

Name \_\_\_\_\_ Student ID \_\_\_\_\_

**MULTIPLE CHOICE.** Choose the one alternative that best completes the statement or answers the question. Write your student ID in the space provided on the SCANTRON form and bubble in the appropriate circles. When you are finished with exam place the SCANTRON form into the exam form and turn in both the exam form and the SCANTRON at the front desk.

- 1) Which of the following is NOT a way that Terrestrial and Jovian planets differ? 1) \_\_\_\_\_  
A) Jovians are less dense than any of the Terrestrials.  
B) Jovians have many more satellites than do Terrestrials.  
C) Jovians have rings, Terrestrials don't.  
D) Jovian orbits are much more eccentric than are Terrestrials, and farther off the ecliptic.  
E) Jovians have larger escape velocities than do the solid Terrestrials.
- 2) Earth and Venus are often called sister planets; in which ways are they most alike? 2) \_\_\_\_\_  
A) polar caps and rusty red deserts  
B) atmospheric composition and density  
C) size, density, and surface gravity  
D) cloud composition and weather  
E) surface temperature and atmospheric pressure
- 3) Currently we know of how many extra-Solar planets? 3) \_\_\_\_\_  
A) 37 planets, including some around pulsars as well as normal stars  
B) three planets, all around Gliese 851  
C) None; ours is the only Solar System now known.  
D) 18 Earth-like planets, all in the habitable zones around nearby solar type stars  
E) over 400 planets, the number growing by the day
- 4) In terms of chemical composition of the interiors of the planets: 4) \_\_\_\_\_  
A) each planet is unique, with no similarities among them.  
B) all the planets are made of the same elements, and in the same proportions.  
C) the Sun is unique in having far more light elements than any of the planets do.  
D) the Terrestrials are similar to the Sun, for they formed closer to it.  
E) the Jovians are much more like the Sun than are the Terrestrials.
- 5) If a Martian meteorite has 1/8 of the original U 235 which has not yet decayed into lead 207, and the half life of U 235 is 700 million years, this rock was formed: 5) \_\_\_\_\_  
A) 1.4 billion years ago.  
B) about 350 million years ago.  
C) less than 100 million years ago.  
D) 700 million years ago.  
E) 2.1 billion years ago.

- 6) The presence of the magnetic field around the Earth is a good indication that: 6) \_\_\_\_\_  
 A) a huge iron meteorite lies somewhere high up in the mantle, not in the core.  
 B) we have a liquid metal outer core, spinning rapidly as we rotate.  
 C) the Earth's interior is similar to Mercury's, as both have fields.  
 D) the Earth's interior has had time to solidify, with a rigid bar magnet created.  
 E) the Earth's interior must be completely molten to the center.
- 7) The lunar maria are radioactively dated at: 7) \_\_\_\_\_  
 A) 3.9–3.2 billion years old, forming after most of the bombardment was over.  
 B) 3.5–2.5 billion years old, similar to the formation of our own oceans.  
 C) 4.6 billion years old, forming first among the lunar features.  
 D) less than a billion years old, the most recent additions to the Moon.  
 E) 4.2–3.9 billion years old, comparable to the adjacent highlands.
- 8) The crust of the Earth is about \_\_\_\_\_ oceanic crust. 8) \_\_\_\_\_  
 A) 25%                      B) 55%                      C) 45%                      D) 95%                      E) 80%
- 9) The oldest rocks found in the crust of the Earth are radioactively dated at about: 9) \_\_\_\_\_  
 A) 4 billion years old.  
 B) 3.2 billion years old.  
 C) 64.9 million years old.  
 D) 2.7 billion years old.  
 E) 200 million years old.
- 10) What factor caused different planets to form out of different types of material? 10) \_\_\_\_\_  
 A) the variation in temperature throughout the Solar Nebula  
 B) the spin (angular momentum) of the forming planet  
 C) the quantity of dust particles in the Solar Nebula  
 D) all of the above  
 E) none of the above
- 11) Of the following, which is **not** commonly associated with a subduction zone? 11) \_\_\_\_\_  
 A) the formation of chains of shield volcanoes  
 B) frequent earthquakes.  
 C) the production of tsunamis  
 D) the destruction of crust.  
 E) volcanism
- 12) The lunar highlands are: 12) \_\_\_\_\_  
 A) more rugged, heavily cratered, and older than the lunar maria.  
 B) formed by plate tectonics, like the Earth's Himalayas.  
 C) brighter than the maria, since they are covered with reflective glass from the rays.  
 D) formed by volcanic eruptions, much like our Andes.  
 E) made of lighter colored, younger rocks than the maria.
- 13) Magellan did **not** find which of these on Venus? 13) \_\_\_\_\_  
 A) coronae, huge but very flat circular features  
 B) continent sized uplands  
 C) impact craters, all larger than five kilometers across  
 D) large shield volcanoes  
 E) sea-floor spreading as seen at the Mid-Atlantic ridge.

- 14) Which of the following characterizes a shield volcano? 14) \_\_\_\_\_  
A) It sits above a hot spot in the planet's mantle.  
B) It erupts only briefly before subsiding forever.  
C) It is formed by moving tectonic plates.  
D) It cannot grow very large, for the plates are constantly moving.  
E) It will be smaller than cinder cones like Maxwell Mons on Venus.
- 15) Maxwell Montes on Venus is a huge: 15) \_\_\_\_\_  
A) tectonic mountain chain, like the Himalayas.  
B) rift valley.  
C) shield volcano.  
D) impact crater larger than Texas.  
E) ocean basin larger than the Pacific Ocean.
- 16) Plate motion on the Earth is driven by: 16) \_\_\_\_\_  
A) cracking of and large scale earthquakes in the lithosphere  
B) convective motions in the atmosphere  
C) the motion of large mountain ranges such as the Himalayas  
D) slips along transform faults  
E) convective motions in the asthenosphere
- 17) The detection of most extra-Solar planets is done by: 17) \_\_\_\_\_  
A) imaging them with the Hubble Space Telescope and a occulting disk over their star.  
B) noting Doppler shifts in the emission from their stars due to the gravitational influence of the planets on their star's motion.  
C) seeing planetary transits and gravitational lensing using the Hubble Space Telescope and Kepler  
D) seeing the drop in light as they transit their star's disk.  
E) receiving radio signals from them.
- 18) Large impacts such as the one suggested to have led to the demise of the dinosaurs occur roughly every \_\_\_\_\_. 18) \_\_\_\_\_  
A) 3.2 billion years on the Earth  
B) they were a one-time event; the impact occurred during the Epoch of Heavy Bombardment  
C) 100,000,000 years or so on the Earth  
D) 10,000 years on the Earth  
E) 4.6 billion years, they are extremely rare only a couple are expected to occur over the lifetime of the Earth
- 19) Our best data about the surface topography of Venus has come from: 19) \_\_\_\_\_  
A) radio and visual observations from Earth-based observatories.  
B) orbiter photos from Pioneer Venus Orbiter.  
C) visual observations made by the Hubble Space Telescope  
D) radar data taken by the orbiting spacecraft Magellan.  
E) spacecraft flybys like Mariner 2 and visual observations of the planet.

- 20) Of the following, which is **not** considered to be one of the fundamental observational results any viable theory for the formation of the Solar System must explain. 20) \_\_\_\_\_
- A) The large sizes of the orbits of the Jovian planets in our Solar System
  - B) The anomalous spins of Venus, Uranus, and Pluto
  - C) There is a dichotomy in the properties of the planets, that is, there are distinct classes of planets known as Terrestrial and Jovian planets
  - D) The orbits of the planets are nearly circular in shape and roughly confined to the ecliptic plane
  - E) All of the planet's orbits are in the counter-clockwise sense as viewed from the north
- 21) Why are the Jovian planets so large? 21) \_\_\_\_\_
- A) They formed from large protoplanets in the outer cooler parts of the Solar Nebula which allowed them to sweep up gas from the Solar Nebula.
  - B) The Jovian planets are at least a billion years older than the Terrestrial planets and have constantly gained matter from comets.
  - C) The Jovian planets are normal in size; the Terrestrial planets were just as large but the Sun's heat reduced their size.
  - D) They started out as small stars, but lost most of their mass through an enhanced wind because the fusion reactions in their cores were unstable.
  - E) The gas and dust were hotter in the outer regions, making it easier for the planets to form.
- 22) When Kepler is lucky enough to see an extra-solar planet transit its star: 22) \_\_\_\_\_
- A) we can determine what elements are in the atmosphere of the Earth.
  - B) it will cause the star to vanish for several hours.
  - C) we can deduce from the drop in the light from the star, the planet's size, mass, and hence density, and the planet's temperature.
  - D) we can be certain it is a Terrestrial, not a Jovian.
  - E) we can determine its shape.
- 23) In noting that the Earth is "differentiated", we mean that: 23) \_\_\_\_\_
- A) the Earth's magnetic field is different now in that its polarity has reversed from it was 700,000 years ago.
  - B) the density of its materials decreases as you go downward toward the core.
  - C) the iron and nickel core is denser than the silicate mantle and crust.
  - D) radioactive heating in the core is at a slower pace than when the Earth was new.
  - E) the Earth has evolved in a different pattern than any other planet.
- 24) Venus has features named Aphrodite Terra and Ishtar Terra. What are these features? 24) \_\_\_\_\_
- A) continental-sized plateaus
  - B) great rift valleys like Valles Marineris on Mars
  - C) large basins similar to the maria on the Moon
  - D) large impact craters
  - E) very large volcanos

- 25) The largest difference between Mars' northern and southern hemispheres is that: 25) \_\_\_\_\_
- A) the northern is dominated by the Tharsis Bulge and large volcanic chains near the northern pole.
  - B) the southern is much darker and younger, with large mare-like basaltic lava flows.
  - C) the southern has higher elevation and is dominated by the Tharsis Bulge near the southern pole.
  - D) the southern has higher elevation and appears older, with more impact craters.
  - E) the northern is higher overall, despite some high volcanoes in the south.
- 26) Beyond our own Solar System, the planets found to date have tended to be: 26) \_\_\_\_\_
- A) large Jovians far from their stars like in our Solar System
  - B) imaginary, with no concrete proof that they really exist.
  - C) Kuiper Belt Objects, far from the glare of their stars.
  - D) large Jovians with orbits much more like the Terrestrial planets in our Solar System.
  - E) small Terrestrial planets, much like the Moon and asteroids, with orbits which place them very close to their stars
- 27) In comparing our own Solar System with others found to date, we find that: 27) \_\_\_\_\_
- A) after planets form, strong orbital migration likely occurs.
  - B) almost 50 % of the discovered systems show Earth-like planets in habitable zones.
  - C) Earth-like planets are common in our Galaxy.
  - D) other planetary systems must form exactly as did ours because of the similarities of the discovered planets and their orbits compared to those of the planets in our Solar System.
  - E) the newly discovered planetary systems completely disprove our current model for how our Solar System formed.
- 28) Active geology on a planet is driven by: 28) \_\_\_\_\_
- A) the impacts of large bodies
  - B) rotation of the asthenosphere
  - C) the rapid rotation of the planet's core
  - D) heating caused by the absorption of Solar energy
  - E) heat flow from the interior of the planet to the surface of the planet
- 29) Mercury's surface most resembles that of which other body? 29) \_\_\_\_\_
- A) Mars                      B) Moon                      C) Io                      D) Venus                      E) Earth
- 30) Mercury, as does the Moon, experiences extreme high and low temperature variations between night and day because: 30) \_\_\_\_\_
- A) its dense atmosphere creates a runaway greenhouse.
  - B) it rotates very slowly.
  - C) it has no atmosphere to moderate temperatures over the globe.
  - D) Mercury has no axial tilt, with its equator always exposed to direct Sunlight.
  - E) its oceans are much hotter than ours.
- 31) Which of these is **not** a characteristic of the Solar Nebula theory our current model for the formation of the Solar System? 31) \_\_\_\_\_
- A) Larger planets should form closer to their star, where there is more debris.
  - B) All the planets should orbit the Sun counterclockwise as viewed from the north.
  - C) The formation of water ice is crucial for our understanding of the formation of Jupiter.
  - D) All the planets should follow the ecliptic plane.
  - E) Planets should rotate counterclockwise as viewed from the north.

- 32) What happens when the cloud from which the Solar System formed, the Solar Nebula, first starts to contract? 32) \_\_\_\_\_
- A) It flattens out.
  - B) It spins faster.
  - C) It develops large condensations called protoplanets.
  - D) only A and B
  - E) A, B, and C
- 33) How do the densities of the Jovian and Terrestrial planets compare? 33) \_\_\_\_\_
- A) The closer a planet lies to the Sun, the less its density.
  - B) All Terrestrials are more dense than any of the Jovians.
  - C) More massive Jovians all have high densities, compared to the tiny Terrestrials.
  - D) Made from the same Solar Nebula, they are all similar.
  - E) No real pattern here; densities vary greatly and are very individual to each world.
- 34) When an oceanic plate and a continental plate collide: 34) \_\_\_\_\_
- A) that region is safe from earthquakes because now the plates are static.
  - B) volcanoes form near the boundary between them.
  - C) they both stop moving.
  - D) they almost always produce long strings of coronae as found on Venus.
  - E) they produce large rift valleys such as the mid-Atlantic ridge.
- 35) What percentage of the surface of Venus could be characterized as continental-sized highlands? 35) \_\_\_\_\_
- A) less than 10%
  - B) 75%
  - C) 100%
  - D) 45%
  - E) about 30%, like the Earth
- 36) The rate of cratering: 36) \_\_\_\_\_
- A) shows that large asteroid impacts are more common now than in the past.
  - B) shows that most interplanetary debris was swept up soon after the formation of the Solar System.
  - C) fluctuates over time, with massive bodies occasionally coming in from the Oort Cloud.
  - D) has remained constant over the last 4.6 billion years.
  - E) has recently increased with more collisions in the asteroid belt.
- 37) What property of Mars is responsible for producing the great heights of its volcanos? 37) \_\_\_\_\_
- A) Its cold temperatures allows the magma to freeze faster.
  - B) Its lower surface gravity does not pull them down as much as on Earth.
  - C) Its lower temperature and higher surface gravity allows higher peaks to form.
  - D) Its volcanoes spout steam, similar to the geyser Old Faithful on the Earth
  - E) Mars has more radioactive material than the Earth.
- 38) From the center outward, the correct ordering of the layers of the Earth is: 38) \_\_\_\_\_
- A) liquid iron inner core, solid nickel outer core, rocky mantle, silicate crust.
  - B) solid metallic inner core, molten metal outer core, silicate mantle and crust.
  - C) solid metal core, molten metal mantle, rocky lithosphere, gases in atmosphere.
  - D) solid rock core, liquid metal mantle, solid rock crust.
  - E) molten metallic core, molten rock lithosphere, solid silicate crust.

39) Seismic waves have been most useful for mapping: 39) \_\_\_\_\_  
A) the depths of the oceans on the Earth.  
B) the density of the lithosphere on the Moon.  
C) the surface of Mars.  
D) the interior of Venus.  
E) the Earth's core and mantle.

40) Various observations suggest there may be recent or even continuing volcanic activity on Venus. 40) \_\_\_\_\_  
Which of the following has NOT been observed?  
A) spacecraft detection over a period of days of active flowing lava on Venus  
B) fluctuations in the level of sulfur dioxide in the planet's atmosphere  
C) chains of large shield volcanoes similar to Hawaii  
D) surface features resembling rift valleys on Earth  
E) observed bursts of radio energy, similar to those produced by lightning discharges occurring in the plumes of erupting volcanoes on Earth

Answer Key

Testname: ASTR.121.X2.WTR10

- 1) D
- 2) C
- 3) E
- 4) E
- 5) E
- 6) B
- 7) A
- 8) B
- 9) A
- 10) A
- 11) A
- 12) A
- 13) E
- 14) A
- 15) C
- 16) E
- 17) B
- 18) C
- 19) D
- 20) B
- 21) A
- 22) C
- 23) C
- 24) A
- 25) D
- 26) D
- 27) A
- 28) E
- 29) B
- 30) C
- 31) A
- 32) D
- 33) B
- 34) B
- 35) A
- 36) B
- 37) B
- 38) B
- 39) E
- 40) A