

- Which element is critical to the formation of the volcanic surface of Io?
  - iron
  - carbon
  - silicon
  - phosphorus
  - sulfur
- What is thought to cause Io's volcanism?
  - Jupiter's gravity
  - impact energy left over from SL-9
  - radioactive decay of Uranium in its dense core
  - Jupiter's magnetosphere
  - tidal stresses from both Jupiter and Europa
- Which of the Galilean moons is densest and most geologically active?
  - Callisto
  - Io
  - Europa
  - Ganymede
  - Titan
- Which are the four Galilean moons of Jupiter?
  - Io, Titan, Triton, and Charon
  - Io, Ganymede, Callisto, and Titan
  - Europa, Titan, Ganymede, and Callisto
  - Europa, Ganymede, Io, and Triton
  - Io, Europa, Ganymede, and Callisto
- The surface of Europa is most like the earth's
  - tundra.
  - Arctic Ocean.
  - Himalayan peaks.
  - South Pole.
  - deserts.
- The weak magnetic fields around Europa and Ganymede were found during flybys of
  - Cassini.
  - Voyager 1.
  - Galileo.
  - Pioneer 10.
  - Stardust.
- In size and density, both Io and Europa resemble
  - Mercury.
  - Pluto.
  - Mars.
  - our Moon.
  - Charon.
- The mare on Ganymede were formed by
  - basalt erupting onto the surface.
  - sulfur spewed from volcanoes.
  - water erupting and spreading over the surface.
  - plate tectonics.
  - gravitational interactions with Callisto and Europa.
- In terms of dark, smoother mare and cratered highlands, which Jovian moon most resembles the near side of our own?
  - Europa
  - Triton
  - Io
  - Ganymede
  - Titan
- Of the Jovian satellites, which shows the oldest, most cratered surface?
  - Triton
  - Callisto
  - Miranda
  - Enceladus
  - Ganymede
- The largest moon in the solar system, bigger but not as massive as Mercury, is
  - Europa.
  - Triton.
  - Titan.
  - Ganymede.
  - Callisto.
- A moon with a smooth, uncratered surface would imply
  - the surface is completely liquid.
  - a strong magnetic field surrounds the moon.
  - the surface is very young.
  - the moon lies within the planet's Roche Limit.
  - meteorites have never struck the moon.
- Which of these moons has the densest atmosphere?
  - Io
  - Triton
  - Callisto
  - Titan
  - Europa
- Which of these moons are most interesting to exobiologists?
  - Io and Enceladus
  - Europa and Miranda
  - Europa and Titan
  - Titan and Triton
  - Triton and Charon
- At Titan, the oceans are made of liquid
  - carbon dioxide.
  - metallic hydrogen.
  - ethane.
  - nitrogen.
  - water.
- The Huygens probe of the ESA made a successful landing on
  - Titan.
  - Saturn.
  - Triton.
  - Europa.
  - Mars.

17. The atmosphere of Titan is composed mainly of
- hydrogen and helium.
  - nitrogen.
  - hydrogen sulfide.
  - carbon dioxide.
  - methane.
18. The grooves and ridges on Ganymede are thought to
- be due to the moon's rapid rotation.
  - have formed within the last thousand years.
  - have grown considerably larger since the Voyager spacecraft discovered them.
  - be part of an ongoing volcanic process.
  - be due to crustal tectonics motion (plate tectonics)
19. What is true of Titan's atmosphere?
- It has produced a runaway greenhouse effect.
  - It was discovered by the Voyager 1 spacecraft.
  - It is similar to Earth's in composition and density.
  - It is oxygen rich.
  - It is primarily hydrogen.
20. The erupting geysers of nitrogen gas on Triton
- are increasing the moon's rotation rate.
  - produced the large liquid oceans.
  - produced the frozen nitrogen surface.
  - are caused by a not yet determined internal energy source.
  - can be viewed by the Hubble Space Telescope.
21. Voyager 1 was unable to image Titan's surface because
- the moon was in shadow during the mission.
  - of Titan's high reflectivity.
  - the cameras were damaged by Saturn's magnetic field.
  - volcanic activity spewed sulfur clouds, obscuring the surface.
  - of "smog" in Titan's atmosphere.
22. The brightest and probably youngest surface of any moon of Saturn belongs to
- Mimas.
  - Tethys.
  - Titan.
  - Enceladus.
  - Iapetus.
23. Which Jovian moon shows the most diverse terrain, suggesting a violent impact broke it into many pieces, some of which reformed it as a jumbled puzzle?
- Enceladus
  - Miranda
  - Triton
  - Io
  - Ganymede
24. What statistic below has changed the most in the last decade?
- the number of known Jovian moons
  - the masses of the Galilean moons
  - the densities of the larger moons
  - the compositions of moons of Uranus
  - the rotational period of the Jovian moons
25. Which moon of Saturn shows the largest impact crater, relative to its size?
- Mimas
  - Callisto
  - Miranda
  - Enceladus
  - Titan
26. For a moon the same density as its planet, the Roche limit lies at \_\_\_\_\_ times the radius of its planet.
- 1.4
  - 2.5
  - 3.6
  - 5.2
  - 7
27. Why are the rings of Saturn so bright?
- Light reflected off of gigantic Titan reinforces the sunlight.
  - They are made of metallic iron, never rusted by exposure to oxygen.
  - They are made of young, fresh water ice.
  - They are made of glassy beads expelled by the volcanoes of Enceladus.
  - They are made of frozen metallic hydrogen.
28. Which statement about Jupiter's rings is true?
- They lie inside Jupiter's Roche Limit.
  - They are made, in part, of material ejected by Europa's volcanoes.
  - They are larger than Saturn's, but darker.
  - They are dark because their ices are dirtier than Saturn's.
  - They were discovered by Galileo at the same time he discovered the moons.
29. When Saturn is at Equinox, its rings will
- double the planet's brightness.
  - appear face-on to the earth.
  - lie perpendicular to the plane of the ecliptic.
  - lie in the plane of the ecliptic.
  - contract closer to the planet's surface.
30. What best explains the darkness of the rings beyond Saturn's?
- Water ice reflects light poorly at the low temperatures beyond Saturn.
  - They are pieces of captured comets.
  - Rocky debris doesn't reflect as well as water ice.
  - old, sooty debris and radiation darkening
  - The sunlight is much fainter out there.

31. The Cassini Division is a gap in Saturn's rings caused by
- Saturn's excess heat.
  - two shepherding moons.
  - the icy ring particles melting.
  - gravitational interaction with Mimas.
  - Saturn's magnetic field.
32. Inside the Roche Limit
- ring systems cannot exist.
  - large moons are torn apart.
  - there is a gap in a planet's magnetic field.
  - is where large moons form.
  - hydrogen can only exist in its liquid metallic form.
33. If Saturn takes about 30 years to orbit the Sun, and its rings were seen edge-on in 1995, when will they appear most open at solstice?
- 1998
  - 2002
  - 2005
  - 2007
  - 2010
34. If Uranus takes 84 years to orbit the Sun, and Voyager 2 found its rings wide open at solstice in 1989, when will they appear edge on, as seen from Earth?
- 1995
  - 2003
  - 2010
  - 2025
  - They can never appear edge on, due to Uranus' 98 degree axial tilt.
35. Which was not a Voyager discovery about the rings of Saturn?
- They are made of tens of thousands of narrow ringlets.
  - The F ring particles are herded by two shepherd moons.
  - There are hundreds of smaller moons imbedded, creating the gaps.
  - The E ring may have been made by volcanic eruptions from Enceladus.
  - They have dark spokes that defy gravity.
36. Which of the following rings of Saturn lies closest to the planet?
- the A ring
  - the B ring
  - the C ring
  - the E ring
  - the F ring
37. Which moon orbits a planet only twice as big as it is?
- Triton
  - Charon
  - Miranda
  - Mimas
  - our Moon
38. Pluto's density is most similar to
- Saturn, but not Jupiter, Uranus, or Neptune.
  - moons of the jovian planets.
  - the jovian planets.
  - the terrestrial planets.
  - Mercury, but not Venus, Earth, or Mars.
39. Pluto was discovered in
- ancient times.
  - 1789.
  - 1859.
  - 1930.
  - 1992.
40. The two names most associated with the discovery of Pluto are
- Kuiper and Whipple.
  - Herschel and Bode.
  - Adams and Leverrier.
  - Lowell and Tombaugh.
  - Shoemaker and Levy.
41. Charon's orbit
- has not been determined yet.
  - lies exactly in Pluto's orbital plane.
  - is perpendicular to Pluto's equator.
  - is highly inclined to Pluto's orbital plane.
  - is retrograde.
42. Pluto is most similar to
- Europa.
  - Miranda.
  - Mercury.
  - our Moon.
  - Triton.
43. What is so unusual about Pluto's orbit?
- It has an unexpectedly short orbital period.
  - Its orbital period is exactly twice that of Neptune's.
  - It is the most inclined to the ecliptic of the 9 planets.
  - It has the lowest eccentricity of any planet's orbit.
  - It lies exactly on the ecliptic.