

Examination III

Practice

Name: _____

Signature: _____

Student ID number: _____

Table: _____

Instructions:

On the scannable answer sheet:

- Put your name (last name first!) and ID number (in col. A-J).
- Identify the form in Special Codes column K.
- Answer all 50 questions using a number 2 pencil.

In addition:

- Do not open your exam until instructed to do so.
- Be sure to also answer each question in the blanks provided on this exam.
- You may not use any notes, texts, calculators or communications devices.
- All work must be your own.
- You have 50 minutes.

Notice

This practice exam includes questions from Exam II and the Final from Fall, 2006, as well as a few additional questions.

This exam has 50 questions, just like the actual exam.

The figures you need to answer questions 18-20 are linked on the handouts page of the course website.

For questions 1 through 10, match the jovian world below to the following statements.

- a. Saturn
- b. Neptune
- c. Uranus
- d. Jupiter
- e. None of the above

_____ 1. This world has the most visible and impressive ring system.

_____ 2. This world is orbited by four large moons that resemble a miniature Solar System.

_____ 3. This world has a highly elliptical orbit.

_____ 4. This world is the most massive planet in the Solar System.

_____ 5. This world is the only jovian planet to have no moons.

_____ 6. This world has the most noticeable color variations among different parts of its atmosphere.

_____ 7. This world is known to have a storm system in its atmosphere that has existed continuously for nearly 400 years, if not longer.

_____ 8. This world had a storm system much like the Great Red Spot during the Voyager encounter, but the storm system had gone several years later when the Hubble Space Telescope looked at it.

_____ 9. This world trapped hundreds of Trojan moons in orbits ahead of and behind it in two of its Lagrange points.

_____ 10. This world has its rotation axis tipped over so far, it is close to perpendicular to the plane of the Solar System.

For questions 11 through 20, match the outer icy worlds below to the following statements.

- a. Ganymede
- b. Io
- c. Europa
- d. Titan
- e. Callisto

_____ 11. This world shows virtually no evidence of geologic activity.

_____ 12. This moon of Jupiter is the largest moon in the Solar System.

_____ 13. This moon is suspected to be undifferentiated.

_____ 14. This world has the most geologically active surface in the Solar System.

_____ 15. This world, according to the latest evidence, has a tectonically active icy surface with a thick salty ocean underneath it.

_____ 16. This world has been described as having a surface that looks like a pizza.

_____ 17. This world is a moon of Saturn.

_____ 18. This world is pictured on the projected image as Surface X.

_____ 19. This world is pictured on the projected image as Surface Y.

_____ 20. This world is pictured on the projected image as Surface Z.

For questions 21 through 28, match the moons of the jovian planets below to the following statements.

- a. Enceladus
- b. Miranda
- c. Triton
- d. Iapetus
- e. Mimas

_____ 21. This world is somewhat larger than Pluto and may look very similar to it.

_____ 22. This moon of Saturn has a large crater on it that makes it look like the Death Star.

_____ 23. This moon of Uranus has such varied terrain features that astronomers suspect it was actually broken up by an impact and then re-assembled itself gravitationally.

_____ 24. This moon of Saturn has an unusual orbit, inclined more than 15° from the plane of Saturn's rings.

_____ 25. This world has almost stolen the show as the Cassini mission orbits Saturn, thanks to its geologically active south polar region with observed outflows and features nicknamed tiger stripes.

_____ 26. This moon of Saturn has two completely different colored regions on its surface, one very dark, the other very light.

_____ 27. This moon has an albedo of 0.99, much like freshly fallen snow.

_____ 28. This moon is the innermost and smallest of the five moons of Uranus known before the Voyager encounter.

_____ 29. What is the dominant component of the atmosphere of Titan?

- a. Carbon dioxide (CO₂).
- b. Methane (CH₄).
- c. Benzene (C₆H₆).
- d. Ammonia (NH₃).
- e. Nitrogen (N₂).

_____ 30. Which of the following molecules exists in solid, liquid, and gaseous states on Titan?

- a. Carbon dioxide (CO₂).
- b. Water (H₂O).
- c. Methane (CH₄).
- d. Nitrogen (N₂).
- e. Ammonia (NH₃).

_____ 31. Which of the following was **not** used to see through Titan's thick clouds?

- a. Sending a probe to the surface.
- b. Observing at infrared wavelengths where the clouds were transparent.
- c. Imaging with radar.
- d. Optical spectroscopy
- e. None of the above; they were all used.

_____ 32. Which of the following worlds is **not** a dwarf planet?

- a. Pluto.
- b. Ceres.
- c. Charon.
- d. Eris.
- e. Ganymede.

_____ 33. The rings of Uranus were discovered by ...

- a. the Voyager 2 encounter.
- b. the Pioneer 10 encounter.
- c. observing a stellar occultation of Uranus.
- d. the Hubble Space Telescope.
- e. communicating with space aliens.

_____ 34. When Triton spirals inside the Roche limit of this planet, it will have an impressive ring system. (Hint: It doesn't have an impressive ring system now.)

- a. Jupiter.
- b. Neptune.
- c. Saturn.
- d. Uranus.
- e. Mars.

Which of the following mechanisms are responsible for the effects described in questions 35 through 38?

- a. Orbital resonances
- b. Shepherd moons
- c. Magnetic shear
- d. Orbital resonances and shepherd moons
- e. Magnetic shear and shepherd moons

_____ 35. The Kirkwood Gaps in the Asteroid Belt.

_____ 36. The radial structure in the rings of Saturn.

_____ 37. The geologic activity in the Galilean Satellites.

_____ 38. The large number of Kuiper Belt Objects with semi-major axes close to the semi-major axis of Pluto.

_____ 39. Several worlds in the Solar System may have had or currently have conditions favorable for the formation of life. Which of the following is **not** one of them?

- a. Earth.
- b. Venus.
- c. Europa.
- d. Mars.
- e. Enceladus.

_____ 40. By Kepler's Second Law, when is a comet moving fastest in its orbit around the Sun?

- a. At its furthest point from the Sun (aphelion).
- b. As it is approaching the Sun.
- c. As it passes by the Sun (perihelion).
- d. As it moves away from the Sun.
- e. None of the above. Its orbital speed is a constant.

_____ 41. Which of the following statements about the tails of comets is **false**?

- a. They can point in the direction the comets are moving.
- b. Comets usually have two tails.
- c. They are composed of many small particles and molecules of gas.
- d. They usually appear only when comets are in the inner Solar System.
- e. They are rarely longer than 0.1 AU.

_____ 42. What is the major difference between objects in the Kuiper Belt and objects in the Asteroid Belt?

- a. Objects in the Kuiper Belt are composed of mixtures of ice and rock, while objects in the Asteroid Belt are predominantly rock or rock and metal.
- b. Objects in the Kuiper Belt can have orbits which are inclined nearly 90° to the plane of the Solar System
- c. Objects in the Asteroid Belt frequently have retrograde orbits, while objects in the Kuiper Belt are usually in prograde orbits.
- d. Most objects in the Asteroid Belt are between Mars and Jupiter, while most objects in the Kuiper Belt are between Jupiter and Saturn.
- e. All of the above are true.

_____ 43. What are Centaurs?

- a. Objects co-orbiting with a jovian planet either 60° ahead or 60° behind.
- b. The moons of Jupiter with orbital properties indicating that they are captured moons.
- c. Objects from the Kuiper Belt that have been scattered inward to orbits between Jupiter and Neptune.
- d. Asteroids with orbits that cross the orbit of Jupiter.
- e. Objects that orbit outside of the Kuiper Belt.

_____ 44. What is the primary difference between long-period and short-period comets, besides the period of their orbits?

- a. Long-period comets have nearly circular orbits.
- b. Long-period comets often have more highly inclined orbits.
- c. Long-period comets usually have prograde orbits.
- d. Long-period comets are usually composed of rock.
- e. None of the above.

_____ 45. Sedna ...

- a. definitely is a Kuiper Belt Object.
- b. definitely is a Scattered Disk Object.
- c. definitely belongs to the Oort Cloud.
- d. might belong to the Oort Cloud, but the point is controversial.
- e. None of the above.

_____ 46. A meteor shower occurs when ...

- a. the Earth is struck by the debris from a disintegrating asteroid.
- b. the Earth is at its aphelion point (farthest from the Sun).
- c. a comet breaks up in the Earth's atmosphere.
- d. a meteoroid is deflected into the Earth by the moon.
- e. the Earth passes through the orbit of a comet.

_____ 47. Why is the discovery of Eris so important?

- a. It is the most massive object in the Asteroid Belt.
- b. It probably has a larger diameter than Pluto.
- c. It is the first object from the Oort Cloud discovered.
- d. It has a moon.
- e. Its orbit is in the exact plane of the Solar System.

_____ 48. Which model for the formation of the Solar System was rejected because it cannot explain the orbital properties of the major planets?

- a. The planets were captured after the Sun formed.
- b. The planets formed from material ejected in a close encounter between the Sun and another star.
- c. The planets formed by accretion in a dusty disk around the forming Sun.
- d. All of the above properly explain planetary orbits.
- e. All of the above fail to explain planetary orbits.

_____ 49. Which model for the formation of the Solar System best explains its properties?

- a. The planets were captured after the Sun formed.
- b. The planets formed from material ejected in a close encounter between the Sun and another star.
- c. The planets formed by accretion in a dusty disk around the forming Sun.
- d. The aliens did it.
- e. None of the above.

_____ 50. How does the accepted model for the formation of the Solar System account for the compositional differences between terrestrial and jovian worlds?

- a. In the inner Solar System, the Sun evaporated the icy mantles from the dust grains, leaving heavier materials to form into planets.
- b. The heavy elements sank to the center of the Solar System.
- c. The less dense planets migrated into the outer Solar System after they formed.
- d. The terrestrial worlds suffered higher impact rates than the jovian worlds early in their history.
- e. The inner Solar System had more radioactive isotopes.