mars Reconnaissance Orbiter* was launched, a satellite with a huge telescope and camera, a spectrometer and many other instruments. It can 'see' objects with a diameter of less than a metre.
Further probes will be launched by NASA and ESA in 2007, 2009 and 2011.

There is no proof yet that life ever existed on Mars and if so, if simple forms of it have survived until today. *But the search goes on!*