

TEST 1

Version 1

EARTH, LIFE, AND TIME GEOLOGY 102

FALL 2002

NAME _____

I.D.# _____

LAB TEACHER _____

PART 1 _____ (40 POINTS TOTAL)

PART 2 _____ (30 POINTS TOTAL)

PART 3 _____ (30 POINTS TOTAL)

BONUS _____ (10 POINTS TOTAL)

TOTAL

PART I – MULTIPLE CHOICE

PLEASE CHOOSE THE ANSWER THAT **BEST** COMPLETES EACH STATEMENT (2 POINTS EACH)

- (1) The distribution and abundance of any species on Earth is governed most notably by:
 - (a) the physical nature of the surrounding landscape
 - (b) the presence of predators
 - (c) the temperature
 - (d) the availability of water

- (2) An ecosystem includes:
 - (a) biological species occurring in a variety of environments
 - (b) both herbivores and carnivores
 - (c) all physical, chemical, and biological processes active within an environment
 - (d) both benthic and planktic organisms

- (3) Which of the following is not an essential component of an ecosystem:
 - (a) primary producers
 - (b) scavengers
 - (c) nutrients
 - (d) decomposers

- (4) Earth reservoirs, where chemical constituents can be stored, include:
 - (a) the ocean reservoir
 - (b) the atmospheric reservoir
 - (c) the biologic reservoir
 - (d) all of the above

- (5) The shape of the Earth is important in determining the amount of energy received by the sun because:
 - (a) the Earth's albedo is less at the poles
 - (b) the sun's rays hit the Earth more directly at the equator
 - (c) the sun's energy travels through a greater thickness of atmosphere at the equator
 - (d) all of the above

- (6) The process that converts carbon dioxide and water into organic matter:
 - (a) heterotrophy
 - (b) decomposition
 - (c) fractionation
 - (d) photosynthesis

- (7) Water vapor in the atmosphere significantly affects:
 - (a) the distance the sun's energy travels before reaching the Earth
 - (b) the amount of the sun's light reflected back into space
 - (c) both of the above
 - (d) none of the above

- (8) Clockwise rotation of ocean currents in the northern hemisphere result from:
 - (a) water in the southern hemisphere being colder than in the north
 - (b) the rotation of the Earth on its axis causing the coriolis effect
 - (c) the southern hemisphere having fewer continental masses
 - (d) all of the above

- (9) Wind-driven downwelling of ocean currents occurs:
- (a) because density changes drive marine waters downward
 - (b) because gravity drives waters downward to attain equilibrium in surface waters
 - (c) most frequently in the northern hemisphere
 - (d) with latitudinal variation of surface water temperatures
- (10) Deep-marine environments are characterized dominantly by:
- (a) the presence of photosynthetic organisms
 - (b) isotopically heavy marine waters
 - (c) high rates of biological productivity
 - (d) cold temperatures
- (11) Environmental variability is most likely to occur in:
- (a) marine, nearshore surface waters
 - (b) deep ocean waters
 - (c) equatorial to tropical environments
 - (d) polar marine waters
- (12) The Principle of Uniformitarianism requires:
- (a) that biological evolution does not occur
 - (b) that present conditions are identical to past conditions
 - (c) that certain processes have not changed through time
 - (d) all of the above
- (13) Surface ocean circulation is driven primarily by:
- (a) the movement of the Earth's atmosphere
 - (b) thermal convection
 - (c) salinity-driven convection
 - (d) the coriolis effect
- (14) A biological species can be thought of as:
- (a) a group of organisms that share a common genetic makeup
 - (b) a group of organisms that share many homologous traits
 - (c) both of the above
 - (d) none of the above
- (15) Primary productivity in the world's oceans is driven primarily by:
- (a) heterotrophs
 - (b) photoautotrophs
 - (c) benthic organisms
 - (d) all of the above
- (16) The primary difference between prokaryotes and eukaryotes is:
- (a) that only prokaryotes have the ability to photosynthesize
 - (b) prokaryotes lack a nucleus containing their genetic material
 - (c) prokaryotes can be both unicellular or multicellular
 - (d) all of the above
- (17) Phylogenetic classification assumes:
- (a) that the more traits shares between organisms, the more closely related they are to one another
 - (b) that organisms pass traits from parent to offspring
 - (c) both of the above
 - (d) none of the above

(18) The intertropical convergence is characterized by:

- (a) a large number of deserts on land
- (b) warm and wet climates
- (c) strong eastward flowing winds
- (d) all of the above

(19) Ocean circulation is driven primarily by:

- (a) friction from overlying atmospheric currents
- (b) the coriolis effect
- (c) heating of tropical waters by the sun
- (d) all of the above

(20) Planktic (or planktonic) organisms:

- (a) are often photosynthetic
- (b) are often unicellular
- (c) typically live in the surface oceans
- (d) all of the above

PART 2 – SHORT ANSWER

PLEASE ANSWER THE FOLLOWING QUESTIONS IN A FEW WORDS, A LIST, OR A SHORT SENTENCE

(1) Very briefly, define autotroph and heterotroph, and give an example of each. (6 points)

(a) Autotroph –

(b) Heterotroph –

(2) Briefly describe three factors that affect insolation (i.e., the amount of heat and light energy that the Earth receives from the sun). (9 points)

(a)

(b)

(c)

(3) Briefly explain, in terms of the movement of nutrients between reservoirs, why herbivores and carnivores are not considered essential ecosystem components. (5 points)

(4) Briefly explain one reason why ocean circulation is important to Earth surface ecosystems. (5 points)

(5) Briefly describe what is meant by nutrient cycling. (5 points)

PART 3 – LONG ANSWER

PLEASE ANSWER *TWO* OF THE FOLLOWING (15 POINTS EACH). YOUR ANSWER MAY BE IN THE FORM OF A PARAGRAPH, A BULLETED LIST, OR AN ANNOTATED DIAGRAM. IF YOU CHOOSE TO ANSWER MORE THAN TWO OF THE QUESTIONS, I WILL COUNT ONLY YOUR TWO HIGHEST SCORES.

(1) What are the primary differences between taxonomic classification and phylogenetic classification as methods for determining relationships among organisms?

(2) Describe the relationship of carbon isotopes to nutrient fluxes in the ocean.

(3) most deserts occur near 30° north and south latitudes. Describe why deserts found at higher latitudes (between approximately 35° and 55° north and south) occur largely on the eastern sides of large mountain ranges.

(4) Describe two different methods by which isotopically light carbon can be sequestered from, then released back into, the ocean reservoir.

(5) Describe the differences between thermohaline and warm-saline ocean circulation, making note of both the temperature (warm or cold) and source (polar or equatorial) for deep ocean water.

BONUS (10 POINTS TOTAL)

CHOOSE ONE OF THE FOLLOWING:

- (1) Answer one more question off of Part 3 – Label it “EXTRA CREDIT”
- (2) Draw detailed pathways of primary ocean currents and clearly label at least two localities where upwelling (U) and downwelling (D) would be expected to occur.

