

***Discussion Questions***

1) Briefly summarize the differences between terrestrial and jovian planets.

2) Describing the solar nebula theory.

3) Briefly describe the modern theory of how our Moon formed.

4) Summarize some of the evidence suggesting that Mars once had flowing water.

5) Describe the three sources of internal heat of the terrestrial planets.

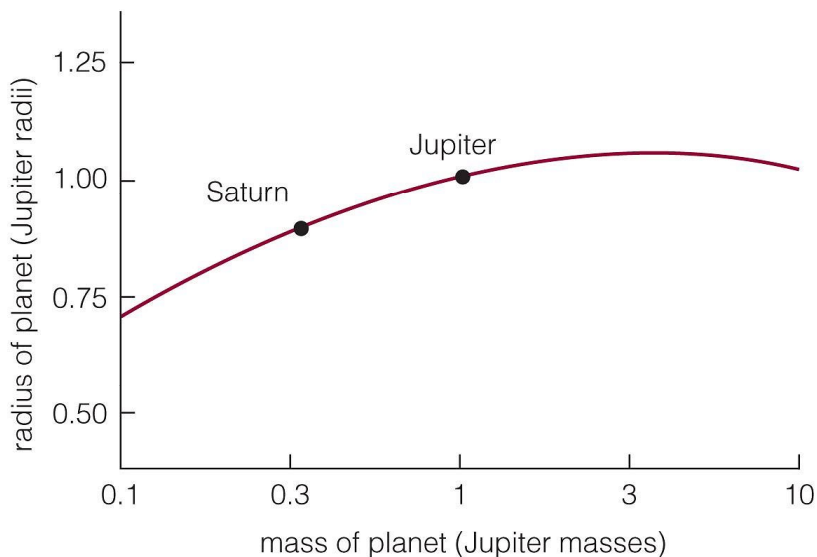
6) Explain how the resonance among Io, Europa, and Ganymede makes their orbits slightly elliptical.

7) Why does it make sense that the jovian planets farther from the Sun have less mass?

8) Why is Pluto now considered to be a Kuiper-belt object? and what is meant by a "dwarf planets"?

9) Describe the impact the discovery of extrasolar planets has had for understanding the origin of our own Solar System.

10) **CRITICAL THINKING: FOR THE NEXT SET OF PROBLEMS, YOU CAN ANSWER MOST BY READING THE TEXT. IF YOU STILL NEED HELP TALK WITH A FEW CLASSMATES. IF NEEDED GO TO ONE OF THE TUTORING CENTERS ON CAMPUS. MAKE SURE YOU UNDERSTAND IT, DON'T SIMPLY COPY THEIR SOLUTION. PLEASE TAKE YOUR TEXTBOOK.**



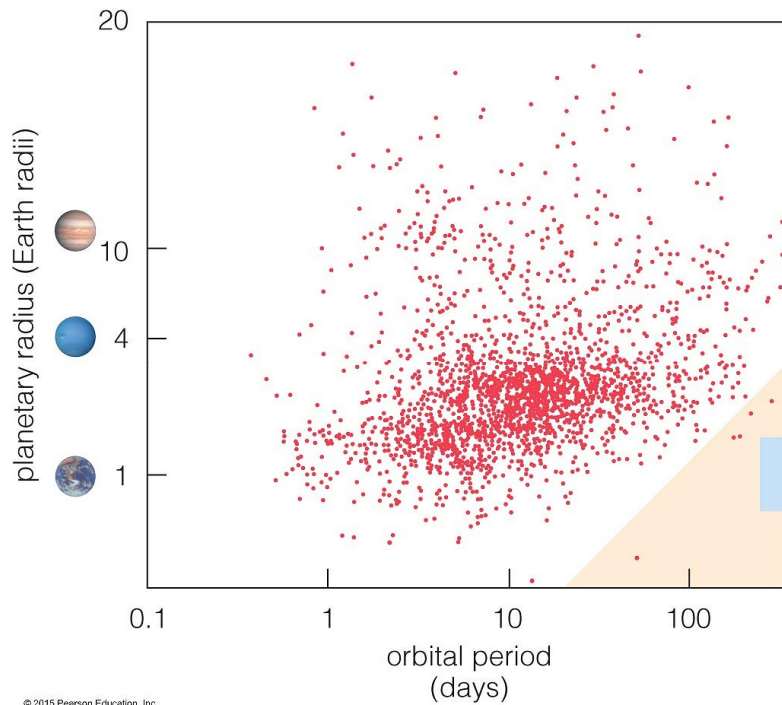
b This graph shows how radius depends on mass for a hydrogen/helium planet. Notice that Jupiter is only slightly larger in radius than Saturn, despite being three times as massive. Gravitational compression of a planet much more massive than Jupiter would actually make its radius smaller.

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If a planet is found with a radius 5% greater than Jupiter, which is the best first estimate of that planet's mass?

- A) about 3 times Jupiter's mass
  - B) about 10 times Jupiter's mass
  - C) about 1 times Jupiter's mass
  - D) about 0.3 times Jupiter's mass
- 11) Suppose you find a rock that contains 10 micrograms of radioactive potassium-40, which has a half-life of 1.25 billion years. By measuring the amount of its decay product (argon-40) present in the rock, you conclude that there must have been 80 micrograms of potassium-40 when the rock solidified. How old is the rock?
- A) 1.25 billion years
  - B) 5.0 billion years
  - C) 2.5 billion years
  - D) 3.75 billion years

12)



This figure shows the orbital periods and radii of all planet candidates identified from *Kepler* data as of early 2013. Which of the following size planets were most detected?

- A) planets between 1 Earth radius and 4 Earth radii in size
- B) planets greater than 10 Earth radii in size
- C) planets less than 1 Earth radius in size
- D) planets between 4 Earth radii and 10 Earth radii in size

Use these choices for the following questions.

- A. the most volcanically active body in the solar system
- B. thought to have a deep, subsurface ocean of liquid water
- C. probably a captured Kuiper Belt object
- D. the target of the Huygens probe, which landed on its surface.
- E. the largest moon in the solar system

13) Which of the above applies to Io?

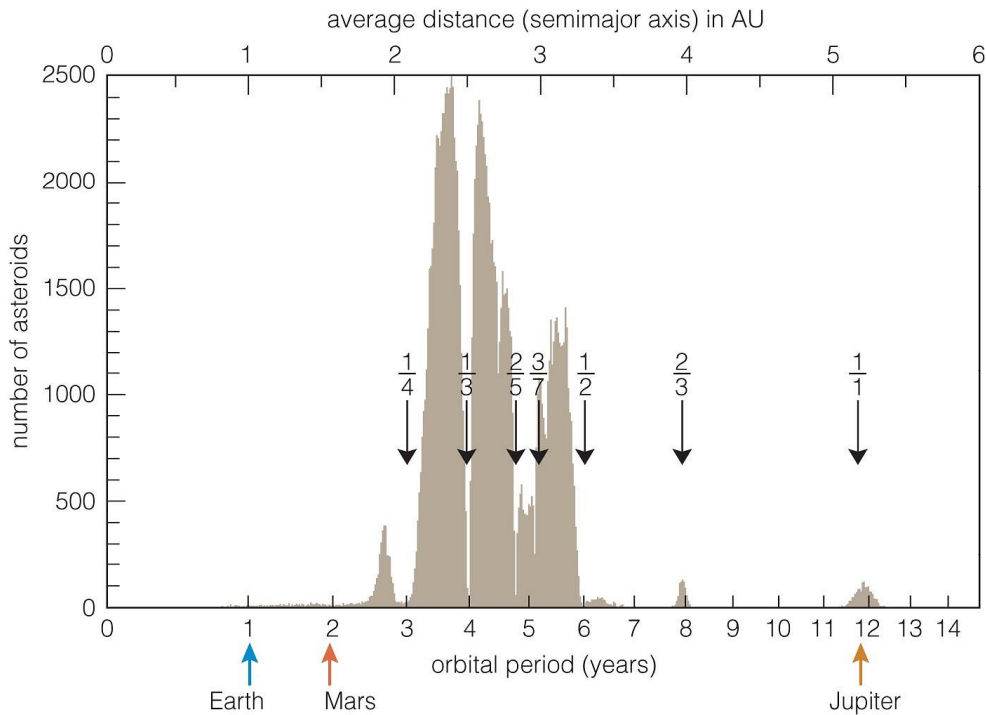
14) Which of the above applies to Europa?

15) Which of the above applies to Triton?

16) Which of the above applies to Titan?

17) Which of the above applies to Ganymede?

18)



The greatest number of asteroids are found

- A) between 3 and 4 AU from the sun.
- B) between 4 and 5 AU from the sun.
- C) between 1 and 2 AU from the sun.
- D) between 2 and 3 AU from the sun.

Refer to the following choices to answer the questions below. Choose the answer that best describes the chemical composition of the object.

- A. nickel and iron
- B. 80 percent nitrogen, 20 percent oxygen
- C. 95 percent carbon dioxide
- D. mostly hydrogen and helium
- E. frozen methane, ammonia, water, and other gases and dust

19) Mercury's core

20) Earth's atmosphere

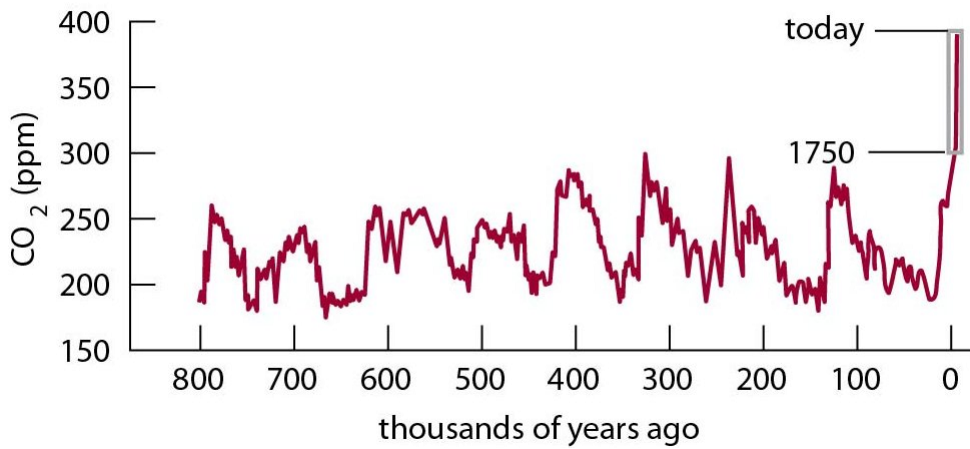
21) the atmosphere of Venus

22) the atmosphere of Mars

23) a Kuiper-belt object

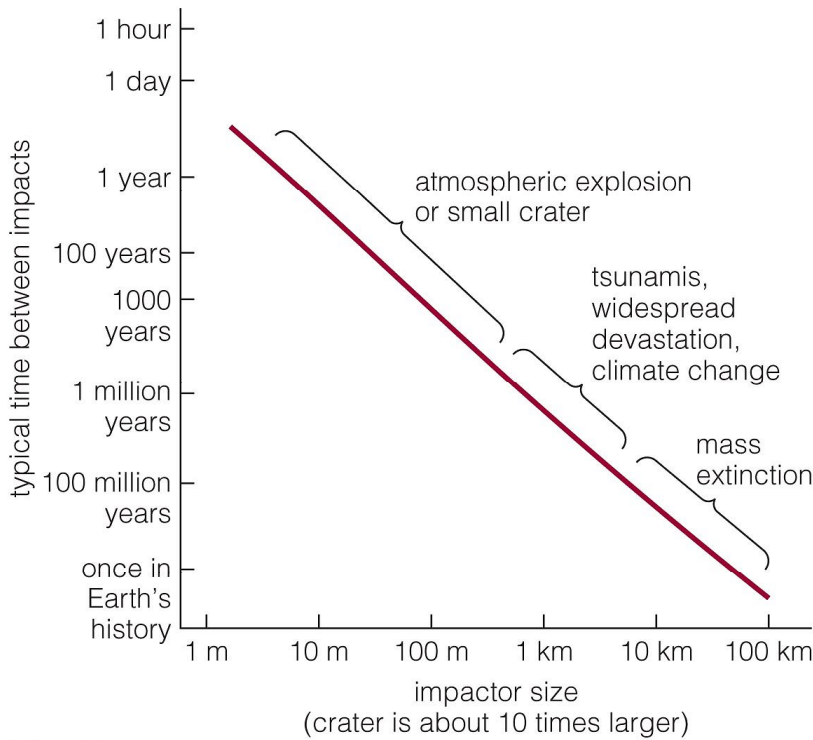
24) Jupiter

25) Comet Hale-Bopp



- 26) The CO<sub>2</sub> concentration of the atmosphere has increased by about \_\_\_\_\_ since 1750.
- A) 10 parts-per-million
  - B) 1000 parts-per-million
  - C) 100 parts-per-million
  - D) None. It has decreased.

27)



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- How frequently do objects that threaten widespread devastation hit the Earth?
- A) about once every year
  - B) about once every million years
  - C) about once every thousand years
  - D) about once every hundred million years

## Solar System Walk.

For this activity we will reduce the Sun to the size of a grapefruit/softball (6 in) 1:10 billion scale. You will walk the solar system with a group of classmates.

Group members. \_\_\_\_\_

Start in front of the J building at the designated free speech area, bottom of the stairs. Walk directly south towards and through the A building. At the chosen interval **state** were you are and **label** on the map. (for example: in the quad or near the bakery). 1 step will be a regular walking step.

Mercury (.39AU)  
 At 20 steps where are you now? \_\_\_\_\_

Venus (.72 AU)  
 At 35 steps where are you now? \_\_\_\_\_

Earth (1 AU)  
 At 50 steps where are you now? \_\_\_\_\_

Mars (1.52 AU)  
 At 75 steps where are you now? \_\_\_\_\_

Jupiter (5.2 AU)  
 At 250 steps where are you now? \_\_\_\_\_

Saturn (9.52 AU)  
 At 500 steps where are you now? \_\_\_\_\_

Uranus (19 AU)  
 At 1000 steps where are you now? \_\_\_\_\_

Neptune (30 AU)  
 At 1500 steps where are you now? \_\_\_\_\_

Pluto & Kuiper belt (39 AU)  
 At 2000 steps where are you now? \_\_\_\_\_

KEY:

- Campus Parking
- Campus Buildings
- Construction Area
- Parking meters
- Daily Parking Permit Machine
- LBCC Shuttle Stop
- Campus Directory
- Designated Free Speech Area
- Designated Smoking Area
- Emergency Phone
- Gender Neutral Restroom

These areas may be subject to change, due to the needs of the district

