



Exploring the World of Science

Captain's Tryouts 2017

Dynamic Planet – Test

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Name: _____ Date: _____

Answer all questions on the answer sheet. Point values are given next to each question or set of similar questions. The maximum possible score is 83 points.

Please do NOT write on the image sheet or question packet.

Tiebreakers (in order): 11, 24, 33, 41, 45, 52, 54, 57

For questions 1 through 20, write a single letter on the answer sheet. Each question is worth 1 point.

1. The _____ is the viscous, ductile layer of the earth that is part of the mantle.
 - a. crust
 - b. lithosphere
 - c. troposphere
 - d. asthenosphere
2. This scientist proposed the theory of continental drift in the early 20th century.
 - a. Robert Dietz
 - b. Alfred Wegener
 - c. Keith Runcorn
 - d. Maurice Ewing
3. This scientist was part of the team that discovered the Mid-Atlantic Ridge.
 - a. Robert Dietz
 - b. Alfred Wegener
 - c. Keith Runcorn
 - d. Maurice Ewing
4. How many major tectonic plates are generally recognized?
 - a. 5-6
 - b. 7-8
 - c. 9-10
 - d. 11-12
5. Mid-Ocean ridges form primarily at which type of plate boundary?
 - a. Transform
 - b. Convergent
 - c. Divergent
 - d. Triple Junction
6. Which of the following is a common cause of continental rifting?
 - a. Collision orogeny
 - b. Subduction
 - c. Obduction
 - d. Hot spots
7. What process is occurring in image 1?
 - a. Crustal formation
 - b. Lateral shear
 - c. Forearc spreading
 - d. Subduction
8. Why does the scale in image 1 end at 100km?
 - a. The earth is 100 km deep
 - b. Measuring instruments cannot see any deeper.
 - c. Rock melts below this point
 - d. Rocks dehydrate below this point, so it becomes tectonically irrelevant.
9. The asthenosphere primarily transfers energy using _____.
 - a. convection
 - b. conduction
 - c. radiation
 - d. refraction
10. Oceanic back arc basins form near what process?
 - a. Island Arc subduction
 - b. Cordilleran subduction
 - c. Collision orogeny
 - d. Transform boundaries
11. Rocks release _____ and become _____ when they subduct.
 - a. water; serpentines
 - b. carbon dioxide; schist
 - c. sulfur; azurite
 - d. water; olivines
12. Which of the following are most likely to form large thrust faults?
 - a. Subduction
 - b. Divergent ridges
 - c. Continent-continent collisions
 - d. Hot spots
13. Continental plates are usually _____ than oceanic plates.
 - a. thinner
 - b. thicker

14. What tectonic process is forming the mountains in image 2?
- Continent-continent collision
 - Island arc subduction
 - Transform fault shearing
 - Oceanic-oceanic subduction
15. What two major plates are colliding to form the mountains in image 2?
- Eurasian and North American
 - South American and African
 - African and Nazca
 - African and Eurasian
16. Earthquakes along which fault formed the Aleutian Islands?
- Dead Sea Transform
 - San Andreas Fault
 - Alpine Fault
 - Queen Charlotte Fault
17. Which of these is the oldest?
- Rocky Mountains
 - Isthmus of Panama
 - Appalachian Mountains
 - Carpathian Mountains
18. Continental crust covered by sediment at a passive margin displays what type of faulting?
- Normal
 - Reverse
 - Listric
 - Transform
19. The motion of the Yellowstone Hotspot indicates that the North American plate is moving _____.
- North
 - Northeast
 - Southeast
 - West

20. Which of the following plates is no longer in existence due to subduction?
- Cocos
 - Farallon
 - Australian
 - Nazca

For questions 21 through 30, circle all of the correct answers on the answer sheet. If none of the answer choices listed is correct, do not circle any. Each question is worth 2 points.

21. Which of the following phenomena are associated with oceanic divergence?
- Pillow basalt
 - Magnetic reversal
 - Oceanic trenches
 - Stratovolcanoes
22. Which of the following answer choices contain related pairs?
- Hot spot; Island Arc subduction
 - Aulacogen; Triple junction
 - Obduction; Ophiolite
 - Rift valley; Graben
23. The Laurentian Shield has been a part of which of the following structures?
- Gondwana
 - Pangaea
 - Rodinia
 - Baltica
24. Which of the following are methods that can detect volcanic activity?
- Monitoring gaseous emissions
 - Detecting earthquakes
 - Monitoring river channels
 - Measuring elevation changes
25. Which of the following locations contains oceanic crust greater than 150 million years old?
- South America's west coast
 - Bay of Bengal
 - Pacific Ocean east of Japan
 - Swahili Coast

26. Which of the following methods can be used in plate reconstruction?
- Continental geometry
 - Magnetic polarity
 - Mountain ranges
 - Hot spots
27. The diagram shown in image 3 is often associated with which of the following?
- Collision orogeny
 - Island arc mélanges
 - Transform boundaries
 - Thrust faults
28. Which of the following often form the features shown in image 3?
- Basin and Range
 - Coastal plain
 - Island arc system
 - Foreland basin
29. Which of the following are associated with mafic volcanoes?
- Transform boundaries
 - Convergent boundaries
 - Divergent boundaries
 - Hot spots
30. Which of the following are associated with dip-slip faults?
- Transform boundaries
 - Continent-continent orogeny
 - Rift valleys
 - Mid-Ocean ridges

Questions 31 through 50 are short answer. Each question is worth 1 point.

- What type of basin is formed when a graben fills with sediment eroded from adjoining horst?
- In a situation where an oceanic plate collides with a continental plate, which plate will subduct?
- Which arm of the Afar Triple Junction is an aulacogen?

Use image 4 to answer questions 34 through 41.

- 39. Identify the structures
- A process occurs when the oceanic crust reaches a sufficient depth in which it releases supercritical water, causing the rock around it to melt due to a decrease in pressure. This is the reversal of what mineral alteration process?
- What type of metamorphism occurs with the release of water in question 40?

Use image 5 to answer questions 42 through 46.

- What geological process is shown in image 5?
- Which section depicts a continental rift valley?
- Which two sections include an oceanic trench?
- What is the name of the flat, eroded plain shown in section (G)?
- What type of geologic structure is shown in section (A)?

Use images 6 and 7 to answer questions 47 through 50.

- In what direction was the African continent rotating between the two images?
- In what general direction was South America moving?
- In what general direction was North America moving?
- Which of the three continents rotated the most?

Questions 51 through 57 are free-response. Point values are given next to each question. The maximum score for this section is 23 points.

51. Explain the primary difference between Cordilleran and Island Arc subduction zones. Give one example of a currently active island arc subduction zone. (4 points)
52. Identify and explain the variations in three characteristics of magma and/or volcanic eruptions that vary based on its silica content. (3 points)
53. Explain the concepts of ridge push and slab pull in relation to seafloor spreading, including their relative strengths. (5 points)
54. Explain the concept of isostasy and how it affects plate tectonics? (3 points)
55. What is the difference between stress and strain? Which of them causes the other? (3 points)
56. Compare and contrast elastic deformation and ductile deformation. Explain the difference between brittle and ductile materials in terms of elastic and ductile deformation. (5 points)

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