

Closed book, closed notes. Clearly circle ("O") the one choice that you think is most definitely correct. Cross out ("X") only one choice that you think is definitely incorrect.

1. [4.0 points.] The water in Earth's oceans originated from:
(A) plants.
(B) the moon.
(C) volcanoes.
(D) the greenhouse effect.

2. [4.0 points.] The moon's dark lowlands (maria) are relatively smoother than its highlands due to:
(A) lava flows.
(B) dust storms.
(C) subduction zones.
(D) a thin flexible crust.

3. [4.0 points.] The long curving ridges on Mercury's surface were produced by:
(A) plate tectonics.
(B) heat from the sun.
(C) its shrinking core.
(D) collapsed lava tunnels.

4. [4.0 points.] Venus' _____ is evidence that its crust was recently covered by lava.
(A) lack of oceans.
(B) thick atmosphere.
(C) small number of impact craters.
(D) runaway greenhouse effect.

5. [4.0 points.] Mars has a very thin atmosphere because it:
(A) has plate tectonics.
(B) is too close to the sun.
(C) did not have plant life.
(D) does not have enough mass.

6. [4.0 points.] Jupiter's _____ makes its belt-zone clouds have more active weather patterns than Saturn's belt-zone clouds.
(A) mass.
(B) density.
(C) magnetic fields.
(D) distance from the sun.

7. [4.0 points.] _____ may explain how the interior of Uranus became cooler than Neptune's.
(A) More mass.
(B) A large impact.
(C) Closer orbit to the sun.
(D) Dissolved ammonia and methane.

Name (last, first):

4-digit PIN:

Quiz 4

Questions (8)-(10) are continued on the back of this page.

Closed book, closed notes. Clearly circle ("O") the one choice that you think is most definitely correct. Cross out ("X") only one choice that you think is definitely incorrect.

This quiz continues from questions (1)-(7) on the other side of this page.

For questions (8)-(10), listed below are the minimal qualifications established by the International Astronomical Union for a planet:

- I. Orbits the sun.
- II. Shape "rounded-out" by gravity.
- III. Cleared/dominates orbit around sun.

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8. [4.0 points.] Which solar system object(s) only meets qualification II, but does not meet qualifications I and III?
- (A) Earth's moon.
 - (B) Ceres (a spherical-shaped body in the asteroid belt).
 - (C) Ida (an irregular-shaped body in the asteroid belt).
 - (D) Mercury.
 - (E) (More than one of the above choices.)
 - (F) (All of the above choices.)
 - (G) (None of the above choices.)
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For questions (9)-(10), 2004 EW₉₅ is an object that is in orbit around the sun, currently located in the Kuiper belt:¹

At first the astronomers thought it was a mistake. They had found an irregular-shaped asteroid floating in the Kuiper belt in 2004. The newly discovered space rock, which they named 2004 EW₉₅, was something the scientists would have expected to have seen in the asteroid belt...

The pieces of evidence led the team to conclude that 2004 EW₉₅ was formed in the inner solar system, and had most likely been hurled to the outer solar system as the giant gas planets, Jupiter and Saturn, migrated away from the sun.

9. [4.0 points.] According to the IAU qualifications, in the past when 2004 EW₉₅ had an orbit in the asteroid belt, it would have been classified as:
- (A) a moon.
 - (B) solar system debris.
 - (C) a dwarf planet.
 - (D) a planet.
 - (E) (None of the above choices.)
10. [4.0 points.] According to the IAU qualifications, in the past while 2004 EW₉₅ was in the process of traveling outwards from the asteroid belt to the Kuiper belt, it would have been classified as:
- (A) a moon.
 - (B) solar system debris.
 - (C) a dwarf planet.
 - (D) a planet.
 - (E) (None of the above choices.)

¹ Nicholas St. Fleur, "Lost in Space: An Asteroid Strayed From Its Companions," *New York Times* (May 14, 2018), page D2, [nyti.ms/2KPKh3i](https://www.nytimes.com/2018/05/14/science/asteroid-2004-ew95.html).