

HWC 44 – EARTH, BODY, AND MIND

Unit 1 Exam

Name _____

All questions on this test are worth two points except the short discussion questions which are worth eight points each. The resulting total will then be converted into a percentage and will count 100 points toward your final grade (the same as each of the other three tests).

I. Multiple choice: Put the letter corresponding to the BEST answer in the space provided.

___C_ 1. When James Hutton observed both vertical and horizontal layers in a river bed, he concluded that

- A. a sudden catastrophe must have occurred to cause such a phenomenon.
- B. God had been very clever to create such unusual characteristics.
- C. the earth is old.
- D. activity caused by converging plates resulted in the unexpected pattern.
- E. none of the above

___A_ 2. Mountain ranges are likely to form

- A. on the overriding plate at a subduction zone
- B. on the plate going under at a subduction zone
- C. both of the above
- D. neither of the above

___D_ 3. Which of the following is true?

- A. All theories can be criticized.
- B. Not all criticisms are good criticisms.
- C. Not liking a theory is not a good reason for rejecting it.
- D. all of the above
- E. none of the above

___E_ 4. Which of the following best describes the situation found in areas like southern California:

- A. convergent boundary
- B. subduction zone
- C. divergent boundary
- D. superficial boundary
- E. transform boundary

___D_ 5. The biggest weakness in the theory of continental drift early in this century was:

- A. lack of biological evidence (e.g., fossils) to support the theory
- B. continental fit evidence that seemed to disprove it
- C. magnetic evidence that seemed to disprove it
- D. lack of a reasonable mechanism
- E. conflicting earthquake and volcano distribution data

___E_ 6. Zebra-like "stripes" in the rocks on both sides of mid-ocean ridges are associated with which of the following:

- A. sediment evidence
- B. earthquake distribution evidence
- C. fit evidence
- D. matching rock strata evidence

E. magnetic evidence

__C__ 7. Which is the most widely accepted causal explanation explaining plate tectonics:

- A. tidal forces
- B. centrifugal force
- C. convection currents
- D. centripetal force
- E. none of the above

__A__ 8. In which of the following areas should you find the oldest ocean floor rocks:

- A. near the mid-ocean ridges
- B. near the continental margins
- C. halfway between ridges and margins
- D. adjacent to seamounts
- E. none of the above

__B__ 9. Which of the following best describes the asthenosphere:

- A. solid, brittle
- B. flexible, gooey, partially molten
- C. completely liquid, flows like water
- D. formed of separate plates or segments
- E. the plates interact only at their boundaries

__C__ 10. Which of the following best describes the relationship of continents to plates as understood by the theory of plate tectonics:

- A. continents represent newer plates while ocean floor represents older plates
- B. continents are simply plates that have not yet been subducted
- C. continents are lighter material that are riding on plates like logs on ice
- D. continents are made of material that has resulted from extraterrestrial impacts
- E. none of the above

__C__ 11. Which of the following areas experienced an earthquake a number of years ago in which damage to buildings was greatly increased due to construction on unstable soil over an old lake basin:

- A. Colombia
- B. Armenia
- C. Mexico
- D. Mt. St. Helens
- E. Costa Rica

__B__ 12. For which of the following paradigms would the quote, "we find no vestige of a beginning, - no prospect of an end," be unacceptable or heretical:

- A. Plate Tectonics
- B. Static Earth of Ussher
- C. Contracting Earth of Jeffreys
- D. Continental Drift of Wegener
- E. none of the above

__D__ 13. Deep trenches are found in close proximity to which of the following:

- A. divergent boundaries
- B. stationary margins
- C. transverse margins
- D. convergent boundaries
- E. spreading zones

__E__ 14. Which of the following best exemplifies a convergent boundary:

- A. boundary between the Cocos and South American Plate
- B. mid-ocean ridge
- C. African Rift Valley
- D. San Andreas Fault
- E. Himalayan Mountains

__C__ 13. The oldest ocean floor rock is approximately:

- A. 3.5 billion years old
- B. 1.5 billion years old

- C. 150 million years old
- E. 1.5 million years old

D. 15 million years old

- B 15. A meteorite is best described by which of the following:
- A. small rocky bodies located in a swarm between the orbits of Mars and Jupiter
 - B. a piece of rock from outer space that strikes the surface of the earth
 - C. near earth objects or those whose orbital paths cross the orbital path of the earth
 - D. glowing fragments of rock that burn and glow upon entering the atmosphere
 - E. none of the above
- D 16. One of the reasons that scientists initially opposed extraterrestrial impacts as a cause of mass extinctions was:
- A. extraterrestrial objects had never been found
 - B. bolides were known to be the result of tectonic activity
 - C. craters were all found in subduction zones and could thus be explained by plate tectonics
 - D. catastrophism had been rejected earlier
 - E. scientists do not believe in UFO's
- D 17. Which of the following plate(s) is involved with tectonic activity in Mexico, Central America, and South America:
- A. Juan de Fuca
 - B. Indian
 - C. Aztec, Mayan
 - D. Cocos, Nazca
 - E. Wedgewood, Patagonian
- C 18. Which of the following is NOT a mass extinction that was discussed in class:
- A. Late Permian
 - B. Late Triassic
 - C. Late Jurassic
 - D. Late Cretaceous
 - E. Late Ordavician
 - F. Late Devonian
- D 19. Which of the following mass extinctions occurred **most recently**:
- A. Late Permian
 - B. Late Triassic
 - C. Late Jurassic
 - D. Late Cretaceous
 - E. Late Ordavician
 - F. Late Devonian
- B 20. The poorly understood reversals of the earth's magnetic poles is important for which of the following:
- A. theories regarding mass extinction
 - B. evidence for sea for spreading
 - C. evidence for subduction zones
 - D. the path's of "planet-killer" asteroids
 - E. the contracting earth theory
 - F. Biblical catastrophism
- B 21. The Keeper of the Sacred Chickens (for the reading of their entrails) was an important position in which of the following cultures:
- A. Mayan
 - B. Roman
 - C. Hebrew
 - D. early Christian
 - E. Islamic
 - F. Hindu

II. True/False. Put a T or F in the space provided.

- F 1. Most of the world's active above-sea volcanoes are located along transform faults, while volcano activity beneath the ocean's surface is most commonly near boundaries of convergent plates where subduction is occurring.

- T 2. The earthquake that caused the Asian tsunami is the strongest that has occurred in the world since the 1960s.
- T 3. Continental drift encompasses the theory of plate tectonics, but is a broader theory and includes more.
- F 4. A trench is a large gap between adjacent plates that are diverging.
- F 5. Pseudoscience is a term used for branches of science that use pure logical reasoning but no empirical evidence.
- T 6. The Contracting Earth paradigm was generally accepted from the mid 1800s until just a few decades ago.
- T 7. Even with overwhelming evidence, scientists do not consider their theories to be 100% proven true.
- F 8. The evidence of shocked quartz supports the idea that volcanic eruptions are a cause of mass extinction.
- F 9. An impact site, known as the Marquez Dome, is found off the northern coast of the Yucatan in Mexico.
- T 10. A number of the volcanic sites discussed in the Plate Tectonics video were closer to Sherman than many localities in the United States.

III. Fill in the blanks with the BEST possible answer.

1. What was Harold Jeffreys' primary *objection* to Wegener's proposed theory? _____ no mechanism _____
2. What is meant by *empirical evidence*? _____ based on observation or experiment _____
3. What is the name Wegener gave to the *super-continent* that he suggested had once existed? _____ Pangaea _____
4. Prior to the time of **Copernicus**, what one word best describes how the universe was viewed. _____ geocentric _____
5. The Deccan Traps in India are associated with an explanation of K-T mass extinction other than extraterrestrial impact. This explanation is assumed by many to be the second most likely cause. Name this explanation. _____ volcanoes _____
6. The scientific method is practiced within a context of scientific/critical thinking, which is based on three things: empiricism, rationalism, and skepticism
7. Unusual ball-shaped molecules, with space gas (isotopes of helium & argon) within a cage of carbon atoms, have been found in sediments associated with the Permo-Triassic boundary. Name these unusual molecules. buckybally _____
8. The huge ocean waves that could form as a result of impact are known as tsunamis _____.
9. Name the impact crater that is thought to be associated with the K-T boundary mass extinction. _____ Chixalub _____

10. An anomaly or spike in concentration of the element Iridium was the initial clue that led researchers to conclude that there had been a massive impact at the time of the K-T mass extinction.
11. Name a creature, other than dinosaurs, that went extinct at the K-T boundary. ammonites or pterosaurs
12. Objects whose orbits cross the orbital path of the earth are known as earth-crossing objects. They are of particular interest because of the danger they pose to our planet.
13. Which mass extinction is considered to be the closest call known for the elimination of life on earth? Permian
14. In 1980, who proposed an asteroid 10 km in diameter struck the earth and caused or contributed to the K-T extinction? Alvarez
- 15-16. What is *uniformitarianism*? (Answer briefly.) the same processes are operating today as in the past
17. 45. Summarize in ONE LINE the meaning of the following quote: “Science as a Candle in the Dark.” Science removes the “darkness” by helping to provide rational explanations for what we see in the physical world around us
18. In lecture and in one of your **readings** a “boundary clay” was discussed in detail. What was its importance? the boundary clay was at the K-T boundary and provides evidence for what happened at that time
19. Faith healing, people letting their children die rather than have medical treatment or blood transfusions, and Christian fundamentalists attributing the origin of AIDS to divine retribution are all examples of superstitious/religious (supernatural) explanations for disease.
20. Approximately *when* did the Scientific Revolution, arguably the most important “event” in Western history, occur in Europe. (Hint: you do not have to give an exact date; rather, approximately when). 1500s and 1600s
21. The reliance on evidence is a critical distinction for the scientific method (versus intuition, believing what others tell you, listening to authority figures, what you read, divine revelation, faith, magic, superstition, pure logic, the reading of chicken entrails, channeling, etc.). (Hint: this question is directly from the outline!)
22. As discussed in this class, science is based on what philosophical viewpoint? mechanistic or naturalistic
23. What does the term *heliocentric* mean? sun-centered solar system
24. During the Dark Ages in Europe, much of the learning of the ancient Greeks was preserved by what culture and then passed back to Europe? Islam

25. Carl Sagan said “It delivers the goods.” To what was he referring? ___it has external validity/it produces tangible results___
26. There are often _cultural__ influences on the development or acceptance of scientific ideas. (Hint: this is directly from one of your outlines.)
27. Sometimes there are radical shifts in science called __paradigm shifts__ where new ways of thinking cause major breakthroughs. Old theories in some cases have to be greatly modified or even discarded in order to make way for the new. (Hint: this is directly from one of your outlines.)
28. What simple *three word definition* of science was emphasized on your outline? ___observe-hypothesize-test___
29. Archbishop James Ussher calculated that the earth was formed *when?* ___4004 B.C. ___
30. *Who* was the individual given credit for bringing the concept of continental drift (and evidence to support it) to widespread attention in 1912? _____Wegener_____
31. The conveyor-belt-like view of the ocean floors, whereby new material is formed at mid-ocean ridges is referred to as _____sea-floor spreading_____.
32. Why were land bridges once proposed as linking a number of the southern continents? _____to explain identical fossils on widely separated continents_____
33. The “ring of fire” occurs around what body of water? ___Pacific Ocean_____
34. Briefly describe the material found at the boundary between the Cretaceous and Tertiary periods _____it has much more iridium than expected; it also has tektites_____
35. Where is the asteroid belt? ___ between orbits of Mars & Jupiter _____
36. In terms of what you have learned in this course, what do ammonites and pterosaurs have in common? _____they became extinct at the K-T boundary_____
37. Name the comet that struck Jupiter in 1994. ___ Shoemaker-Levy 9 _____
38. As discussed in class, what is our current best estimate of the magnitude of the earthquake that caused the Asian tsunami disaster a bit over a year ago. _____ 9.15 was given in class, somewhere between 9.1 and 9.3 _____
39. Approximately how many people were killed in the Asian tsunami disaster a bit over a year ago. _____ somewhere between 225,000 and 290,000 (most recent estimates are a bit lower that previously thought) _____

40. In class there was a discussion of hot-spot volcanoes and a slide was shown of Dr. Diggs standing by a stop sign engulfed by lava from a hot-spot volcano. Where in the world was this hot-spot volcano located? _____Hawaii_____
41. Some people resort to the supernatural for whatever is not understood at a given point in time. What is the phrase that is used to describe this approach? ___God of the Gaps___
42. What do we call the phenomenon when something purports to use the methods and findings of science, but actually does not? _____Pseudoscience_____
43. Define the word empirical in such a way that you demonstrate your understanding of the word. _____= based on observation or experiment _____

V. Short Discussion. Answer using the space provided.

1. Discuss “science” including the time and place of its origin, the origin of the word itself, the definition of science, the critical distinct of science, and the philosophical viewpoint that science is based on. (five points)

2. *Discuss* the following two types of evidence for impacts: 1) that first discovered in 1980 at Gubbio, Italy, and 2) tektites. (four points)

3. Discuss the late Permian extinction, being sure to include its significance and the various types of evidence in terms of a cause. (four points)

This exam was taken in accordance with the Austin College Academic Integrity Policy.

Name Printed _____ Signature _____