Geology 200, Questions for Test 2, November 8, 2007

Matching: what type of rocks or sediments would you most likely find in each of the following environments? Use each answer only once.
Matching: write the correct letter next to each term (1 pt. Each) Use each answer only once.
1. Fluvial/stream  ____  A. limestone with large fossils
2. Regolith  ____  B. associated with freeze/thaw
3. Eolian  ____  C. unsorted clastic sediments
4. Barrier island  ____  D. thick, cross-bedded sandstones
5. A horizon  ____  E. decayed rock
6. Glacial  ____  F. well-sorted, flat sandstones
7. Alluvial fan  ____  G. coal
8. Wedging  ____  H. topsoil
9. Lagoon or swamp  ____  I. conglomerate and breccia
10. Organic reef  ____  J. cross-bedded channel sandstones

Explain why joints are important in weathering processes.

How does soil originate? Describe how it forms.

Why are mudrocks the most common sedimentary rocks? (Hint: think of weathering products.)

Why is quartz sand so abundant in clastic sedimentary rocks? (Hint: think of weathering products.)

Put these rock types in the order (starting with 1) by which they would weather the fastest:

____ Granite
____ Rock salt
____ Gabbro
____ Sandstone
____ Schist
____ Shale
____ Gypsum

Which rock type would weather to form the most clay?
A. limestone
B. granite
C. basalt
D. sandstone

Which of the following rocks would be most susceptible to chemical weathering?
A. sandstone
B. slate
C. granite
D. shale
E. limestone

Chemical weathering would progress most rapidly in:
A. Colorado
B. Brazil
C. West Virginia
D. Greenland

Ice wedging is important in preparing rocks for chemical weathering because it:
A. keeps rocks from moving down slope
B. produces swelling as certain minerals are altered to clay
C. enlarges fractures and cracks, thereby increasing the surface area of the rock
D. reduces the rock to its constituent minerals
Ice wedging would be most effective in:
A. permafrost areas of Alaska
B. areas where freezing and thawing occur many times a year
C. areas beneath the glaciers in Greenland
D. latitudes where strong heating occurs

Which of the following minerals is most resistant to chemical weathering:
A. plagioclase
B. quartz
C. olivine
D. amphibole

Which of the following rock-forming minerals weathers to form most of the clay found in soils?
A. quartz
B. olivine
C. mica
D. feldspar

The general term for the blanket of loose rock debris that covers large areas of the Earth’s surface is
A. regolith
B. bedrock
C. outcrop
D. laterite

A talus accumulation consists largely of:
A. soil
B. a mixture of silt and ice
C. alternating layers of clay and sand
D. coarse, angular rock fragments

Physical weathering would progress most rapidly in:
A. the Rocky Mountains
B. Brazil
C. West Virginia
D. Antarctica

Which of the following minerals is most stable at Earth’s surface?
A. plagioclase feldspar
B. olivine
C. pyroxene
D. hematite

The products of ice wedging often accumulate at the base of cliffs to form piles of angular rock fragments called:
A. soil
B. talus
C. bedrock
D. exfoliation domes

Which environment has the strongest chemical weathering?
A. Polar climates
B. Temperate climates
C. Deserts
D. Tropical climates

Because of differential weathering, most of the ridges of the Appalachians are capped by what type of sedimentary rock?

Which of the following is the most effective process of physical weathering.
A. Ice wedging
B. Exfoliation
C. Thermal expansion and contraction
D. Plant roots
What are the two most important variables in chemical weathering? (2 pts.)

________________________________________________________________________

Where are the two regions on the Earth where the thickest regolith be found? (2 pts.)

________________________________________________________________________

This chemical reaction: \(2\text{Fe}_2\text{SiO}_4 + 4\text{H}_2\text{O} + \text{O}_2 = 2\text{Fe}_2\text{O}_3 + 2\text{H}_4\text{SiO}_4\), is an example of:

A. dissolution  
B. hydration  
C. oxidation

The susceptibility of weathering of silicate rocks follows the same path as ___________________________________. (2 pts.)

Which of the following elements are concentrated in clays during chemical weathering:

A. Ca and K  
B. Na and Mg  
C. Fe and Mn  
D. Al and Si

The zone of accumulation is called the ____ horizon of the soil/regolith.

Ions of which element are most readily carried by river water to the ocean?

A. Fe  
B. Al  
C. Ca  
D. Si

Where do laterites occur, and what is their composition?

What is the principal cause of grain-size variations in clastic sedimentary rocks?

In which environment are graded beds most likely to form?

E. delta  
F. beach  
G. continental slope  
H. tidal flat

What are the two major categories of sedimentary rocks?

________________________________________________________________________

________________________________________________________________________

Give two examples of each type and indicate which category they belong in.

What is the difference between a breccia and a conglomerate?

What is the upper size limit of sand grains?

A. \(\frac{1}{8}\) mm  
B. \(\frac{1}{2}\) mm  
C. 2 mm  
D. 4 mm
What is the lower size limit for boulders?
   A. 6 inches
   B. One foot
   C. Three feet
   D. 10 feet

Which of the following is texturally most similar to sandstone?
   A. gypsum
   B. fossiliferous limestone
   C. carbonate grainstone
   D. carbonate mudstone

The most universal feature of sedimentary rocks is:
   A. cementing material
   B. uniform grain size
   C. fossils
   D. stratification

Which of the following would a geologist call a formation?
   A. a distinctive layer of sedimentary or volcanic rock
   B. a unique landscape feature such as a steep spire
   C. a stalactite in a cave
   D. a naturally formed staircase up a cliff of sedimentary rock

A sedimentary rock formed of clastic particles derived from weathering and erosion of rocks is:
   A. gypsum
   B. rock salt
   C. limestone
   D. chert
   E. sandstone

Which of the following is the most abundant nonclastic rock?
   A. limestone
   B. rock salt
   C. gypsum
   D. drip stone in caves

A clastic sedimentary rock composed of rounded to subrounded gravel is called a:
   A. breccia
   B. conglomerate
   C. sandstone
   D. siltstone

Transportation and deposition of sediment by turbidity currents is commonly indicated by:
   A. mud cracks
   B. cross bedding
   C. ripple marks
   D. graded bedding
   E. horizontal layers

In graded bedding, the size of the sediment particles in a single layer:
   A. is uniform from top to bottom
   B. ranges from coarsest at the top to finest at the bottom
   C. ranges from coarsest at the bottom to finest at the top
   D. ranges from fine to coarse to fine in a vertical sequence

Which of the following would NOT be expected in sedimentary rocks?
   A. vesicles
   B. fossils
   C. ripple marks
   D. mud cracks
The material from which chemically-precipitated sedimentary rocks are made is transported to the place of deposition:
A. by wind
B. as silt
C. as sedimentary particles
D. in solution

The shoreline sedimentary environment includes all but:
A. deltas
B. beaches
C. barrier islands
D. flood plains

A deposit of poorly sorted angular cobbles, boulders, sand, and mud, which lacks stratification, would most likely represent which of the following environments?
A. alluvial fan
B. fluvial
C. glacial
delta

Well-sorted, fine-grained sand deposited in cross-bedded layers tens of feet thick would likely represent which of the following environments?
A. deep marine
B. eolian
C. fluvial
D. beach
E. shallow marine

Most clastic sedimentary rocks are consolidated by the process of:
A. recrystallization
B. heating and annealing of grains
C. cementation
D. metamorphism

The separation of clastic grains according to size is called:
A. sorting
B. graduating
C. dessication
D. collimating

A limestone with numerous fossil corals, sponges, and other fossils, with little or no stratification or cross bedding, formed in which environment?
A. the deep ocean
B. a beach
C. a delta
D. an organic reef

Which sequence of rock types would you find forming on a stable continental platform?
A. thick beds of conglomerate, sandstone interbedded with lake deposits and evaporites
B. thick deposits of shallow marine limestones and shales
C. thin deposits of fluvial sediments and layers of shallow marine mudstones and limestones
d. turbidites mixed with deep sea oozes

What sequence of rocks would help you identify an ancient convergent margin?
A. lake sediments interlayered with evaporites
B. thin layers of horizontal shallow marine shale and limestone
c. conglomerate in basins bounded by normal faults
d. deformed layers of turbidite and deep marine sediments mixed with basaltic lava

One foot of bituminous coal formed from ____ ft. of peat.

A ______ colored sedimentary rock formed in the presence of abundant oxygen.

Give two examples of a terrestrial sedimentary environment.
Give two examples of a marine sedimentary environment.

Give two examples of a transitional sedimentary environment.

The Tuscarora Sandstone at Seneca Rocks was deposited in a ___________________ depositional environment.

Sedimentary facies defined by organic features, such as fossils, are termed ____________________ .

A __________ colored sedimentary rock formed in the absence of oxygen.

How do we count cyclothems in Pennsylvanian-age rocks?

Lithofacies are defined by ______________________ content or features.

Biofacies are defined by __________________________ content or features.

In a regressive sequence, nonmarine facies ______________ marine facies. (2 pts.)

Explain the modern concept of uniformitarianism.

Explain the meaning of half life in radiometric dating.

What kinds of rocks – igneous, sedimentary, or metamorphic – are best for radiometric dating? Why?

Can you think of a simple test of the accuracy of radiometric dating using several minerals found in one volcanic rock?

Why are most rocks dated with respect to their position in the standard geologic column rather than assigned a definite numerical age, even though accurate methods of radiometric dating are available?

Which technique is most useful in absolute dating of rock bodies?
   A. cross-cutting relationships
   B. inclusions
   C. fossils
   D. radiometric dating

In which situation would C-14 dating be used?
   A. a log buried in glacial sediments a few thousand years old
   B. basalts less than a million years old
   C. dinosaur fossils
   D. Paleozoic sedimentary rocks

The half-life of a radioactive element is:
   A. the amount of radioactive material left after a given period of time
   B. the amount of radioactive material left after 1 million years
   C. the time required for ½ of a sample to become radioactive
   D. the time required for ½ of the radioactive material to decay

The most accurate expression of the modern views of uniformitarianism is:
   A. types of geologic processes are uniform, but rates may change
   B. natural laws do not change
   C. the present is the key to the past
   D. past geologic events can be explained only by processes we observe at the present
   E. rates of geologic processes are uniform, but types may change
Relative dating is determining the:

A. length of time since a rock formed
B. time span between geologic events
C. approximate age of a rock
D. chronological order of a sequence of events

The law of superposition does not apply when rocks are:

A. overturned
B. slightly tilted
C. sedimentary
D. fossiliferous
E. cut by high-angle faults

Determining the relative age of a rock body in the field is based largely on:

A. C-14 dating
B. Fossil identification
C. Superposition
D. Cross-cutting relationships

Which of the following applies to the standard geologic time scale?

A. It was developed in North America
B. It is divided into periods of equal length
C. It was developed through radioactive dating.
D. It is based on superposition and faunal succession.

A valuable principle for relative dating that is based on the process of organic evolution is the principle of:

A. superposition
B. faunal succession
C. cross-cutting relationships
D. inclusion

A sample of basalt contains a radioactive isotope that has a half-life of 10 million years. Analysis shows that one quarter of the original radioactive isotope has not decayed. How old is the rock?

A. 5 million years
B. 10 million years
C. 20 million years
D. 40 million years

The most useful rock for obtaining reference points for a radiometric time scale is:

A. granite
B. gneiss
C. fossiliferous limestone
D. rhyolitic ash interlayered in sedimentary rock

The rate at which a radioactive element decays is:

A. influenced by pressure
B. influenced by temperature
C. influenced by the mineral where the decay is taking place
D. independent of external conditions

The decay rate of a radioactive isotope in a mineral

A. is constant
B. depends on the number of radioactive atoms present
C. declines with time
D. only B and C

Carbon-14 has a half-life of 5,730 years. Charcoal removed from beneath a lava flow has 1/8 the amount of C-14 as a living tree. The lava flow is probably:

A. 2,865 years
B. 5,730 years
C. 11,460 years
D. 17,190 years
E. 45,840 years
The age of sedimentary rock layers in Europe can be correlated with those in North America by using:
   A. the principle of superposition
   B. tracing their physical continuity
   C. fossils and the use of faunal succession
   D. similarity of rock types and sequences

A radioactive nuclide has a half life of 500 MY. The parent:daughter ratio from an igneous crystal is 1:15. How old is the rock that contains the crystal? (4 pts.)

What type of correlation works best over long distances? (2 pts.)

In a transgressive sequence, marine facies ________________ nonmarine facies.

Give one cause of change in sea level over geologic time.

List two principles used to determine relative geologic time.

There are 3 or 4 types of unconformities. Name two:

List 5 principles used to determine relative age of rocks:

Which of the following does not have layers that record annual cycles?
   A. layered volcanic rocks
   B. tree rings
   C. varves
   D. glaciers

Which radioactive isotope forms by cosmic ray collisions in the atmosphere?
   A. $^{40}$K
   B. $^{235}$U
   C. $^{3}$H
   D. $^{14}$C

If geologic time were represented by the length of a football field, how many yards from the goal line did dinosaurs first appear?
   A. 30
   B. 25
   C. 10
   D. 5

Which type of unconformity has sedimentary rocks overlying igneous or metamorphic rocks?
Label each of the four unconformities

A. _______________________________  B. _______________________________

C. _______________________________

Rock time is divided into _________________________ units, whereas pure time is divided into
_______________________ units.
Formations can be divided into __________________ or placed into __________________.

What two measurements are needed for radiometric dating?

In the equation below, what does $\lambda$ stand for? __________________

What does $\ln$ mean? __________________

\[ t = \frac{\ln (P+D)/P}{\lambda} \]

If the half life of $^{235}U$ is 713 MY and a zircon crystal has a $^{235}U$:$^{207}Pb$ ratio of 1:7, how old is the zircon crystal?

What is the daughter nuclide of $^{14}C$?

What is the approximate effective age limit in years for $^{14}C$ dating?

The dashed lines in the above figure represent what type of correlation?

Draw lines across the above diagram to show the formation boundaries between the Tapeats Sandstone and the Bright Angel Shale, and between the Bright Angel Shale and the Muav Limestone. Clearly label each of the two boundaries you draw.
The dotted lines in the above figure represent what type of correlation?
Draw and label lines across the cross section showing the approximate formation boundaries between the Cody Shale and Parkman Sandstone and the Parkman Sandstone and Lewis Shale.

Draw three separate time lines through the Parkman Sandstone.
Write out the geologic time scale showing the correct relationships of the three eons, three eras, and 12 periods. Spelling counts. Use the included chart:

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