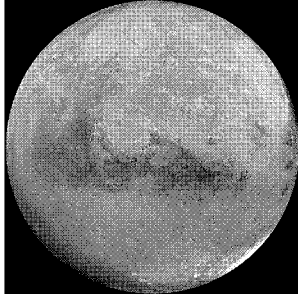


Thursday, October 28
Mars

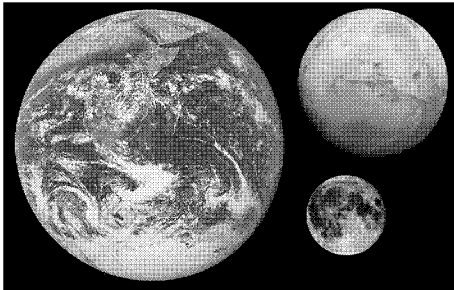


Problem set #2 will be due on Monday.

Mars
Key Concepts

- 1) The present atmosphere of Mars is thin, dry, breezy, and cold.
- 2) The present surface of Mars is a desert, with signs of past volcanic activity.
- 3) Evidence of past water flows indicates that Mars was once warmer & wetter.

Mars is a fairly small planet.

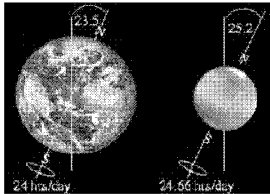
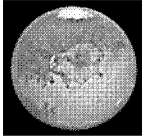


Earth radius $\approx 2 \times$ Mars radius
Mars radius $\approx 2 \times$ Moon radius

Mars is relatively easy to observe from Earth.

Orbital period = 1.88 years

Rotation period = 24 hours, 37 min

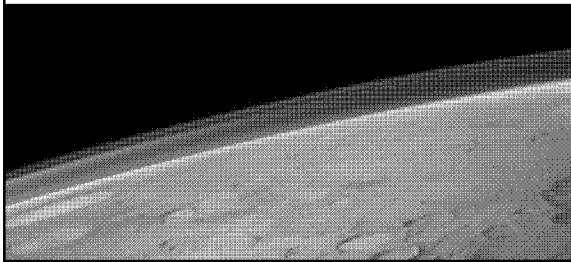


Martian seasons are similar to Earth seasons (only longer).

Martian atmosphere: thin & dry

95% CO₂, only traces of water vapor.

Martian air pressure is just 0.7% of Earth's.
(Like being at an altitude of 30 km on Earth.)



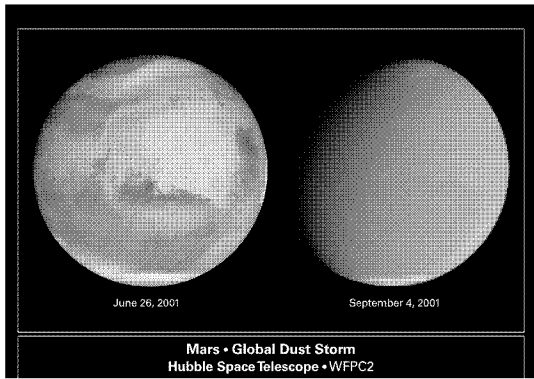
Martian weather: breezy & cold.



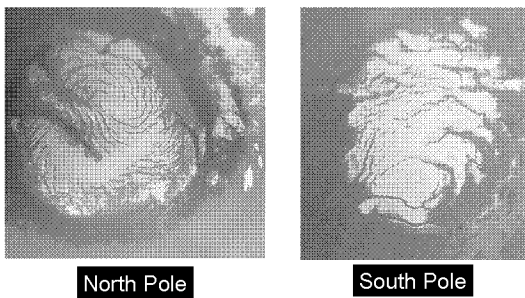
Average temperature = -50°C (= -58°F)

Gusty winds lead to "dust devils".

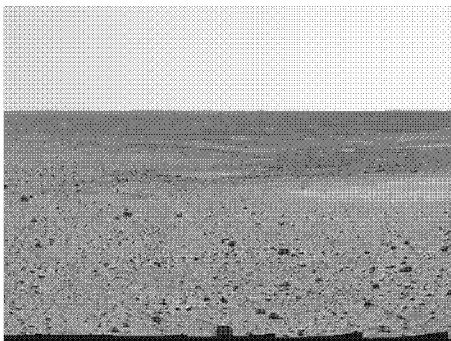
Huge dust storms can enshroud the entire planet.



The polar caps of Mars are a mixture of frozen H₂O (“ice”) and frozen CO₂ (“dry ice”).

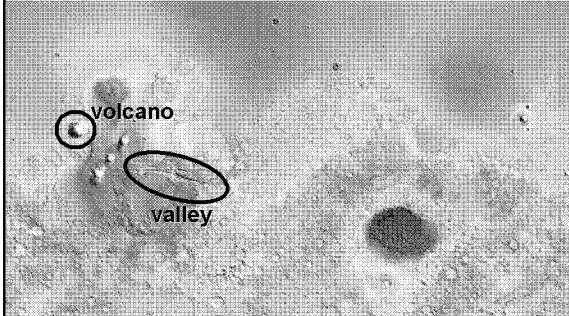


The surface of Mars looks like a desert.



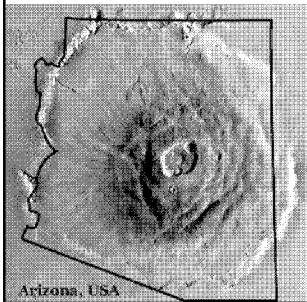
By Earthly standards, it **is** a desert.

Mars is divided between old cratered highlands and younger smooth lowlands.



Red = highlands Blue = lowlands

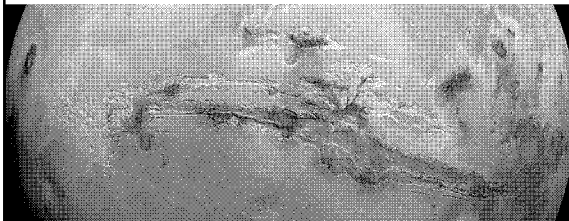
Olympus Mons is the largest volcano in the Solar System.



It's located over a "hot spot" in the Martian mantle.

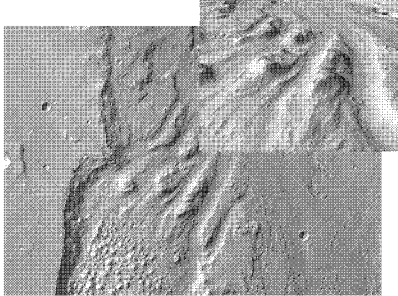
It last erupted 300 Myr ago (extinct or dormant).

Valles Marineris is the biggest valley in the Solar System.

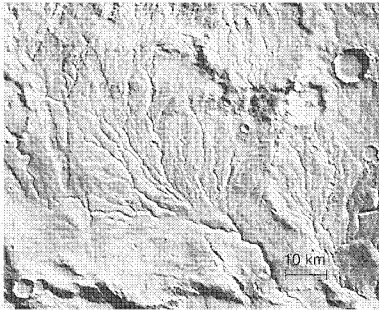


It's a **rift valley** over 4000 km long (about the distance from Boston to LA).

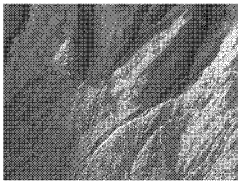
Deep, broad outflow channels are evidence for catastrophic floods in the past.



Narrow, dried riverbeds are evidence for sustained flow billions of years ago.

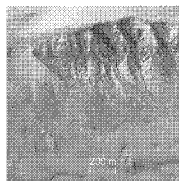


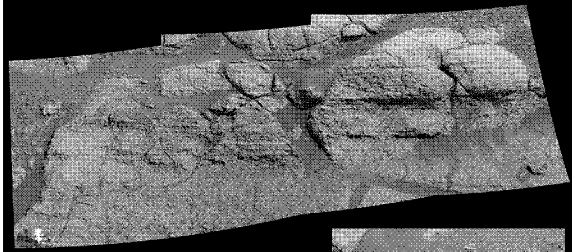
Flow patterns are strong evidence for liquid water in the past.



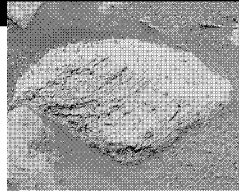
Scarcity of impact craters on top of some flows shows they are quite young.

Some narrow gullies are a few million years old – or less.

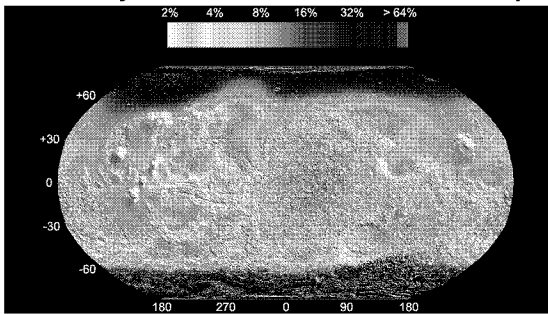




Layered sedimentary rocks contain hydrated minerals like hematite.



Ice lurks just below the Martian surface today.



What's actually plotted is the hydrogen content of the soil (presumably from H₂O).

Mars was once warmer and wetter.

