

# Solar System

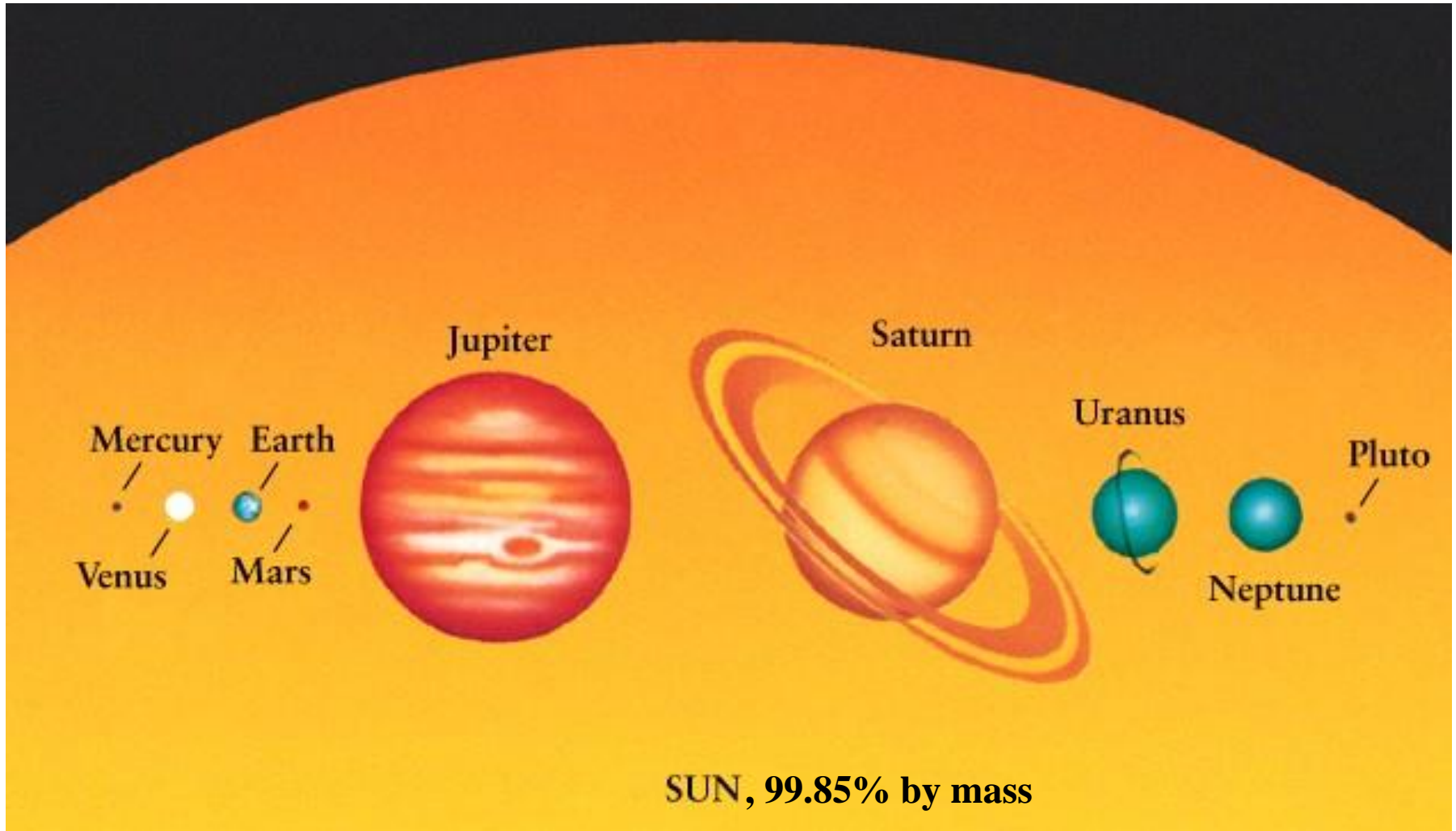


**Can you name the objects?**

# Solar System: inventory

- **Sun**                    **99.85%** by mass
- **Planets**                **0.1 %** by mass
- **Satellites** (“moons”) and **Rings** of planets
- **Asteroids** (“minor planets”, small *rocky* bodies orbiting the Sun)
- **Comets** (small *icy* bodies orbiting the Sun)
- **Meteoroids** (rocky or metallic bodies smaller than 1 m)
- **Dust** (very small particles)
- **Solar Wind** (ionized gas escaping the Sun)

# Sun and Planets: sense of scale



# Our star: the Sun

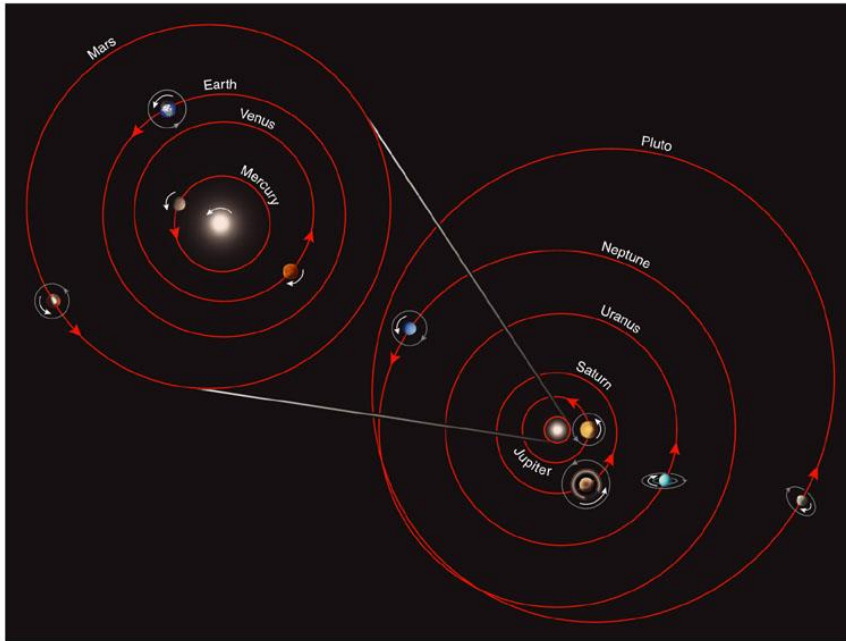


**The Sun is a star at the center of our Solar System**

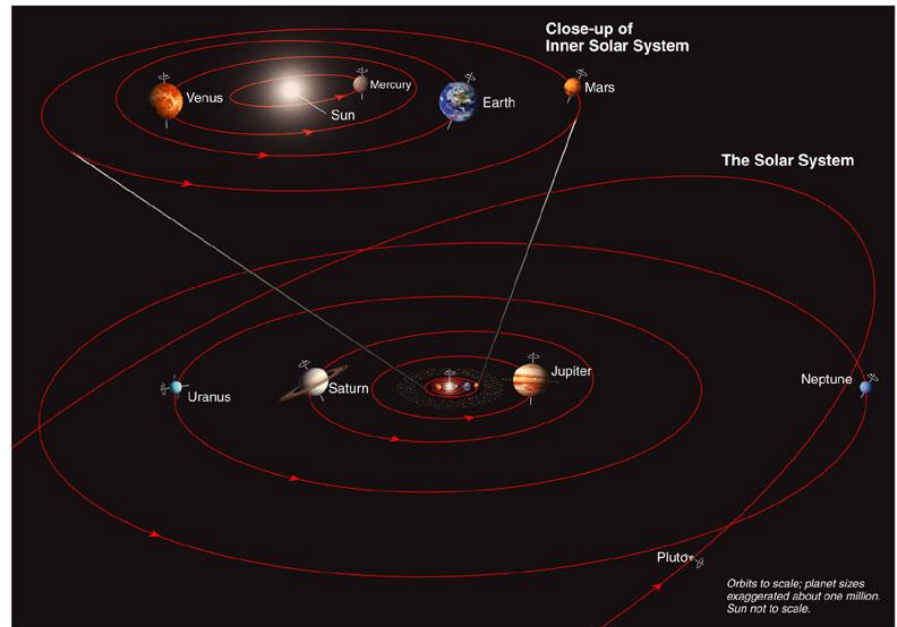
- The Sun is estimated to be **4.5 billion years old**.
- It is **333,400 times more massive** than the Earth.
- It is **99.85% of all the mass** of the Solar System.
- **Core** temperature: **~28 million °F**
- **Surface** temperature: **~10,000 °F**
- It takes **several hundred thousand years for light to escape** from the dense core and reach the surface.
- The Sun generates energy equivalent of **100 billion tons of TNT** (*famous explosive*) **exploding every second**.
- It **supports all life on Earth**.

# General Characteristics of Major Planets

All eight major planets have nearly **circular** orbits.  
All orbits are within 10 degrees of Earth's orbital plane.



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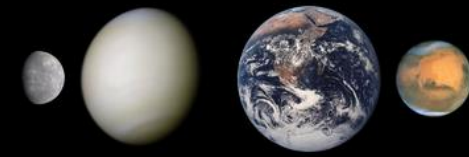
All planets **revolve** in the same direction.  
All **except Venus** **rotate** in the same direction.



# Definitions and Units

- **Day** time it takes for a planet to complete one rotation about its axis
- **Year** time it takes for a planet to complete one orbit around its star
- **<surface T>** average temperature at the planet's surface
- $^{\circ}\text{C}$  (“degrees Celsius”) =  $(^{\circ}\text{F}-32)\times 5\div 9$
- **1 km** (“kilometer”) = **0.62 miles**

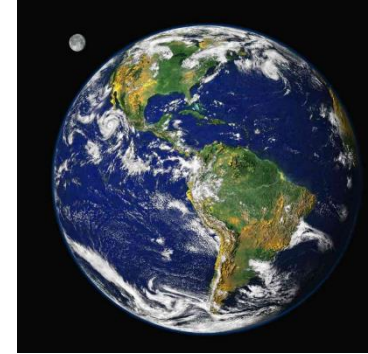
# Terrestrial Planets



## 1. MERCURY

“Smallest planet”  
Craters

1 Year on Mercury = 88 Earth days  
1 Day on Mercury = 58.6 Earth days  
<surface T> = 117°C day/ -170°C night  
<distance from the Sun> = 58 million km  
Number of moons = 0



## 3. EARTH

“The Blue Planet”  
Water  
Life

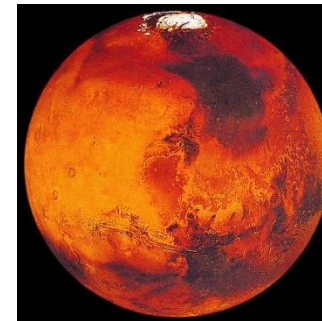
<surface T> = 15°C  
<distance from the Sun> = 150 million km  
Number of moons = 1



## 2. VENUS

“Sister planet”  
CO<sub>2</sub> atmosphere  
Hottest planet

1 Year on Venus = 225 Earth days  
1 Day on Venus = 243 Earth days  
<surface T> = 460°C  
<distance from the Sun> = 108 million km  
Number of moons = 0

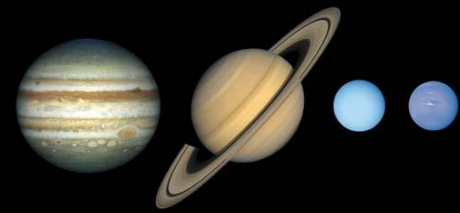


## 4. MARS

“Red planet”  
Polar ice caps  
Dust storms

1 Year on Mars = 687 Earth days  
1 Day on Mars = 24.6 hours  
<surface T> = -63°C  
<distance from the Sun> = 249 million km  
Number of moons = 2

# Jovian Planets



## 5. JUPITER

Gas Giant

“Largest planet”

Giant storms

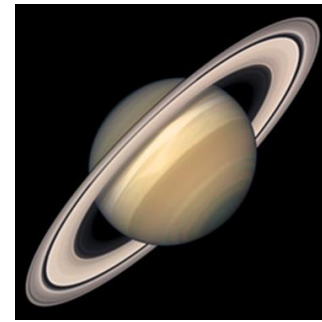
Fastest rotation

1 Year on Jupiter = 11.9 Earth years

1 Day on Jupiter = 9 hours 55 minutes

<distance from the Sun> = 778 million km

<T> = -110°C      **Number of moons = 69 !**



## 6. SATURN

Gas Giant

“Ring planet”

Metal-rock core?

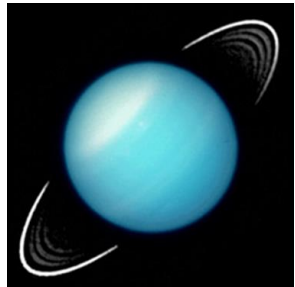
1 Year on Saturn = 29.5 Earth years

1 Day on Saturn = 10 hours 33 minutes

<surface T> = -140°C

<distance from the Sun> = 1457 million km

Number of moons = 62+



## 7. URANUS

Ice Giant

42 Earth years long

summer...

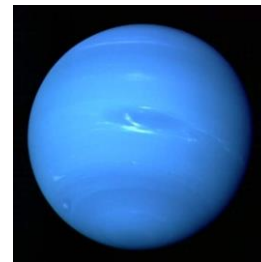
1 Year on Uranus = 84 Earth years

1 Day on Uranus = 17 hours 14 minutes

<surface T> = -197°C

<distance from the Sun> = 2870 million km

Number of moons = 27



## 8. NEPTUNE

Ice Giant

Fastest winds

Coldest planet

1 Year on Neptune = 164 Earth years

1 Day on Neptune = 16 hours 6 minutes

<surface T> = -201°C

<distance from the Sun> = 4498 million km

Number of moons = 14