

DO NOT WRITE ON THIS EXAM – ONLY WRITE ON THE ANSWER SHEET!

Multiple Choice Questions (20 points) – for each question, please choose the best answer and circle your answer on the answer sheet (**do not write on this exam**). One point each.

1. The study of the origin and evolution of Earth is:

- A. astronomy
- B. historical geology
- C. astrobiology
- D. physical geology
- E. paleontology

2. Plates are composed of:

- A. the crust and upper mantle
- B. the asthenosphere and upper mantle
- C. the crust and asthenosphere
- D. continental and oceanic crust only
- E. the core and mantle

3. The movement of plates is thought to result from:

- A. density differences between the inner and outer core
- B. rotation of the mantle around the core
- C. gravitational forces
- D. the Coriolis Effect
- E. convection cells

4. Which of the following statements about a scientific theory is not true?

- A. It is an explanation from some natural phenomenon
- B. It is a conjecture or guess
- C. It has a large body of supporting evidence
- D. It is testable
- E. Predictive statements can be derived from it

5. What two observations led scientists to conclude that the Big Bang occurred approximately 14 billion years ago?

- A. A steady-state universe and background radiation of 2.7K above absolute zero
- B. A steady-state universe and opaque background radiation
- C. An expanding universe and opaque background radiation
- D. An expanding universe and background radiation of 2.7K above absolute zero
- E. A shrinking universe and opaque and opaque background radiation

6. Any rock that has been altered from a previous state by heat, pressure and chemical fluids is a _____ rock.

- A. plutonic
- B. metamorphic
- C. ferromagnesium
- D. sedimentary
- E. evaporite

7. Lithification is the processes whereby:

- A. lava cools and forms an aphanitic texture
- B. atoms of two different elements join together
- C. organic matter is converted in granite
- D. rocks are altered by heat at the margin of a pluton
- E. sediment is converted into a sedimentary rock

8. Which one of the following is a phaneritic igneous rock?

- A. gabbro
- B. sandstone
- C. coal
- D. phyllite
- E. dolostone

9. If a naturally occurring solid substance has all of its atoms arranged in a specific three-dimensional framework it is said to be:

- A. covalently bonded
- B. crystalline
- C. porphyritic
- D. biochemical
- E. sedimentary

10. If you were to encounter an igneous rock in which the minerals were clearly visible, you would be justified in concluding that the rock is:

- A. detrital
- B. foliated
- C. plutonic
- D. metamorphic
- E. extraterrestrial

11. An atom with 6 protons and 8 neutrons has an atomic mass of:

- A. 14
- B. 2
- C. 6
- D. 8
- E. 48

12. The particles ejected by volcanoes during explosive eruptions are collectively called:

- A. biochemical constituents
- B. volcanic compounds
- C. carbonates minerals
- D. pyroclastic materials
- E. intrusive metamorphics

13. The man credited with developing the continental drift hypothesis is:

- A. Wilson
- B. Hess
- C. Vine
- D. Wegener
- E. du Toit

14. The southern part of Pangaea, consisting of South America, Africa, India, Australia and Antarctica is called:
- A. Gondwana
 - B. Laurentia
 - C. Atlantis
 - D. Laurasia
 - E. Pacifica
15. Hot spots and aseismic ridges can be used to determine:
- A. location of divergent boundaries
 - B. absolute motion of plates
 - C. location of magnetic anomalies in the oceanic crust
 - D. relative motion of plates
 - E. location of convergent plate boundaries
16. Magnetic surveys of the ocean basins indicate that:
- A. the oceanic crust is youngest adjacent to mid-oceanic ridges
 - B. the oceanic crust is oldest adjacent to mid-oceanic ridges
 - C. the oceanic crust is youngest adjacent to the continents
 - D. the oceanic crust is the same age everywhere
 - E. answers b and c
17. The driving mechanism of plate movement is thought to be:
- A. isostasy
 - B. Earth's rotation
 - C. thermal convection cells
 - D. magnetism
 - E. polar wandering
18. Convergent plate boundaries are areas where:
- A. new continental lithosphere is forming
 - B. new oceanic lithosphere is forming
 - C. two plates come together
 - D. two plates slide past each other
 - E. two plates move away from each other
19. The most common biotic province boundaries are:
- A. geographic barriers
 - B. biologic barriers
 - C. climatic barriers
 - D. answers a and b
 - E. answers a and c
20. The Andes Mountains are a good example of what type of plate boundary?
- A. continental-continental
 - B. oceanic-oceanic
 - C. oceanic-continental
 - D. divergent
 - E. transform

Short Answers (10 points) – please write your answer on the answer sheet (**do not write on this exam**). Two points each.

1. List the three major layers of the Earth starting with the surface and descending to the center.
2. The three major types of plate boundaries are transform plate boundaries and what other two types of plate boundaries?
3. What are the three major types of rock produced by natural processes on Earth?
4. The Earth is primarily composed of oxygen and iron, neither of which was present after the Big Bang. Where were these elements produced?
5. Our understanding about the inner layers of the Earth comes primarily from what kind of data?

Essay Question (15 points) - please write your essay on the back of your answer sheet (**do not write on this exam**).

Data from each of the following subjects has been used to support the theory of plate tectonics:

Regional geology

Paleobiogeography

Pattern of alternating stripes of magnetic polarity of oceanic basalts

In a well-written essay, analyze each type of data as it applies to plate tectonics. Specifically, for each type of data, you must

1. Describe the data (what was observed).
2. Explain why the observed data was an anomaly in the old geology paradigm in which the Earth's continents never moved.
3. Explain how the observed data supports the theory of plate tectonics.

The essay must be an essay, not a list of sentences. Assume that you are writing for someone who knows nothing about plate tectonics. Your essay will be graded based on content, syntax, grammar and spelling. You will lose points if I cannot understand what you have written.