DYNAMIC PLANET

Exploring the World of Science

Cypress Falls High School
Science Olympiad Invitational
October 22, 2016

Names ____________________________  Team Number _____
1. Indicate the type of plate boundary associated with each of the following geologic features:
   a. Andesitic volcanoes
   b. Basaltic volcanoes
   c. Long linear scarps
   d. Island arcs
   e. Normal faults

2. The concept that adding or removing a weight from the earth’s crust causes it to depress or rebound:

3. The name of the scientist who proposed seafloor spreading:

4. The name of the scientist who proposed continental drift:

5. Define orogenesis:

6. What is the character of magnetic anomalies on the seafloor?
   a. They occur in stripes that parallel mid-ocean ridges and are offset along transform faults.
   b. They occur in stripes that run perpendicular to mid-ocean ridges and parallel transform faults.
   c. They occur in stripes that parallel continental margins and transform faults.
   d. They occur in stripes that run perpendicular to continental margins and parallel to transform faults.
   e. They occur in stripes that parallel transform faults and end at mid-oceanic ridges.

7. What is the age order of sea floor types (the crust underlying them) from oldest to youngest?
   a. Abyssal hills, abyssal plains, mid-ocean ridge, continental shelf
   b. Abyssal plains, abyssal hills, mid-ocean ridge, continental shelf
   c. Continental shelf, abyssal plains, abyssal hills, mid-ocean ridge
   d. Mid-ocean ridge, abyssal hills, abyssal plains, continental shelf
   e. Mid-ocean ridge, abyssal plains, abyssal hills, continental shelf
8. Which sea is an example of rifting forming an incipient ocean?
   a. Baltic Sea
   b. Bering Sea
   c. Black Sea
   d. English Channel
   e. Red Sea

9. How does plate tectonic theory explain the Ural Mountains separating Europe and Asia?
   a. Ancient collision and suturing of Europe and Asia
   b. Eurasia is moving over a hot spot in the mantle
   c. Incipient rifting apart of Europe and Asia
   d. Intraplate orogenesis in Eurasia
   e. The Urals are the one mountain chain that was better explained by older theories.

10. Using the choices below, indicate the kind of convergent plate boundary that formed (if any) for each mountain/island system:

    I. Continental crust colliding with oceanic crust
    II. Oceanic crust colliding with oceanic crust
    III. Continental crust colliding with continental crust
    IV. Not a type of convergent boundary

   a. Hawaiian Islands ________
   b. Andes Mountains ________
   c. Mariana Islands ________
   d. Himalayan Mountains ________
   e. Cascade Mountains ________

11. What is the east coast of the United States an example of?
    a. Active continental margin
    b. Convergent plate boundary
    c. Divergent plate boundary
    d. Passive continental margin
    e. Transform plate boundary
12. What is the New Zealand Alpine Fault an example of?
   a. Active continental margin
   b. Convergent plate boundary
   c. Divergent plate boundary
   d. Passive continental margin
   e. Transform plate boundary

13. What is the East African Great Rift valley an example of?
   a. Active continental margin
   b. Convergent plate boundary
   c. Divergent plate boundary
   d. Passive continental margin
   e. Transform plate boundary

14. The San Andreas fault creates the tectonic boundary between which two plates?

15. What happens when a piece of continent reaches an ocean-bound subduction zone?
   a. A decollement forms along a foredeep
   b. An island chain is quickly formed
   c. Subduction ceases
   d. Subduction switches to the other plate
   e. The continent is subducted

16. What has become accepted as the primary mechanism for seafloor spreading?

17. How is oceanic crust forced back into the earth's mantle?
   a. It wants to float but is forced to curl as it cools.
   b. It wants to float but is forced under by colliding plates.
   c. It wants to sink because it is made of high density minerals.
   d. It wants to sink because it is cold and therefore dense.
   e. It wants to sink because of its high iron content.

18. The process described in the previous question is known as ____________________.

19. List the modern continents that were derived from Gondwanaland:

20. The time period in which the five continents above formed Gondwanaland: ___________. 
21. In the illustration to the right
   a. What block is the White Pine located on?
      ____________________________
   b. What block is the Maple located on?
      ____________________________
   c. What kind of fault is illustrated?
      ____________________________

22. Please answer the question on the following illustration.
   ____________________________
23. The following graph shows carbon dioxide levels over the past 400 million years.

![Graph showing carbon dioxide levels over time]

a. In the space below, plot an estimate for the change in temperature over that timespan.

![Temperature change graph]

b. Explain why your graph looks the way it does.

24. Despite having similar latitudinal extremes, the arctic was not covered in ice until roughly 3 to 5 million years ago, while the antarctic has been covered in ice for approximately 35 million years. What major tectonic event could have caused this? Explain your answer.

25. Define the geologic word *talus*.
26. Which would most likely be the period of a tsunami?
   a. 3 seconds  
   b. 30 seconds  
   c. 3 minutes  
   d. 30 minutes  
   e. 300 minutes

27. Which would most likely be the wavelength of a tsunami?
   a. 3 meters  
   b. 30 meters  
   c. 300 meters  
   d. 3000 meters  
   e. 30000 meters

28. As a tsunami enters shallow water, it (speeds up / slows down) and its amplitude (increases / decreases). Circle your answers.

29. Sometimes, a triple junction plate boundary has one of its rift arms fail. What word best describes this phenomenon?
   a. Aulacogen  
   b. Graben  
   c. Mass Effect  
   d. Elluviation  
   e. Kaufblau Indentation

30. The fault lines in this picture are parallel. Write a word that would best fill boxes A and B.
Matching: Match each word to the correct definition:

<table>
<thead>
<tr>
<th>A. Hypsometry</th>
<th>B. Bathymetry</th>
<th>C. Isometry</th>
</tr>
</thead>
<tbody>
<tr>
<td>D. Subduction</td>
<td>E. Abduction</td>
<td>F. Conjunction</td>
</tr>
<tr>
<td>G. Tephra</td>
<td>H. Slurry</td>
<td>I. Lahar</td>
</tr>
</tbody>
</table>

31. The measure of how far above sea level a given point is.
32. The measure of how far below sea level a given point is.
33. The name for all solid particles emitted by a volcano
34. A type of debris flow with pyroclastic material, rocky debris, and sometimes water.
35. The act of one plate pushing another plate downward into the mantle.

36a. Rank the types of magma (andesitic, basaltic, rhyolitic) in order from lowest to highest concentration of silicon dioxide.
   Lowest:                           Medium:                           Highest:

36b. Rank the same three types in order from lowest to highest concentration of potassium and sodium.
   Lowest:                           Medium:                           Highest:

36c. Which type of magma generally has the highest eruption temperature?

36d. Which type of magma has the highest viscosity?

36e. Melting (crust/mantle) will result in more basaltic magmas. (circle your answer)

37. In Bowen’s reaction series, what are the two branches?
38. Which is located closest to olivine on Bowen's reaction series?

   a. Muscovite
   b. Oligoclase
   c. Biotite
   d. Pyroxene

Circle whether each statement is true or false.

39. True or false: There exists exposed land (NOT underwater) on Earth that is below sea level.

40. True or false: There exists exposed land (NOT underwater) on Earth that is more than 100 meters below sea level.

41. True or false: There exists exposed land (NOT underwater) on Earth that is more than 500 meters below sea level.

42. True or false: There exists exposed land (NOT underwater) on Earth that is more than 1000 meters below sea level.

43. What is the name of the deepest point in the ocean floor?

44. Give an approximation of its depth in meters (+/- 1000m).

45. Name each of the three types of plate boundaries shown here.

   45b. The San Andreas fault is an example of which type?

   45c. Which type of boundary is responsible for the creation of most new crust?

46. When a volcano erupts, what is the primary gas emitted?