2pts ec

What is the difference between the inner & outer planets?

Chp 18, Section 1, Lect 2 Notes: The Planets

How do we measure distance in space?

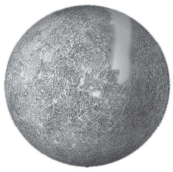
Because space is so big, we use special units to measure distance. Imagine trying to measure the distance from Earth to the sun in kilometers. Instead, astronomers use the _____ (AU). An AU is the distance from the _____ to the _____, or 150,000,000 km. Another way to measure distance is by the distance light travels in a given amount of time. Light travels 300,000 km per second in space. 1 light year (the distance light travels in 1 year) is 9.36×10^{12} km. 1 light minute (the distance light travels in 1 minute) is around 18 million km.

_____ Planets

- The _____ planets are similar to Earth.
- "terra" is the latin word for "Earth"
- **Features:** small, dense cores, rocky crusts, high densities, _____ rotations, _____ moons, relatively close to one another.

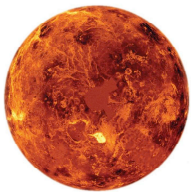
First Planet: _____

- Smallest planet after Pluto
- _____ larger than our moon
- 1 rotation = 59 days, 1 revolution = 88 days
  - A day on Mercury is almost a year!
  - Long cycles of day & night: 3 months of daylight, 3 months of darkness
- Looks like our moon, rocky & cratered, because it has no atmosphere
- _____ moon
- Extreme temperatures: 420˚C (hot enough to melt lead!) to -170˚C
- Named for the messenger of the Roman gods because of its quick motion in the sky



Second Planet: _____

- Earth's _____or Sister Planet: same size, gravity, & rocky surface
- Opposite rotation, _____, or retrograde rotation
- A day on Venus is longer than a year: 1 day is 243 Earth days (8 months)
- Crushing atmosphere - 90 times our atmosphere
- _____planet: average surface temperature is 464˚C (870˚F)
- Clouds are not water, but deadly sulfuric acid
- Brightest planet in our sky - called the morning or evening star because it rises and sets with our sun
- Named after the Roman goddess of love because of its beautiful, shiny appearance

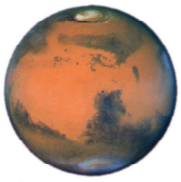


Third Planet: _____

- Just the right distance from the sun
- Warm enough to prevent most water from freezing, cool enough to keep it from boiling away
- Vast amounts of water lead to life - as far as we know, the only planet with life in the solar system
- Tilt of the axis provides seasons
- Atmosphere made mostly of Nitrogen (78%) and Oxygen (21%)
- Active geology - volcanoes, crustal movement

- Only planet not named after a Roman god - Earth comes from the old English “oerthe” meaning land or country

Fourth Planet: _____



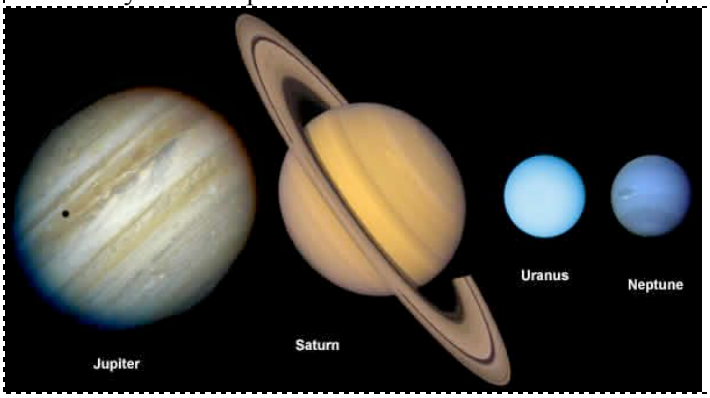
- Most studied planet besides Earth
- _____ tiny, irregular-shaped moons (once asteroids?): Deimos & Phobos
- Very _____ (below 0˚C) due to it thin atmosphere & distance from sun
- Air pressure is so low that any liquid water would boil away - the only water on Mars exists as ice
- Surface covered in deserts, huge valleys, craters, and volcanic mountains
- The Mars rover (Viking) discovered erosion and patterns of riverbeds - indicating that there was once flowing water
- Named after the Roman god of war since its color resembles that of blood.

Pit Stop: _____

- Between _____ and_____, at a distance of 320-495 million kilometers, is a huge gap that cuts the solar system in half
- This gap is is filled with thousands of small rocky asteroids.
- There are at least 10,000 asteroids.
- They have elliptical orbits.

Side Trip: _____

- Largest object in the asteroid belt, about the size of _____
- Its diameter (940 km) is about 25% the diameter of our Moon
- Discovered in 1801
- Rotates once every 9 hours
- Named after the Roman goddess of the harvest, of growing plants, and motherly love



Outer Planets

- _____ - they are all enormous planets made of mostly gas
- Inside the planets, the gases are more dense than water
- Also called the Jovian planets
- Don’t have any known solid surfaces
- Separated from each other by huge distances

Fifth Planet: _____

- Largest planet - mass is greater than all of the planets combined
- Spins the fastest - rotates once every 10 hours
- Made mostly of hydrogen & helium, with some water, methane & ammonia (like our sun)
- More liquid than gaseous or solid - over half its volume is an ocean of liquid hydrogen
- Great Red Spot: A storm that has been observed for over 300 years, has a diameter of 1 and a half that of Earth’s
- Has _____ known moons (Jupiter is almost a mini-solar system) - some of these moons are so large they resemble planets
- _____ - largest moon in solar system and has a magnetic field like Earth
- Named for the king of Roman gods - due to its brightness in the sky

Sixth Planet: _____

- Second largest planet in the solar system
- Atmosphere made of mostly hydrogen & helium
- Spins quickly - 1 day is about 11 Earth hours
- Revolves slowly - 1 year is about 29 Earth years
- Saturn's rings, made up of billions of particles of rock and ice are over 136,000 km wide, but less than 100 meters thick
- At least _____ moons. - _____: Saturn’s largest moon, scientists have found evidence of organic molecules, raising the possibility of life, In 2004, a probe from Earth landed on Titan.
- Named for the Roman god of agriculture & time, due to its slow orbit

Seventh Planet: _____

- Pronounced "yer - uh - nus"
- Another giant & cold planet made mostly of hydrogen & helium
- Rotates _____ -its axis is tilted 98°
- 1 day is about 18 Earth hours, but 1 year is about 84 Earth years
- Has at least 21 moons, all small
- Through a telescope - looks like a small blue-green disk
- Named from the Greek word which means "sky"

Eighth Planet: _____

- Very similar to Uranus - big and cold
- Outermost of the gas giants
- Neptune's orbit is almost a perfect circle
- Has a series of faint rings which cannot be seen from Earth
- Has 8 small moons
- _____: Neptune's largest moon, probably mix of rock and ice
- Discovered in 1846 - its discovery nearly doubled the boundaries of our solar system
- Also has a great dark spot as well as some bright clouds
- Named after the Roman god of the sea, due to its color?

Ninth Planet: _____

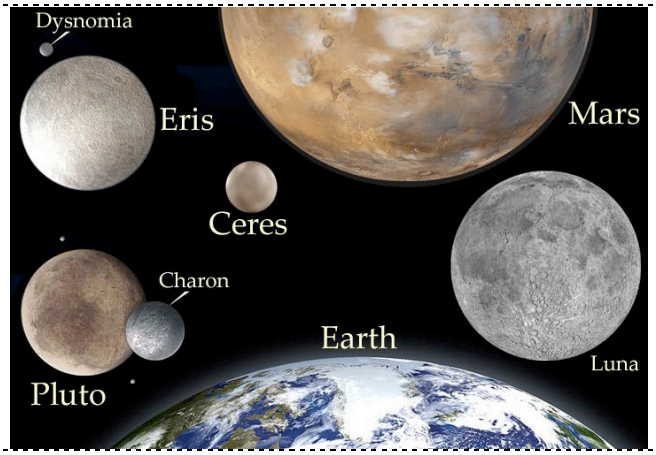
- Because it is so far away, we know very little about Pluto
- Made of rock and ice
- Smallest planet - less than half the size of Mercury
- Orbits slowly and backwards 1 rotation every 6 days
- Named for the Roman god of the underworld
- Has 1 moon: _____, which is half its size
- Very _____ orbit - its path actually crosses Neptune's for about 20 years out of the 249 years it takes to revolve once around the sun

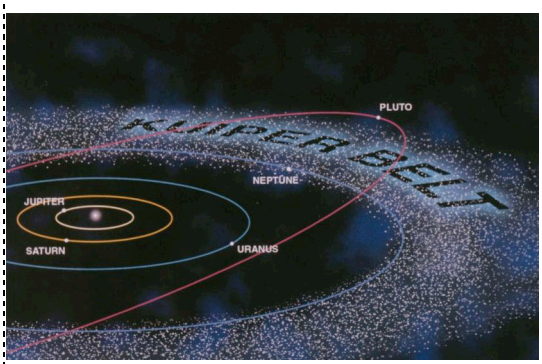
So, is Pluto a planet or not?

- Not! Last summer, the International Astronomical Union (IAU) decided that Pluto is a _____.
- They made this decision for two reasons:
  1. _____: Pluto is TINY and made out of rock & ice - definitely not like the other outer planets
  2. _____: Pluto has a very weird orbit - its highly elliptical orbit isn't even on the same plane as the rest of the planets
- That makes for one weird little guy

Planet #10?: _____

- Located in the in the outer reaches of the Kuiper belt
- Discovered in 2005
- So cold, it's atmosphere has frozen on its surface - reflects as much sunlight as snow
- 27% more massive than Pluto… so if Pluto's a planet, then so is Eris!
- In fact, if you scooped up all the asteroids in the asteroid belt they would fit inside Eris, with a lot of room to spare.
- Highly elliptical orbit - in about 290 years, Eris will move close enough to the Sun to partially thaw & melt away.
- Named after the Greek goddess of conflict





Final Stop: _____

- Located outside the region of Pluto
- Stretches 1,000 AU
- Discovered in 199
- A spacecraft is estimated to reach the belt in 2016
- Contains _____, plus asteroid-size and a few Pluto-size objects
- Including: Sedna, Xena
- The IAU decided we'll say Pluto, Sedna, Xena, and any other similar bodies would be classified as _____ (or KBOs).

SOLAR SYSTEM

Date:_____
Name:_____
Class:_____

1 Which figure is closest to the age of the solar system?

A 450,000 years
B 4.5 million years
C 450 million years
D 4.5 billion years

2  **What force pulled the solar system together out of a cloud of gas and dust?**

A The strong force
B Gravity
C Electrical force
D Magnetic force

3 Which term best describes how the solar system formed?

A Gradually
B Rapidly
C Electrically
D Chemically

4 Which of the following is a terrestrial planet?

A Jupiter
B Saturn
C Mercury
D Neptune

5  **Where can you find the asteroid belt?**

A Between Earth and Mars
B Between Venus and Earth
C Between Mars and Jupiter
D Between Saturn and Uranus

6 How is Venus different from Jupiter?

A Jupiter is a gas giant, Venus is a terrestrial planet
B Jupiter is a planet, Venus is a large asteroid
C Jupiter is a terrestrial planet, Venus is a gas giant
D Jupiter has no moons, Venus has two moons

7 What does Jupiter have in common with Neptune?

A They're both red in color
B They're both terrestrial planets
C They both have exactly three moons
D They both have large storm "spots"

8 Which of the following can be found in the Kuiper Belt?

A 
B 
C 
D 

9 In terms of orbit, the Earth is to the sun as what is to the Earth?

A Mars
B The moon
C A comet
D Venus

10  **How might Mars be different if its surface did not contain so much iron?**

A It would be much lighter
B It would be a different color
C It would be a gas planet
D Its orbit would be different

OUTER SOLAR SYSTEM

Date:_____
Name:_____
Class:_____

1 How is Pluto different from Planet X?

A Planet X was never discovered; Pluto was
B Planet X is a gas giant; Pluto is a dwarf planet
C Planet X has several moons; Pluto has no moons
D Planet X contains single-celled life forms; Pluto does not

2  **Why is Pluto no longer considered a planet?**

A Its orbit is too irregular
B Its orbit is too far away from the sun
C It isn't large enough
D It orbits Neptune, not the sun

3 Place the following in order, from closest to furthest away: A) The scattered disc; B) The Kuiper Belt; C) The Oort cloud

A A, B, C
B C, B, A
C B, A, C
D C, A, B

4 What can you infer about the Kuiper Belt from the objects that orbit within it?

A It's very small
B It's very cold
C It's very dense
D It's very close to Neptune

5 How is Orcus different from Charon?

A Orcus orbits the sun; Charon orbits Pluto
B Orcus is a dwarf planet; Charon is a Kuiper Belt object
C Orcus is a comet; Charon is a trans-Neptunian object
D Orcus is very large; Charon is very small

6 Place the following objects in order, according to size: A) Earth; B) Pluto; C) Eris

A A, C, B
B B, A, C
C C, A, B
D A, B, C

7 Which of the following objects most likely originated in the Oort Cloud?

A Eris
B Pluto
C Comet Hale-Bopp
D Varuna

8 What is the difference between the termination shock and the heliopause?

A The termination shock slows the solar wind and the heliopause stops it
B The heliopause slows the solar wind and the termination shock stops it
C Sunlight is not visible from the heliopause; it is visible from the termination shock
D Sunlight is not visible from the termination shock; it is visible from the heliopause

9 What do the Voyager and Pioneer probes have in common?

A They've both passed the heliopause
B They were all launched during the 1980s
C They've all been very easy to track
D They're all unmanned spacecraft

10 If you had a spaceship that could travel at the speed of light, how long would it take you to reach the Oort cloud?

A About a year
B About six months
C About a month
D About a week