

Name _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. 32 multiple choice questions at 2 points per question. There are 64 multiple choice points.

- 1) When two tectonic plates collide: 1) _____
 - A) they always produce high mountain chains like the Himalayas.
 - B) they both stop moving.
 - C) volcanoes always mark the boundary between them.
 - D) they continue moving, producing a variety of large deformations.
 - E) that region is safe from earthquakes now the plates are fixed.

- 2) What is the name of the theory that is currently used to describe the formation of the solar system? 2) _____
 - A) Nebular theory
 - B) Differentiation Theory
 - C) Capture theory
 - D) Planetesimal Theory
 - E) Condensation theory

- 3) Our present atmosphere is a secondary atmosphere. It is thought to have arisen from 3) _____
 - A) volcanic outgassing
 - B) cometary impacts
 - C) direct capture from the protoplanetary disk from which the planets formed
 - D) A and B may have both played roles
 - E) A, B, and C all played prominent roles

- 4) Which major atmospheric component of the Earth is chiefly a product of life processes? 4) _____
 - A) oxygen
 - B) carbon dioxide
 - C) nitrogen
 - D) water
 - E) hydrogen sulfide

- 5) Mercury experiences extreme high and low temperatures between night and day because: 5) _____
 - A) its dense atmosphere creates a runaway greenhouse.
 - B) it is so close to the Sun.
 - C) its oceans are much hotter than ours.
 - D) Mercury has no axial tilt, with its equator always exposed to direct sunlight.
 - E) it has no atmosphere to moderate temperatures over the globe.

- 6) Without the greenhouse effect operating in our atmosphere: 6) _____
A) we would not have to worry about any warming problems in the future.
B) the Earth would have become much more like Venus long ago.
C) the Earth would not have differentiated
D) the Earth's oceans would have been frozen for most of the lifetime of the Earth.
E) the ice in the polar regions would have melted long ago.
- 7) What happens when the cloud which forms the Solar System contracts? 7) _____
A) It spins faster.
B) It flattens out.
C) It heats up.
D) all of the above
E) none of the above
- 8) The majority of Venus's surface is best described as: 8) _____
A) continental regions, highland regions
B) coronae and arachnoids
C) rolling plains
D) oceanic basins
E) uplifts similar to the Tharsis Bulge
- 9) Which of the following characterizes a shield volcano? 9) _____
A) It is formed by colliding tectonic plates.
B) It cannot grow very large, for the plates are constantly moving.
C) It will be smaller than cinder cones like Maxwell Mons on Venus.
D) It erupts only briefly before subsiding forever.
E) It sits above a hot spot in the planet's mantle.
- 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 quantity of dust particles in the solar nebula
C) the angular momentum of the forming planet
D) all of the above
E) none of the above
- 11) The lunar mare are found: 11) _____
A) almost entirely on the far side, which was more likely to be hit.
B) almost entirely on Earth side, where the crust was thinner.
C) mainly in the south polar region, where the largest impact occurred.
D) anywhere large meteor impacts created deep basins.
E) not at all, since no liquid water really exists on the Moon.

- 12) Whether a planet was able to attract and hold onto an atmosphere when it was formed was determined by: 12) _____
- A) the temperature in the interior of the planet and the gravity of the planet
 - B) the temperature of the gas near it and the gravity of the planet
 - C) whether water can form ice in the vicinity of the planet
 - D) whether the planet had a large satellite such as the Earth's moon.
 - E) how close the planet was to the Sun and whether the planet had a moon large enough to produce strong tides
- 13) In terms of chemical composition: 13) _____
- A) the jovians are much more like the sun than are the Terrestrial.
 - B) the sun is unique in having far more light elements than any of the planets do.
 - C) all the planets are made of the same elements, and in the same proportions.
 - D) each planet is unique, with no similarities among them.
 - E) the Terrestrial are similar to the sun, for they formed closer to it.
- 14) Venus has a feature named Aphrodite Terra. What is this feature? 14) _____
- A) a large basin similar to the maria on the Moon
 - B) a very large volcano
 - C) a large impact crater
 - D) a continental-sized plateau
 - E) a great rift valley like Valles Marineris on Mars
- 15) Earth and Venus are often called sister planets; in which ways are they most alike? 15) _____
- A) polar caps and rusty red deserts
 - B) cloud composition and meteorology
 - C) size, density, and surface gravity
 - D) surface temperature and pressure
 - E) atmospheric composition and density
- 16) Active geology on a planet: 16) _____
- A) requires the existence of a lithosphere
 - B) requires an extensive and thick atmosphere
 - C) only occurs when the planet has a sizable moon
 - D) will only occur if the planet has a hot interior
 - E) will only occur on smaller planets, in general
- 17) Why are the Jovian planets so large? 17) _____
- A) The jovian planets are normal in size; the terrestrial planets were just as large but the Sun's heat reduced their size.
 - B) The jovian planets are at least a billion years older than the terrestrial planets and have constantly gained matter from comets.
 - C) They formed from the largest protoplanets in the region where water formed ice, which then captured gas from their surroundings
 - D) They started out as low-mass stars, but lost most of their mass after they ignited and started to shine
 - E) The gas and dust were hotter in the outer regions, making it easier for the planets to form.

- 18) A lunar rock has 1/16-th of the original uranium not yet decayed into lead, and the half life of Uranium is 700 million years, this rock has age: 18) _____
- A) 700 million years .
 - B) 2.1 billion years.
 - C) about 350 million years.
 - D) about 1,400 million years.
 - E) 2.8 billion years.
- 19) Of the following, which is a correct statement concerning the properties of different Terrestrial planets? 19) _____
- A) Venus is thought to contain more iron in its core than does the Earth because it is closer to the Sun.
 - B) The Earth has polar ice caps while Venus has none because the Earth is beyond the *Snowline*.
 - C) Venus and Earth have nearly the same mass.
 - D) The Earth and Mars are considered twins because they have nearly the same mass and atmospheric composition
 - E) The Earth and Mars both exhibit vigorous plate tectonic activity
- 20) Maxwell Mons on Venus is a huge: 20) _____
- A) ocean basin larger than the Pacific Ocean.
 - B) shield volcano.
 - C) impact crater larger than Texas.
 - D) tectonic mountain chain, like the Himalayas.
 - E) rift valley.
- 21) The _____ are an example of structures on Venus which formed from vertical crustal motions? 21) _____
- A) shield volcanoes.
 - B) crater basins
 - C) cinder cones.
 - D) coronae.
 - E) All of the above are examples vertical crustal motions.
- 22) Large impacts, such as the one that supposedly led to the extinction of the dinosaurs, currently happen: 22) _____
- A) every few thousand years
 - B) every 50 thousand years or so
 - C) every 4-5 billion years or so
 - D) every 100,000 years on average
 - E) every 100 million years or so
- 23) The lunar highlands are: 23) _____
- A) brighter than the mare, since they are covered with reflective glass from the rays.
 - B) more rugged, heavily cratered , and older than the lunar mare.
 - C) formed by volcanic eruptions, much like our Andes.
 - D) formed by plate tectonics, like the Earth's Himalayas.
 - E) made of lighter colored, younger rocks than the mare.

- 24) What is thought to have caused the craters on Venus? 24) _____
- A) Because meteorites cannot survive passing through the atmosphere of Venus, all craters must be volcanic.
 - B) Most are volcanic in origin; some are due to meteoritic impacts.
 - C) Venus' craters originated during differentiation.
 - D) Venus has very few craters and their origin is not known.
 - E) As in the case of Mercury, all the craters are due to meteorite impacts.
- 25) Which of the following statements about density is correct? 25) _____
- A) the density gives important information about the chemical composition of the interior of a planet.
 - B) In differentiated bodies, the denser materials lie close to their cores.
 - C) The denser planets orbit closer to the Sun.
 - D) The materials in the crust of the Earth are less dense than the average density of the Earth
 - E) All of the above are correct statements about density.
- 26) The largest difference between Mars' northern and southern hemispheres is that: 26) _____
- A) the southern appears older, with more impact craters.
 - B) the northern has all the outflows and must have been much hotter.
 - C) the southern is much darker, with large mare-like basaltic lava flows.
 - D) the southern has a polar cap, but none ever forms in the north.
 - E) the northern is higher overall, despite some high volcanoes in the south.
- 27) In noting that the interior of the Earth is "differentiated", we mean that: 27) _____
- A) radioactive heating in the core is at a slower pace than when the Earth was new.
 - B) the Earth has evolved in a different pattern than any other planet.
 - C) the Earth's magnetic field is different now in polarity than it was 700,000 years ago.
 - D) the density of its materials decreases as you go downward toward the core.
 - E) the iron and nickel core is denser than the silicate mantle and crust.
- 28) Which of the following statements about the surface of Venus is correct? 28) _____
- A) Venus's lithosphere is thought to be weaker and more pliable than the Earth's lithosphere
 - B) The surface of Venus is thought to be ancient, 4.6 billion years old
 - C) there is an overabundance of craters with diameters less than 30 km on Venus
 - D) Most of the surface of Venus is fairly young, only 3 billion years old
 - E) The surface of Venus is covered primarily by continental-type regions
- 29) The cratering of the lunar highlands shows us: 29) _____
- A) they have been unchanged for the last 4.6 billion years.
 - B) they are younger than the maria.
 - C) they are like the Earth's continents, removed from the tectonic cycle of the mare.
 - D) they were made of more rigid lavas than the basalts that made the maria.
 - E) they are older than the smoother maria.

- 30) What property or properties of Mars is(are) responsible for producing the great heights of its volcanos? 30) _____
- A) Its stronger surface gravity compared to the Earth allows higher peaks to form.
 - B) Its thick crust can support larger peaks, and there is little plate motion compared to the Earth
 - C) Its volcanoes are made of sulfur, like Io's, not like the volcanoes on the Earth
 - D) Its cold temperatures allows the magma to freeze faster.
 - E) Mars has more radioactive material in its molten core than does the Earth.
- 31) In the interior of the Earth, from the center outward, the correct ordering of the layers is: 31) _____
- A) solid metallic inner core, molten metal outer core, silicate mantle and crust.
 - B) solid metal core, molten metal hydrosphere, rocky lithosphere, gases in atmosphere.
 - C) solid rock core, liquid metal mantle, solid rock crust.
 - D) molten metal hydrosphere, molten rock lithosphere, solid silicate crust.
 - E) liquid iron inner core, solid nickel outer core, rocky mantle, silicate crust.
- 32) Which of the following is a true statement about an S wave? 32) _____
- A) It is a wave whose disturbance is in a direction parallel to its direction of its propagation
 - B) An example of an S wave is a wave travelling down a rope
 - C) An example of an S wave is a compression wave moving along a spring
 - D) S waves can only be produced by earthquakes.
 - E) S waves can only propagate along the surfaces of planets

Short Answer. Write your answer in the space provided or on a separate sheet of paper. There are 36 total points.

33) Extra-Solar Planets and Planetary Systems (6 points)

a. Compared to our Solar System, what properties of the newly discovered planets and planetary systems differ from the properties of our Solar System?

b. Compared to our Solar System, what properties of the newly discovered planets and planetary systems are similar to those of our Solar System?

c. What is meant by orbital migration and how does it explain what one of the discrepancies between the newly discovered extra-Solar planets and planetary systems and our Solar System?

34) Lunar Chronology (6 points)

a. Explain how crater counts allow us to estimate the relative ages of surface features in the Solar System.

b. How were we able to convert relative ages of features on the Moon to ages in years?

c. Draw a graph which shows how the cratering rate on the Moon has changed since its birth. Mark the Period of Heavy Bombardment, and the time when the maria formed on your chronology.

35) Plate Tectonics (6 points)

a. What drives the horizontal motion of the plates in plate tectonics?

b. What are the signatures of plate tectonic activity?

36) Terrestrial Planet Atmospheres. (6 points)

Compare the Earth, Venus, and Mars in terms of their:

a. atmospheric masses and atmospheric pressures at their surfaces

b. atmospheric compositions

c. surface temperatures

37) There are several pieces of evidence that suggests that Venus is still active volcanically. (6 points)

a. List two pieces of evidence known before Magellan which suggests that there is ongoing volcanic activity of Venus.

b. What piece of evidence was found by Magellan as evidence of recent volcanic activity on Venus?

38) Any theory of the origin of the solar system must explain a number of general properties of our system of planets. List the general properties below. (6 points)

a. Dynamical Regularities

b. Planetary Properties

Answer Key

Testname: ASTR121_X2_FALL2011

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