

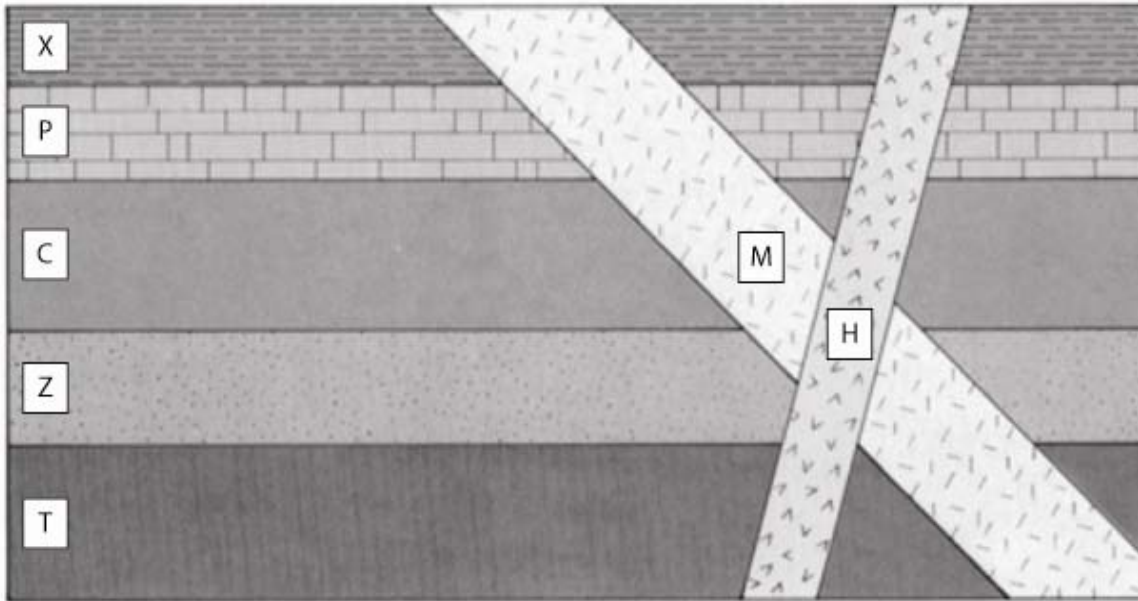
Name \_\_\_\_\_

Choose the letter representing the unit in the diagram below that best answers the question (2.5 points each answer)

1) Examine the geologic cross section below.

Which feature is the **youngest**? a) \_\_\_\_\_ H

Which feature is the **oldest**? b) \_\_\_\_\_ T



Choose the one alternative that best completes the statement or answers the question (5 points each)

2) The ratio of parent to daughter isotopes in a radioactive decay process is 0.40. How many half-lives have elapsed since the material was 100% parent atoms?

A) between 2 and 3

**B) between 1 and 2**

C) less than 1

D) more than 3

3) Visualize five, horizontal, sedimentary strata exposed in a cliff or canyon wall identified by consecutive numbers, 1 being the lowest bed and 5 being the highest. Which of the following statements concerning the strata are true?

**A) beds 1 and 3 are older than bed 4**

B) bed 5 is the oldest

C) bed 3 is older than beds 2 and 4

D) bed 4 is older than bed 2

4) What fundamental concept states that in a horizontal sequence of conformable sedimentary strata, each higher bed is younger than the bed below it?

A) theory of correlative deposition

B) law of original correlation

**C) law of superposition**

D) theory of superstition

- 5) Brittle deformation would be favored over plastic deformation in which of the following conditions?
- A) deeper in the earth  
B) warmer temperatures  
C) high confining pressures  
D) **cooler temperatures**
- 6) Which one of the following stress situations results in folding of flat-lying, sedimentary strata?
- A) vertically directed; compressive stresses  
B) vertically directed; extensional or stretching stresses  
C) **horizontally directed; compressive stresses**  
D) horizontally directed; extensional stresses
- 7) In thrust faulting, \_\_\_\_\_.
- A) the hanging wall block slips downward along the thrust fault  
B) **the crust is shortened and thickened**  
C) horizontal, tensional stresses drive the deformation  
D) grabens develop on the footwall block
- 8) Which one of the following statements regarding rock deformation and strength is correct?
- A) Rocks undergo plastic deformation less readily as temperatures and pressures increase.  
B) **Rupture and plastic deformation occur when stresses exceed the elastic limit of a material.**  
C) When rocks are subjected to stress for long time periods, very small, plastic deformations accumulate to produce large, permanent, elastic deformations.  
D) Elastic deformation is accomplished through internal flow of material.
- 9) The \_\_\_\_\_ is a direct measure of the distance from a seismic receiving station to the focus of a distant earthquake.
- A) time interval between the first P-wave and the last surface wave  
B) **time interval between the first P and S- wave arrivals**  
C) magnitude of the ground acceleration of surface wave passing a receiving station  
D) time elapsed between the first P-wave arrivals from the first and last aftershocks
- 10) What are the smaller magnitude quakes that follow a major earthquake?
- A) hyposhocks      B) epishocks      C) **aftershocks**      D) exoshocks
- 11) The \_\_\_\_\_ is directly related to the Richter earthquake-magnitude rating.
- A) **amplitude of the seismic waves**  
B) distance between the receiving station and the epicenter  
C) time interval between the first P-wave arrival and the first P wave reflected from the crust-mantle discontinuity  
D) average of the highest and lowest Mercalli intensity ratings

- 12) Which one of the following best characterizes tsunamis?
- A) They cause the land to ripple and oscillate.
  - B) They are faster than seismic surface waves.
  - C) They are easily seen at sea but are lost in the swell and breaking waves along a coast.
  - D) They have relatively small amplitude at sea compared to their very long wavelengths.**
- 13) \_\_\_\_\_ are thought to be similar in composition to rocks in Earth's mantle.
- A) Metallic meteorites
  - B) Cosmic gas clouds
  - C) Stony meteorites**
  - D) Shooting stars
- 14) Which of the following best characterizes how the diameter of Earth's core and the nature of the outer core were discovered?
- A) because P-wave speeds are higher in the outer core than in the lower mantle
  - B) by analysis of the P-wave and S-wave shadow zones**
  - C) Crystalline iron was found in lavas erupted from the deepest known hot spots.
  - D) by using the ratio of iron meteorites to stony meteorites to deduce the relative diameters of the core and mantle
- 15) The \_\_\_\_\_ of the Earth has the smallest volume.
- A) mantle
  - B) outer core
  - C) crust**
  - D) inner core
- 16) A shallow-focus earthquake occurs directly under the South Pole. A seismic station at the North Pole would receive \_\_\_\_\_.
- A) neither P waves nor S waves from the quake
  - B) both P and S waves from this quake separated in arrival times by two minutes
  - C) P waves from this quake, but no S waves would be detected**
  - D) S waves from this quake but not P waves
- 17) Geologically, \_\_\_\_\_ are actually submerged parts of the continents.
- A) continental trenches
  - B) continental shelves**
  - C) abyssal plains
  - D) coastal guyots
- 18) Oceanic ridges are elevated compared to the surrounding ocean floor because \_\_\_\_\_.
- A) newly formed lithosphere is hotter and therefore less dense than the surrounding rocks**
  - B) of the shield volcanoes that develop due to seafloor spreading
  - C) the mantle is pushing up the lithosphere along the ridge
  - D) the older, colder lithosphere is less dense and tends to rise
- 19) Seamounts \_\_\_\_\_.
- A) form only in the Pacific Ocean basin
  - B) are a special type of oceanic trench
  - C) are volcanoes that form on the ocean floor**
  - D) are submarine canyons found near Australia

- 20) Which one of the following is not connected in any way with submarine, hot spring vents?
- A) black smokers on a mid-ocean ridge
  - B) ecological communities living without photosynthesis
  - C) *thick turbidites on the continental rise***
  - D) sediment rich in metallic sulfides
- 21) According to the crustal, gravitational balance idea, which of the following statements is true?
- A) The crust is thicker under a low lying plain than under a high standing plateau or mountain range.
  - B) A basin being filled with sediments should uplift slowly.
  - C) As a continental ice sheet thickens, the land beneath should uplift slowly.
  - D) *A mountain range undergoing erosion should uplift slowly.***
- 22) Which of the following best describes the geology of the Pacific coastal regions of western North America including Alaska?
- A) Tightly folded, continental shelf strata were squeezed between North America and the convergent, Bering-Siberian subcontinent.
  - B) An earlier, continental margin broke apart and the geologically similar fragments were tectonically reassembled.
  - C) A massive subcontinent of old igneous and metamorphic rocks (similar to India) was accreted during late Proterozoic time.
  - D) *Geologically different, microcontinent-sized fragments and terranes, formed elsewhere, were tectonically accreted to North America.***
- 23) Accretionary wedges are formed \_\_\_\_\_.
- A) on the oceanic plate side of a transform fault
  - B) *at the edge of the overriding plate facing a subduction zone***
  - C) at the base of a passive continental margin
  - D) around oceanic plate volcanoes fed by long-lived hot spots in the mantle
- 24) Since the early Mesozoic, the \_\_\_\_\_ has been passive tectonically.
- A) western margin of North America
  - C) *eastern margin in the United States***
  - B) southern margin of Eurasia
  - D) western margin of South America
- 25) How do the strength and cohesion of clay-rich regolith or soil change with the addition of water?
- A) Water does not affect the cohesion but lowers the strength.
  - B) *Water lowers the strength and cohesion.***
  - C) Water reduces the strength of clays but raises the cohesion of the soil.
  - D) Water increases the strength and cohesion.

- 26) Consider a steep highway cut made by removing slightly weathered to fresh, fractured, granite bedrock. Which of the following situations is most stable against rockslides?
- A) *one set of widely spaced, sub-horizontal fractures*  
 B) two sets of fractures, one widely spaced and sub-horizontal, the other inclined away from the highway cut  
 C) two sets of fractures, one inclined toward the road cut and the other away  
 D) one set of widely spaced fractures inclined towards the road cut
- 27) Which mass wasting process has the slowest rate of movement?
- A) *creep*                      B) solifluction                      C) slump                      D) rock avalanche
- 28) \_\_\_\_\_ denotes the exposed, crescent-shaped rupture surface at the head of a slump.
- A) Toe                      B) Scoop                      C) *Scarp*                      D) Sole
- 29) How does urbanization (paving, etc.) affect runoff and infiltration in a small, previously forested, drainage basin?
- A) both decrease                      B) *runoff increases; infiltration decreases*  
 C) runoff decreases; infiltration increases                      D) both increase
- 30) Many larger rivers in the Colorado Plateau region meander in deep, narrow canyons and have no floodplains. How could this happen?
- A) As sea level rose, the original, old age streams were rejuvenated.  
 B) Original, youthful meandering streams become braided streams as the land rose.  
 C) As sea level dropped, the original youthful streams matured into old-age streams.  
 D) *Original, old age streams downcut as the land gradually rose.*
- 31) \_\_\_\_\_ are components of the hydrologic cycle that release water vapor directly to the atmosphere.
- A) Precipitation and runoff                      B) Runoff and infiltration  
 C) Discharge and transportation                      D) *Evaporation and transpiration*
- 32) Where is erosion concentrated along a meandering stream?
- A) *on the outer parts of the meander loops or bends*  
 B) on the inner banks of the meander loops  
 C) at the unconsolidated point bars  
 D) on the straight channel segments that connect the meander loops

**Extra Credit (5 points each)**

- 33) \_\_\_*Gravity*\_\_\_ is the driving force of all mass wasting.
- 34) Where is the best pāhoehoe in the whole wide world found (be as specific as possible)? *Big Island, Hawaii on the Hilina Pali Fault Scarp along the Chain of Craters Road (Naulu Trail)*