

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) Active geology on a planet is driven by: 1) _____
A) heating caused by the absorption of Solar energy
B) heat flow from the interior of the planet to the surface of the planet
C) rotation of the asthenosphere
D) the impacts of large bodies
E) the rapid rotation of the planet's core
- 2) How do the densities of the Jovian and Terrestrial planets compare? 2) _____
A) Made from the same Solar Nebula, they are all similar.
B) More massive Jovians all have high densities, compared to the tiny Terrestrials.
C) The closer a planet lies to the Sun, the less its density.
D) All Terrestrials are more dense than any of the Jovians.
E) No real pattern here; densities vary greatly and are very individual to each world.
- 3) Plate motion on the Earth is driven by: 3) _____
A) .cracking of and large scale earthquakes in the lithosphere
B) slips along transform faults
C) convective motions in the asthenosphere
D) the motion of large mountain ranges such as the Himalayas
E) convective motions in the atmosphere
- 4) 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: 4) _____
A) about 350 million years ago.
B) 700 million years ago.
C) 1.4 billion years ago.
D) less than 100 million years ago.
E) 2.1 billion years ago.
- 5) Mercury, as does the Moon, experiences extreme high and low temperature variations between night and day because: 5) _____
A) Mercury has no axial tilt, with its equator always exposed to direct Sunlight.
B) it rotates very slowly.
C) its oceans are much hotter than ours.
D) it has no atmosphere to moderate temperatures over the globe.
E) its dense atmosphere creates a runaway greenhouse.

- 6) Beyond our own Solar System, the planets found to date have tended to be: 6) _____
- A) imaginary, with no concrete proof that they really exist.
 - B) large Jovians far from their stars like in our Solar System
 - 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
- 7) Why are the Jovian planets so large? 7) _____
- A) 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.
 - B) The gas and dust were hotter in the outer regions, making it easier for the planets to form.
 - C) The Jovian planets are at least a billion years older than the Terrestrial planets and have constantly gained matter from comets.
 - D) The Jovian planets are normal in size; the Terrestrial planets were just as large but the Sun's heat reduced their size.
 - E) 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.
- 8) The detection of most extra-Solar planets is done by: 8) _____
- A) imaging them with the Hubble Space Telescope and a occulting disk over their star.
 - B) seeing planetary transits and gravitational lensing using the Hubble Space Telescope and Kepler
 - C) receiving radio signals from them.
 - D) noting Doppler shifts in the emission from their stars due to the gravitational influence of the planets on their star's motion.
 - E) seeing the drop in light as they transit their star's disk.
- 9) Various observations suggest there may be recent or even continuing volcanic activity on Venus. 9) _____
Which of the following has NOT been observed?
- A) surface features resembling rift valleys on Earth
 - B) spacecraft detection over a period of days of active flowing lava on Venus
 - C) chains of large shield volcanoes similar to Hawaii
 - D) fluctuations in the level of sulfur dioxide in the planet's atmosphere
 - E) observed bursts of radio energy, similar to those produced by lightning discharges occurring in the plumes of erupting volcanoes on Earth
- 10) The rate of cratering: 10) _____
- A) has remained constant over the last 4.6 billion years.
 - B) has recently increased with more collisions in the asteroid belt.
 - C) shows that most interplanetary debris was swept up soon after the formation of the Solar System.
 - D) shows that large asteroid impacts are more common now than in the past.
 - E) fluctuates over time, with massive bodies occasionally coming in from the Oort Cloud.
- 11) Which of the following is NOT a way that Terrestrial and Jovian planets differ? 11) _____
- A) Jovians have larger escape velocities than do the solid Terrestrials.
 - B) Jovians are less dense than any of the Terrestrials.
 - C) Jovians have many more satellites than do Terrestrials.
 - D) Jovians have rings, Terrestrials don't.
 - E) Jovian orbits are much more eccentric than are Terrestrials, and farther off the ecliptic.

- 12) Currently we know of how many extra-Solar planets? 12) _____
A) None; ours is the only Solar System now known.
B) 37 planets, including some around pulsars as well as normal stars
C) three planets, all around Gliese 851
D) over 400 planets, the number growing by the day
E) 18 Earth-like planets, all in the habitable zones around nearby solar type stars
- 13) What percentage of the surface of Venus could be characterized as continental-sized highlands? 13) _____
A) less than 10%
B) 100%
C) 45%
D) about 30%, like the Earth
E) 75%
- 14) What property of Mars is responsible for producing the great heights of its volcanos? 14) _____
A) Mars has more radioactive material than the Earth.
B) Its lower temperature and higher surface gravity allows higher peaks to form.
C) Its lower surface gravity does not pull them down as much as on Earth.
D) Its volcanoes spout steam, similar to the geyser Old Faithful on the Earth
E) Its cold temperatures allows the magma to freeze faster.
- 15) Our best data about the surface topography of Venus has come from: 15) _____
A) radio and visual observations from Earth-based observatories.
B) spacecraft flybys like Mariner 2 and visual observations of the planet.
C) orbiter photos from Pioneer Venus Orbiter.
D) visual observations made by the Hubble Space Telescope
E) radar data taken by the orbiting spacecraft Magellan.
- 16) In comparing our own Solar System with others found to date, we find that: 16) _____
A) after planets form, strong orbital migration likely occurs.
B) almost 50 % of the discovered systems show Earth-like planets in habitable zones
C) 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.
D) the newly discovered planetary systems completely disprove our current model for how our Solar System formed.
E) Earth-like planets are common in our Galaxy.
- 17) The largest difference between Mars' northern and southern hemispheres is that: 17) _____
A) the southern has higher elevation and is dominated by the Tharsis Bulge near the southern pole.
B) the southern has higher elevation and appears older, with more impact craters.
C) the northern is higher overall, despite some high volcanoes in the south.
D) the southern is much darker and younger, with large mare-like basaltic lava flows.
E) the northern is dominated by the Tharsis Bulge and large volcanic chains near the northern pole.

- 18) The lunar highlands are: 18) _____
 A) brighter than the maria, since they are covered with reflective glass from the rays.
 B) made of lighter colored, younger rocks than the maria.
 C) formed by plate tectonics, like the Earth's Himalayas.
 D) formed by volcanic eruptions, much like our Andes.
 E) more rugged, heavily cratered, and older than the lunar maria.
- 19) The presence of the magnetic field around the Earth is a good indication that: 19) _____
 A) the Earth's interior is similar to Mercury's, as both have fields.
 B) the Earth's interior must be completely molten to the center.
 C) the Earth's interior has had time to solidify, with a rigid bar magnet created.
 D) a huge iron meteorite lies somewhere high up in the mantle, not in the core.
 E) we have a liquid metal outer core, spinning rapidly as we rotate.
- 20) Mercury's surface most resembles that of which other body? 20) _____
 A) Moon B) Io C) Mars D) Earth E) Venus
- 21) When Kepler is lucky enough to see an extra-solar planet transit its star: 21) _____
 A) 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.
 B) we can determine what elements are in the atmosphere of the Earth.
 C) we can determine its shape.
 D) it will cause the star to vanish for several hours.
 E) we can be certain it is a Terrestrial, not a Jovian.
- 22) Magellan did **not** find which of these on Venus? 22) _____
 A) coranae, huge but very flat circular features
 B) large shield volcanoes
 C) continent sized uplands
 D) sea-floor spreading as seen at the Mid-Atlantic ridge.
 E) impact craters, all larger than five kilometers across
- 23) From the center outward, the correct ordering of the layers of the Earth is: 23) _____
 A) solid rock core, liquid metal mantle, solid rock crust.
 B) liquid iron inner core, solid nickel outer core, rocky mantle, silicate crust.
 C) solid metal core, molten metal mantle, rocky lithosphere, gases in atmosphere.
 D) solid metallic inner core, molten metal outer core, silicate mantle and crust.
 E) molten metallic core, molten rock lithosphere, solid silicate crust.
- 24) Which of these is **not** a characteristic of the Solar Nebula theory our current model for the formation of the Solar System? 24) _____
 A) The formation of water ice is crucial for our understanding of the formation of Jupiter.
 B) All the planets should follow the ecliptic plane.
 C) Larger planets should form closer to their star, where there is more debris.
 D) All the planets should orbit the Sun counterclockwise as viewed from the north.
 E) Planets should rotate counterclockwise as viewed from the north.

- 25) 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. 25) _____
- A) The large sizes of the orbits of the Jovian planets in our Solar System
 - B) All of the planet's orbits are in the counter-clockwise sense as viewed from the north
 - 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 anomalous spins of Venus, Uranus, and Pluto
 - E) The orbits of the planets are nearly circular in shape and roughly confined to the ecliptic plane
- 26) What happens when the cloud from which the Solar System formed, the Solar Nebula, first starts to contract? 26) _____
- 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
- 27) In noting that the Earth is "differentiated", we mean that: 27) _____
- A) the density of its materials decreases as you go downward toward the core.
 - B) the Earth's magnetic field is different now in that its polarity has reversed from it was 700,000 years ago.
 - C) radioactive heating in the core is at a slower pace than when the Earth was new.
 - D) the iron and nickel core is denser than the silicate mantle and crust.
 - E) the Earth has evolved in a different pattern than any other planet.
- 28) Maxwell Montes on Venus is a huge: 28) _____
- A) impact crater larger than Texas.
 - B) rift valley.
 - C) ocean basin larger than the Pacific Ocean.
 - D) tectonic mountain chain, like the Himalayas.
 - E) shield volcano.
- 29) What factor caused different planets to form out of different types of material? 29) _____
- A) the quantity of dust particles in the Solar Nebula
 - B) the variation in temperature throughout the Solar Nebula
 - C) the spin (angular momentum) of the forming planet
 - D) all of the above
 - E) none of the above
- 30) The lunar maria are radioactively dated at: 30) _____
- A) 3.9-3.2 billion years old, forming after most of the bombardment was over.
 - B) 4.6 billion years old, forming first among the lunar features.
 - C) less than a billion years old, the most recent additions to the Moon.
 - D) 3.5-2.5 billion years old, similar to the formation of our own oceans.
 - E) 4.2-3.9 billion years old, comparable to the adjacent highlands.

- 31) When an oceanic plate and a continental plate collide: 31) _____
 A) that region is safe from earthquakes because now the plates are static.
 B) they both stop moving.
 C) they almost always produce long strings of coronae as found on Venus.
 D) volcanoes form near the boundary between them.
 E) they produce large rift valleys such as the mid-Atlantic ridge.
- 32) Of the following, which is **not** commonly associated with a subduction zone? 32) _____
 A) the production of tsunamis
 B) the formation of chains of shield volcanoes
 C) volcanism
 D) the destruction of crust.
 E) frequent earthquakes.
- 33) Seismic waves have been most useful for mapping: 33) _____
 A) the Earth's core and mantle.
 B) the depths of the oceans on the Earth.
 C) the interior of Venus.
 D) the density of the lithosphere on the Moon.
 E) the surface of Mars.
- 34) In terms of chemical composition of the interiors of the planets: 34) _____
 A) all the planets are made of the same elements, and in the same proportions.
 B) the Jovians are much more like the Sun than are the Terrestrials.
 C) the Terrestrials are similar to the Sun, for they formed closer to it.
 D) each planet is unique, with no similarities among them.
 E) the Sun is unique in having far more light elements than any of the planets do.
- 35) Large impacts such as the one suggested to have led to the demise of the dinosaurs occur roughly every _____. 35) _____
 A) 100,000,000 years or so on the Earth
 B) 4.6 billion years, they are extremely rare only a couple are expected to occur over the lifetime of the Earth
 C) 10,000 years on the Earth
 D) they were a one-time event; the impact occurred during the Epoch of Heavy Bombardment
 E) 3.2 billion years on the Earth
- 36) The oldest rocks found in the crust of the Earth are radioactively dated at about: 36) _____
 A) 64.9 million years old.
 B) 2.7 billion years old.
 C) 3.2 billion years old.
 D) 4 billion years old.
 E) 200 million years old.
- 37) The crust of the Earth is about _____ oceanic crust. 37) _____
 A) 80% B) 45% C) 95% D) 55% E) 25%

- 38) Earth and Venus are often called sister planets; in which ways are they most alike? 38) _____
- A) cloud composition and weather
 - B) polar caps and rusty red deserts
 - C) surface temperature and atmospheric pressure
 - D) atmospheric composition and density
 - E) size, density, and surface gravity
- 39) Which of the following characterizes a shield volcano? 39) _____
- A) It erupts only briefly before subsiding forever.
 - B) It sits above a hot spot in the planet's mantle.
 - C) It will be smaller than cinder cones like Maxwell Mons on Venus.
 - D) It cannot grow very large, for the plates are constantly moving.
 - E) It is formed by moving tectonic plates.
- 40) Venus has features named Aphrodite Terra and Ishtar Terra. What are these features? 40) _____
- A) very large volcanos
 - B) large basins similar to the maria on the Moon
 - C) large impact craters
 - D) great rift valleys like Valles Marineris on Mars
 - E) continental-sized plateaus

Answer Key

Testname: ASTR.121.X2.WTR10

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