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Question: 1

The map in Figure 1 shows two vertical dikes (Dike 1 and Dike 2) and two faults (Fault A and Fault B). What is the correct sequence of events, listed from oldest to youngest?

- A. Emplacement of Dike 1, emplacement of Dike 2, movement of Fault A, movement of Fault B
- B. Movement of Fault A, emplacement of Dike 1, emplacement of Dike 2, movement of Fault B
- C. Movement of Fault B, emplacement of Dike 2, movement of Fault A, emplacement of Dike 1
- D. Emplacement of Dike 2, movement of Fault B, movement of Fault A, emplacement of Dike 1

Answer: D

Explanation:

The question is answered based on the principle of cross-cutting relationships, which states that a geologic feature that cuts another is the younger of the two. Fault B cuts Dike 2; therefore, Dike 2 must be older than Fault B. Fault A cuts Fault B, so Fault A is younger than Fault B. Dike 1 cuts Fault A, so Dike 1 is younger than Fault A.

Question: 2

A rock described as arkoses

- A. is frequently a basalt.
- B. contains olivine.
- C. is sandstone containing 225% feldspar.
- D. is a type of carbonate.

Answer: C

Explanation:

Arkose is a type of detrital sedimentary rock that contains at least 25% feldspar. The answer cannot be A or D because neither basalt nor carbonate are detrital sedimentary rocks. The answer cannot be B because a detrital sedimentary rock containing >90% olivine could not also contain 225% feldspar.

Question: 3

If the scale of a map is what does 1 inch on the map represent?

- A. 240 feet
- B. 2,000 feet

- C. 24,000 feet
- D. 1,000 feet

Answer: B

Explanation:

The map scale is a ratio of distance on a map to the actual distance on the ground. A scale of means that 1 inch on the map represents a distance of 24,000 inches (2,000 feet).

Question: 4

In a region eroded by glaciers, what are bowl-shaped depressions at the head of a glacial valley?

- A. Cirques
- B. Kames
- C. Aretes
- D. Drumlins

Answer: A

Explanation:

Bowl-shaped portions of valleys carved by glacial erosion are called cirques. The other choices are glacial features, but they are all hills or ridges, as opposed to depressions.

Question: 5

Which two-letter symbol is commonly used for a fat clay?

- A. CH
- B. OH
- C. CL
- D. ML

Answer: A

Explanation:

A fat clay is one with a high liquid limit. Under the United Soil Classification System, the letter C denotes clay, and H denotes a high liquid limit. The other choices are other types of fine-grained soils: OH is an organic-rich soil with a high liquid limit, CL is a clay with a low liquid limit ("lean clay"), and ML is silt with a low liquid limit.

6.

Question: 6

For a dip-slip fault, what is the area above the fault plane known as?

- A. Footwall
- B. Core
- C. Flank
- D. Hanging wall

Answer: D

Explanation:

For a dip-slip fault, the hanging wall lies above the fault plane. The footwall is below the fault plane. For reverse and thrust faults, the hanging wall moves up relative to the footwall, and for normal faults the hanging wall moves down relative to the footwall.

Question: 7

Which isotope dating method is commonly used to determine the ages of detrital zircon grains in sandstone?

- A. K-Ar
- B. U-Pb
- C. Rb-Sr
- D. Sm-Nd

Answer: B

Explanation:

U-Pb geochronology is the most commonly used method for dating zircon grains. The other methods are not appropriate for dating zircon because of the low abundances of the parent isotopes (i.e., K) in zircon.

Question: 8

In general, which tectonic environment is most likely to include normal faults?

- A. Mid-ocean ridge
- B. Subduction zone
- C. Transform plate boundary
- D. Mantle hot spot

Answer: A

Explanation:

Mid-ocean ridges are plate boundaries where oceanic plates diverge from each other, so they are regions of normal faulting. Subduction zones are dominantly regions of thrust faulting, and

transform plate boundaries are characterized by strike-slip faults. Mantle hot spots are not necessarily regions of regional-scale faulting.

Question: 9

Which of the following up-section stratigraphic sequences is the clearest example of a marine transgression?

- A. Beach sand, open-shelf carbonate, shore face deposits, fluvial sand
- B. Fluvial sand, beach sand, shore face deposits, open-shelf carbonate
- C. Shore face deposits, fluvial sand, open-shelf carbonate, beach sand
- D. Open-shelf carbonate, beach sand, fluvial sand, shore face deposits

Answer: B

Explanation:

Marine transgressions are represented by stratigraphic sequences that reflect an up-section change to deeper water conditions. Fluvial sands may be deposited above sea level, beach sands are deposited at sea level, shore face deposits occur immediately off shore, and open-shelf carbonate is deposited in the shallow sea. Thus, answer B represents a continuous up-section change to a deeper water environment.

Question: 10

Which of the following minerals is NOT normally associated with hydrothermal alteration?

- A. Epidote
- B. Pyrite
- C. Hematite
- D. Olivine

Answer: D

Explanation:

Olivine is not typically formed through hydrothermal alteration but rather through magmatic processes.

Question: 11

What is a sandstone with detrital quartz called?

- A. Feldspathic arenite
- B. Lithic arenite
- C. Quartz arenite

D. Volcaniclastic

Answer: C

Explanation:

Quartz arenite is sandstone with detrital quartz. Feldspathic arenite contains quartz, and lithic arenite contains a significant proportion of lithic fragments. A volcaniclastic rock is simply a classic rock that contains volcanic fragments.

Question: 12

In which of the following tectonic environments is continental crust created?

- A. Subduction zone
- B. Mid-ocean ridge
- C. Back-arc basin
- D. Transform plate boundary

Answer: A

Explanation:

New continental crust is generated in continental arcs along subduction zones. Both mid-ocean ridges and back-arc basins are environments where new oceanic crust is created. Transform plate boundaries are not typically where new crust is formed.

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