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Continuing Education Course #407  
Systems: Tectonic & Hydrologic  
Field Study Observations & Interpretations

1. Petrogenesis is the branch of study under petrology that covers a rocks origin and its past.  
 a. True  
 b. False
2. The Cobbles outcrop in this field study is located in \_\_\_\_\_.  
 a. Harrisburg, PA  
 b. Orlando, FL  
 c. Colorado Springs, CO  
 d. Cheshire, MA
3. How many study field visits were completed in order to capture the objective evidence needed to complete the interpretation?  
 a. one  
 b. two  
 c. three  
 d. four
4. The field study visits resulted in which of the following objective evidence collected?  
 a. photographs that show vertical bedding structure, deformation joints, and scour  
 b. principal rock identification of quartzite  
 c. nonconformity sedimentary rock sandstone  
 d. all of the above
5. The sedimentary rock nonconformity on The Cobbles quartzite outcrop is very significant. This finding alone, describes the following four major geological events that must have occurred in sequence:  
1)creation of ancient rock  
2)metamorphism  
3)uplift and erosion  
4)deposition of younger sedimentary rock  
 a. True  
 b. False
6. 600 - 530 million years ago (mya), the area was \_\_\_\_\_ .  
 a. an old (low) mountain range  
 b. a young (high) mountain range  
 c. under a warm, shallow ocean  
 d. under a cold, deep ocean
7. Following this long period (530 mya) towards the middle of the Cambrian, the final geologic environment was an epicontinental sea; with The Cobbles \_\_\_\_\_ .

- a. part of the sea bed as layers of the sedimentary rock, sandstone
  - b. metamorphosed into quartzite
  - c. completely disappeared into the aesthenosphere
  - d. melted in the mantle
8. Between 530 to 500 mya, located in the \_\_\_\_\_ of an ocean-continent convergent plate boundary as depicted in the following figure, this cold slab (i.e. the ancient sandstone strata) was subducted to great depths.
- a. magmatic arc
  - b. swell
  - c. forearc
  - d. back-arc
9. Following the subduction (500 mya) towards the end of the Cambrian, the final geologic environment was tectonically convergent (ocean-continent); with The Cobbles plunged to great depths and \_\_\_\_\_.
- a. metamorphosed into quartzite
  - b. completely disappeared into the aesthenosphere
  - c. remained horizontal bedding of sandstone strata
  - d. melted in the mantle
10. The \_\_\_\_\_ were formed from a series of three orogenies: Taconic, Acadian, and Alleghenian.
- a. Rocky Mountains
  - b. Himalayas
  - c. The Alps
  - d. Appalachian Mountains
11. Following the three orogenies (300 mya) towards the end of the Pennsylvanian, the final geologic environment was orogenic - high, much like today's Rocky Mountains; where The Cobbles was uplifted by \_\_\_\_\_.
- a. accretion cycles and compression
  - b. subduction
  - c. volcanic activity
  - d. earthquakes
12. About 179 million years ago, the North American and African plates began to diverge as the mid-atlantic ridge formed and began moving the plates apart by \_\_\_\_\_; and consequently, a long period of erosion and isostatic adjustments.
- a. sea-floor spreading
  - b. subduction
  - c. volcanic activity
  - d. earthquakes
13. Following 300 million years of \_\_\_\_\_, The Cobbles finally breached the ground surface and is now exposed as an outcrop.
- a. erosion and isostatic adjustment
  - b. subduction
  - c. volcanic activity
  - d. earthquakes
14. As the quartzite inched closer to sea-level, 20-40 mya, the \_\_\_\_\_ unconformities formed.
- a. scoria and obsidian
  - b. sandstone and chert

- c. granite and pegmatite
  - d. phyllite and gneiss
15. Which of the following two conditions made it ideal for the nonconformities to form?
- a. lower temperature and higher pressure
  - b. lower temperature and lower pressure
  - c. lower pressure and groundwater flow
  - d. higher temperature and higher pressure
16. According to Table 4.1: The Cobbles Petrogenesis Summary w/ Major States & Events, what was the state of The Cobbles in the Cambrian, 540-520 mya, in an Epicontinental sea environment?
- a. Sandstone Horizontal Strata
  - b. Erosion & Isostasy Adjustment
  - c. Uplift by Accretion Cycles
  - d. Uplift by Compression
17. According to Table 4.1: The Cobbles Petrogenesis Summary w/ Major States & Events, what was the state of The Cobbles in the Cambrian, 520-500 mya, in a Tectonic Convergence (ocean-continent) environment?
- a. Subduction: 1) Vertical Strata 2) Quartzite Metamorphism
  - b. Erosion & Isostasy Adjustment
  - c. Uplift by Accretion Cycles
  - d. Uplift by Compression
18. According to Table 4.1: The Cobbles Petrogenesis Summary w/ Major States & Events, what was the state of The Cobbles in the Pennsylvanian, 320-300 mya, in a Tectonic Convergence (Alleghenian Orogeny) environment?
- a. Subduction: 1) Vertical Strata 2) Quartzite Metamorphism
  - b. Erosion & Isostasy Adjustment
  - c. Uplift by Accretion Cycles
  - d. Uplift by Compression
19. According to Table 4.1: The Cobbles Petrogenesis Summary w/ Major States & Events, what was the state of The Cobbles in the Cenozoic, 40-20 mya, in a the following environment: Rain, Ice; Tectonic Divergence; Groundwater?
- a. Subduction: 1) Vertical Strata 2) Quartzite Metamorphism
  - b. Erosion & Isostasy Adjustment, Nonconformities
  - c. Uplift by Accretion Cycles
  - d. Uplift by Compression
20. According to Table 4.1: The Cobbles Petrogenesis Summary w/ Major States & Events, what was/is the state of The Cobbles in the Cenozoic, 20-0 mya, in a the following environment: Rain, Ice; Tectonic Divergence?
- a. Subduction: 1) Vertical Strata 2) Quartzite Metamorphism
  - b. Erosion & Isostasy Adjustment, now EXPOSED
  - c. Uplift by Accretion Cycles
  - d. Uplift by Compression
21. According to Figure 4.1: The Cobbles Petrogenesis Summary Elevation Curves, The Cobbles started in an epicontinental sea at a depth of \_\_\_\_\_ ft.
- a. -20
  - b. -200
  - c. -2,000
  - d. -20,000

22. According to Figure 4.1: The Cobbles Petrogenesis Summary Elevation Curves, The Cobbles subducted to a maximum depth of \_\_\_\_\_ ft.

- a. -20,000
- b. -60,000
- c. -70,865.7
- d. -80,000

23. According to Figure 4.1: The Cobbles Petrogenesis Summary Elevation Curves, The Cobbles rose to an elevation of \_\_\_\_\_ ft after the orogenies.

- a. -20,000
- b. -48,725
- c. -60,000
- d. -80,000

24. According to Figure 4.1: The Cobbles Petrogenesis Summary Elevation Curves, the sandstone and chert nonconformities began to form after The Cobbles rose to a depth of less than \_\_\_\_\_ ft.

- a. -5,000
- b. -25,000
- c. -45,000
- d. -75,000

25. According to Figure 4.1: The Cobbles Petrogenesis Summary Elevation Curves, The Cobbles rose to its current elevation of \_\_\_\_\_ ft after 300 million years of erosion and isostasy adjustments?

- a. 18
- b. 180
- c. 1,800
- d. 18,000

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