

NAME _____

Exam III: Geologic Time, Metamorphic Rocks

Geologic Time

- 1) What is the definition of half-life?
A) Time needed to decay isotope by $\frac{2}{3}$
B) Time needed to decay isotope by $\frac{3}{4}$
C) Time needed to decay isotope by $\frac{1}{2}$
D) None of the above
- 2) The Pleistocene epoch ended with the melting of the glaciers _____ years ago.
A) 75,000
B) 15,000
C) 10,000
D) 1,600,000
- 3) A disconformity results when _____.
A) parallel sedimentary strata have a true time gap between them
B) tilted sedimentary strata are overlain by horizontal strata
C) sedimentary strata are not exposed on land surface
D) crystalline basement is overlain by sedimentary strata
- 4) An angular unconformity results when _____.
A) parallel sedimentary strata have a true time gap between them
B) tilted sedimentary strata are overlain by horizontal strata
C) sedimentary strata are not exposed to land surface
D) crystalline basement is overlain by sedimentary strata
- 5) A nonconformity results when _____.
A) parallel sedimentary strata have a true time gap between them
B) tilted sedimentary strata are overlain by horizontal strata
C) sedimentary strata are not exposed to land surface
D) crystalline basement is overlain by sedimentary strata
- 6) The atomic number of element is the _____ and the mass number of an isotope is _____.
A) number of protons in nucleus, sum of protons and neutrons in nucleus
B) number of protons in nucleus, number of neutrons in nucleus
C) number of neutrons in nucleus, sum of protons and neutrons in nucleus
D) number of protons and neutrons in nucleus, number of protons in nucleus
- 7) The radioactive parent Carbon-14 isotope decays to the stable daughter isotope of Nitrogen-14. The half-life of this isotopic system is 5730 years. If you measured and Parent/Daughter ratio of 75/25 is a piece of charcoal, how many half lives have elapsed?
A) one half life
B) two half lives
C) three half lives
D) $\frac{1}{2}$ of a half live
- 8) What would be the age of the piece of charcoal in question above?
A) 11,460 years (2 half lives)
B) 5,730 years (1 half life)
C) 17,190 years (3 half lives)
D) 2,865 years (0.5 of a half life)
- 9) What is the age of the Earth?
A) 4.1 Billion years
B) 4.6 Billion years
C) 3.8 Billion years
D) 540 Million years
- 10) Geologists deal with two types of time. These are _____ and _____.
A) relative and coherent
B) relative and approximate
C) relative and absolute
D) relative and vague

11) The principle of superposition states that in a bedded sequence, the beds at the top are _____ than the beds at the bottom.

- A) older
- B) younger
- C) the same age
- D) none of the above

12) The principle of Uniformitarianism ("the present is the key to the past) states that _____.

- A) natural laws existing today, existed throughout geologic time
- B) natural laws existing today, have changed over geologic time
- C) natural laws existing today, did not exist over geologic time
- D) none of the above

Metamorphic Rocks

13) On the diagram below, which path or paths best describes subduction zones?

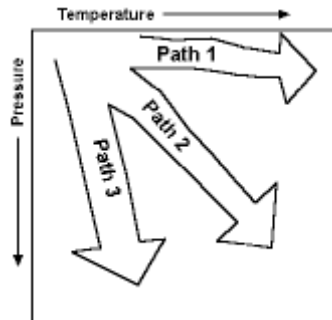
- a. path 1
- b. path 2
- c. path 3
- d. paths 1 and 2
- e. paths 2 and 3

14) On the diagram below, which path or paths best describes regional metamorphism?

- a. path 1
- b. path 2
- c. path 3
- d. paths 1 and 2
- e. paths 2 and 3

15) On the diagram below, which path or paths best describe contact metamorphism?

- a. path 1
- b. path 2
- c. path 3
- d. paths 1 and 2
- e. paths 2 and 3



16) Blueschist metamorphic rocks are indicative of old subduction zones and are referred to as low-grade metamorphic rocks. _____ pressure conditions must exist in order to metamorphose oceanic basalt to blueschist facies? The tectonic setting where this occurs is in _____.

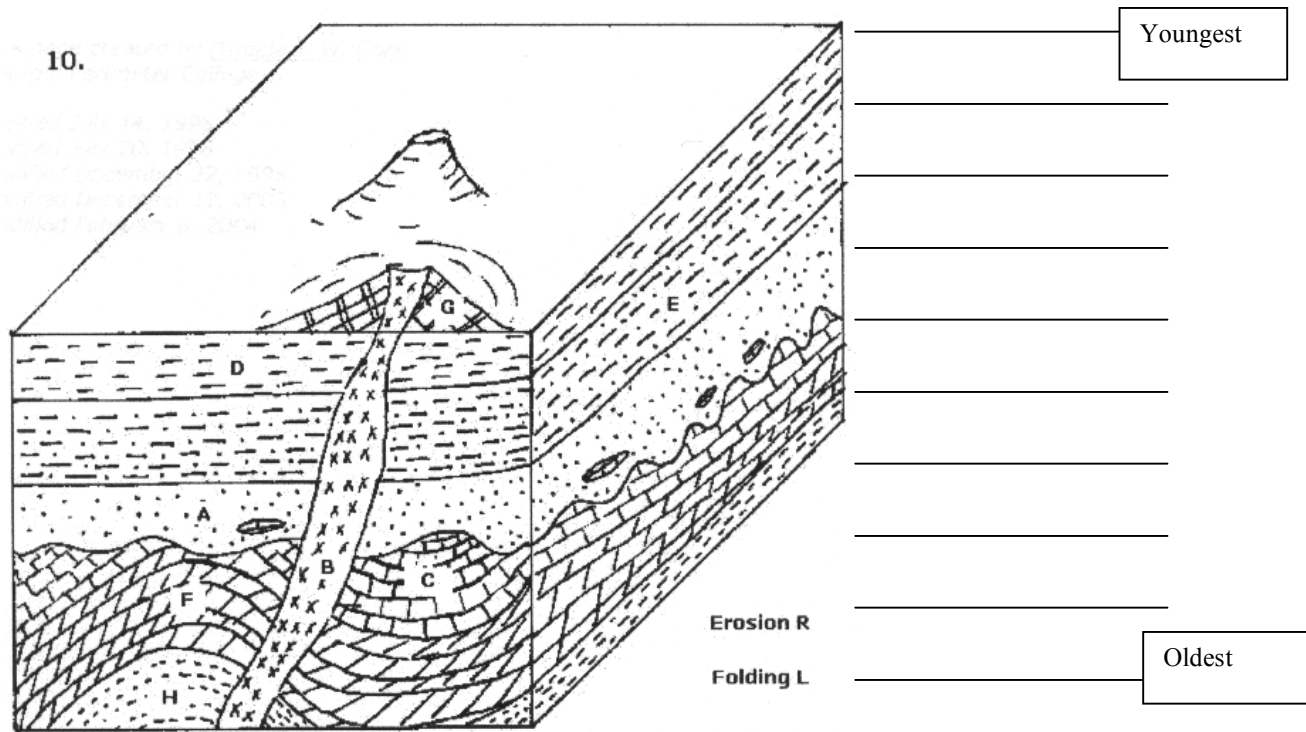
- A) Low, magmatic arcs
- B) High, magmatic arcs
- C) Low, subduction zones
- D) High, subduction zones

17) What is the protolith to the California State rock?

- A) Oceanic basalt
- B) Oceanic turbidite
- C) Oceanic upper mantle peridotite
- D) Oceanic chert

18) What tectonic environment is the California State rock associated with?

- A) Divergent margins
- B) Transform margins
- C) Subduction zones
- D) None of the above



29) Label the relative sequence of the 10 events from oldest to youngest on the side column (H = Shale; F = dolomite; C = limestone; A = sandstone; G = basalt cinder; D = shale; E = turbidite; B = basalt dike; R = erosion below unit A; L = folding event).

30) What type of unconformity is found below unit A? _____

31) On the following cross-section sketch of Mesozoic California tectonic margin label the (1) **Franciscan Formation**, the (2) **Great Valley Sequence (arc-trench gap)**, the (3) **Coast Range Ophiolite**, and the (4) **Sierra Nevada magmatic arc**. Label the current position of the (5) **Coast Ranges**, (6) **Central Valley**, and (7) **Sierra Nevada**. (7 pts.)

32) Complete the Geologic Column below and **include the absolute ages** for the age of the Earth, base of the Phanerozoic, base of the Mesozoic, base of the Cenozoic, base of the Pleistocene, and base of the Holocene.

Mesozoic, Cambrian, Proterozoic, Paleozoic, Triassic, Permian, Carboniferous, Cenozoic, Paleocene, Silurian, Tertiary, Oligocene, Cretaceous, Ordovician, Quaternary, Pleistocene, Jurassic, Devonian, Hadean, Eocene, Miocene, Holocene, Archean, Pliocene. (10 pts.)

Eons		Eras	Periods	Epochs
<u>Phanerozoic</u>				
				----- --
				----- --
				----- --
				----- --
				----- --
				----- --
				----- --
				----- --
<u>Pre-cambrian</u>	Proterozoic	----- -----	----- --	----- --
	Hadean			