also do: p. 32 Lab Manual

Earth's History Review

Name: Key

LEVEL A Testing for Recall

Multiple Choice: Circle the letter of the choice that BEST answers the question.

1. The concept that in a pile of sedimentary rocks, the sediments on the bottom were deposited first is the

   a. Principle of Superposition
   b. Principle of Original Horizontality
   c. Law of Faunal Succession
   d. Law of Gravity

2. Which of the following is true of unconformities?

   a. Beds above and below slope in different directions. – could also be parallel as in a disconformity
   b. Their formation commonly results from metamorphism.
   c. They represent time-breaks in the geologic record.
   d. all of the above

3. "Absolute dating" is an older, inaccurate term for

   a. correlation
   b. relative dating
   c. evolution
   d. radiometric dating

4. The half-life of a radioactive isotope is

   a. the length of time required for half of a given quantity of that radioisotope to decay.
   b. constant
   c. characteristic of that radioisotope; different isotopes have different half-lives
   d. all of the above

5. The Principles of Superposition and Original Horizontality were first set forth by

   a. James Hutton
   b. Nicholas Steno
   c. Charles Lyell
   d. Charles Darwin

6. An unconformity in which the sedimentary rock layers above and below it are parallel is called a

   a. non-conformity
   b. disconformity
   c. angular unconformity

7. An unconformity in which the sedimentary rock layers above and below it are NOT parallel is called a

   a. non-conformity
   b. disconformity
   c. angular unconformity

8. The time of the Big Bang is determined by

   a. measuring the distance of the stars to the earth.
   b. measuring the distance of the stars to each other.
   c. extrapolating the star's movement backward until a point is reached at which all matter was apparently together in one place.
   d. projecting the movement of the stars outward to the limits of space.
   e. none of the above

Complete, by filling in the blanks, the following dialog that summarizes the processes by which our solar system forms.

The sun and its system of circling planets, including the earth, are believed to have formed from (9) a single rotating cloud of gas and dust, starting nearly (10) 5 billion years ago. It may be that a (11) shock wave from a nearby exploding (12) supernova pushed enough of the material in the cloud together that it began to (13) collapse under its own gravitational pull. Whatever the cause, most of the (14) mass coalesced to form what would eventually become the (15) sun. Like the rest of the universe the early sun consisted mostly of (16) H. The inner parts of this ball of gas were so compressed by its enormous mass that they became hot and (17) dense enough to initiate (18) nuclear reaction. The ball of gas became a (19) star, radiating light and other forms of energy. While the proto-sun developed, the remaining matter settled into a (20) rotating disk around it. Dust began to (21) condense from the gas, and the dust gradually formed (22) planets that continue to circle the sun as they formed.

LEVEL B Testing for Understanding

Multiple Choice: Circle the letter of the choice that BEST answers the question.

1. The most accurate estimation of the age of the earth is based on

   a. the salinity of seawater
   b. the thickness of sediments in the geologic record
   c. radiometric methods
   d. calculation of the earth's cooling history

2. Which of the following is NOT true of radioactive isotopes?

   a. They decay because their nuclei are unstable.
   b. Their decay rates can be modified by heat and pressure.
   c. The decaying isotope is known as the Parent; the product, the Daughter.
   d. Energy and, usually, particles are released during their decay.

3. Which of following is most difficult to date radiometrically?

   a. crystallization of a pluton
   b. deposition of sedimentary rock
   c. strong metamorphic event
   d. age of a lava flow

4. A good index fossil that can be useful for correlation must be derived from a particular plant or animal species, widely distributed over the earth, and existed

   a. over a long period of time.
   b. over a limited period of time.
   c. no correct answer

Match the early attempts to determine the age of the rocks with the person who proposed the theory. One of the theories has more than one answer.

look over the theories as you do this quest. pg 157

5. d Theological
6. c Sun's Energy
7. e Molten Earth
8. b Gravitational
9. g Sediment Thickness
10. f Ocean Salinity

a. Kelvin
b. Helmholtz
c. Kant
d. Usher and Lightfoot
e. Buffon
f. Joly
g. Walcott

11. List the three requirements or conditions that must be satisfied to use radiometric dating.

(1) parent isotope must be abundant enough to be measured

(2) daughter must not be originally in sample or must be able to correct for it.

(3) half-life of parent must be appropriate to age of event being dated.

(4) must be a closed system or be able to correct for it.

Match the parent and daughter isotopes commonly used in geology.

	parent		½ Life	daughter
12.	potassium-40	d	1.25 bill	a. lead-208
13.	rubidium-87	f	48.8 bil	b. nitrogen-14
14.	thorium-232	a	14 bill	c. lead-207
15.	uranium-235	c	704 mil	d. argon-40
16.	uranium-238	e	4.5 bill	e. lead-206
17.	carbon-14	b	5,730 yrs	f. strontium-87

18. The inner planets, closer to the sun, are composed of more solid materials than the outer planets, farther from the sun. Why did this occur?

a. solids condensed near the sun contained mainly high-temperature materials.
b. lower temperature materials farther out were condensed into planets where it was cooler.
(c.) a and b

19. The early earth atmosphere and oceans were formed during the process of heating and melting which resulted in the differentiation into layers (core, mantle, crust - diff. comp.)

LEVEL C Testing for Application

Multiple Choice: Circle the letter of the choice that BEST answers the question.

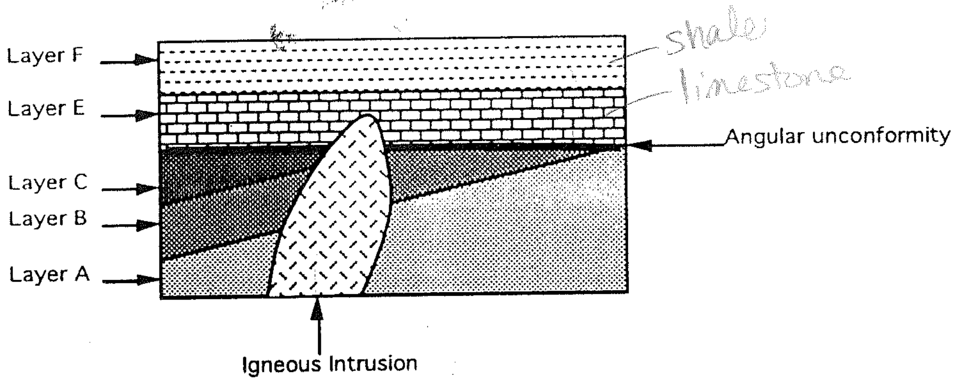
1. A rock started out with eight thousand atoms of parent radioisotope X and none of its daughter Y. We now find in it one thousand atoms of X and seven thousand of Y. The half-life of X is 10 million years. How old is the rock?

(a.) 30 million years
b. 70 million years
c. 7,000 years
d. The age cannot be determined from the information given.

2. A sandstone sits atop a three hundred fifty-million-year-old granite, and a fifteen-million-year-old basalt dike cuts across both units. The sandstone is

a. over 350 million years old.
(b.) between 350 and 15 millions years old.
c. younger than 15 million years
d. of completely unknown age.

3. Using the Principles of Superposition, Original Horizontality and Cross-cutting Relationship, describe the sequence of events that are illustrated by the diagram.



Sequence of events from oldest to youngest:

1) **Deposition of layers A, B, and C**

2) uplift, tilt, erosion (erosion of large surface occurs out of water)

3) rapid or slow downwarping of the crust/ocean transgression (so limestone could be deposited on top of tilted layers in ocean)

4) deposition of E forming an angular unconformity

5) igneous intrusion

6) deposition of F (F could have been dep. after intrusion)

4. Fossil correlation is limited using faunal succession because

a. fossils have to be well preserved.
b. sedimentary rocks are necessary for study. } these two are too absolute, as long as you can recognize the fossil which could be in igneous rock or a meta rock, can use faunal succession
c. index fossils must be present (answer key says)
d. all of the above

5. Explain how faunal succession is used to correlate rock rock units.

Faunal succession - life-forms change thru time, old disappear new appear, never duplicated at a diff. times in history so if see same form in diff rocks, rocks must be the same age.

6. The oldest rocks found on earth that we can reliably radiometrically date are 3.6 to 3.9 billion years old. If the earth is 4.6 billion years old, why don't we find the rocks that age?

⊕ geologically still active - volcanoes, weathering plate tectonics, etc - so no rocks have been preserved unchanged

(when dating radiometrically, can only find out how long ago rock was most recently solidified or metamorphosed).

7. Why do we use moon rocks and meteorites that are 4.6 billion years old to determine the age of the earth?

Since they have the same chem. comp. as ⊕ it is highly likely they formed at the same time ~~and~~ they aren't geologically active so have remained unchanged.

ISE 1

each of the following terms, choose the phrase in column B that best describes the term in column A, and mark letter in the blank space.

A		B
e	1. fossil	a. sediment showing an annual cycle of deposition
h	2. relative time	b. longest segment of geologic time
b	3. era	c. atoms with atomic number 6 and atomic weight 14
g	4. mold	d. paths of destruction left by the pieces of an atom that has split
f	5. amber	e. evidence that shows the existence of life in the past
j	6. half-life	f. fossilized resin from pine trees
d	7. fission track	g. hollow depression showing the shape of a fossil
a	8. varve	h. an ordering of events in time
c	9. radiocarbon C14	i. a stratum easily recognizable over large areas
i	10. key bed (Tree index fossil)	j. length of time to convert 50 percent of a radioactive material into a stable atom

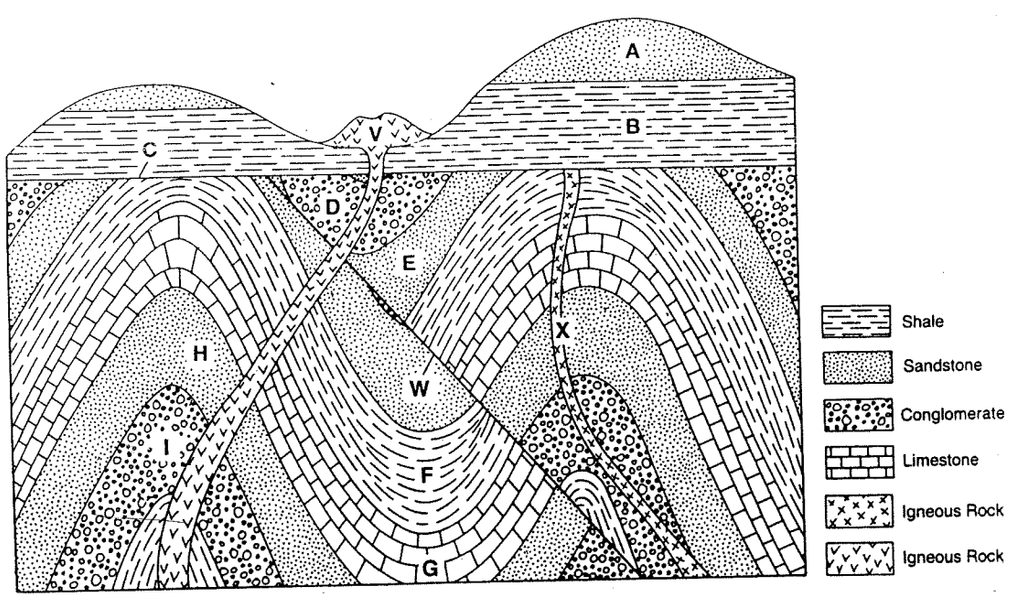
EXERCISE 2

For each of the following, determine if the phrase describes absolute or relative time, and then write absolute *or* relative *in the space provided next to each.*

relative	1. Younger rocks are formed in strata that lie on top of older rocks.
absolute	2. Wood can be analyzed to determine the carbon content.
relative	3. Rock layers are often cut by sills and dikes.
absolute	4. Uranium decays with a half-life of 4.5 billion years.
absolute	5. Fission tracks can be seen on specially treated rock surfaces.
relative	6. Intrusive rocks sometimes contain pieces of the country rock into which they are intruded.
absolute	7. Argon is a gas that might escape from a rock after it has been formed.
absolute	8. Tree rings can be counted to determine which years were moist and which years were dry.
absolute	9. Varves are usually seen as pairs of sediment beds.
absolute	10. An index fossil is unique in some way, is found over a large region, and has existed for a short period of time.

EXERCISE 3

Using the laws of superposition, cross-cutting relationships, and included fragments, determine the geologic history of the region shown and answer the questions concerning the area.



1. Which of the two igneous rocks units is the oldest, and how do you know this is true?

V is youngest - cuts across all layers (except A but erosion of A & B happened before V intruded) so, X is older than V. X was eroded at base of B (unconformity) then B dep. etc.

2. How can you tell that the younger igneous rock unit is the youngest rock layer in the diagram?

V cuts through the erosion surface that cuts through A which is the youngest sed layer then by superposition.

3. What is the difference between the boundaries labeled C and W?

C - unconformity (angular)

W - fault

4. Where, if anywhere, have any rocks moved relative to one another and if they have done so, in what direction have they moved?

rocks to the left of W moved downward compared to rocks to right of W. (reverse fault)

EXERCISE 4

For each of the following, choose the geologic time period during which the plant or animal first appeared or the geologic event occurred. Some periods may be used more than once.

- Use ESCI timetable - bit more detail, in some cases, than we need for - could be getting used to that kind of more

e	1. age of fishes Devonian	a. Precambrian
d	2. sea scorpions appear	b. Cambrian
h	3. trilobites became extinct Permian	c. Ordovician
f	4. crinoids became an important life form Miss	d. Silurian
b	5. abundant animals with hard parts appear Cambrian	e. Devonian
g	6. age of cockroaches	f. Mississippian
a	7. first life appears in the oceans Precambrian	g. Pennsylvanian
g	8. swamps formed due to the warm, rainy climate = coal Pennsylvanian	h. Permian
e	9. the first amphibians appear Devonian	
d	10. the first land plants appear Silurian	
h	11. the coral of the Guadalupe Mtns. of West Texas were formed	
c	12. all major groups of animals with hard parts appeared by the close of this period Ord	
a	13. bacteria or algae built up stromatolites Precamb	
h	14. a great ice age occurred in the Southern Hemisphere	
e	15. mountain building reached a peak, especially in northeastern North America Devonian	
c	16. relatives of the nautilus built shells up to six meters long Ordovician	
a	17. copper ores were formed in Michigan	
h	18. deposits of rock salt and gypsum formed in Kansas, Nebraska, Oklahoma, and Texas	
g	19. coal formed in Pennsylvania, Ohio, West Virginia, Indiana, and Illinois. Penn	
d	20. thick rock salt and gypsum beds formed from New York to Michigan	

EXERCISE 5

Complete the following analogies by choosing one of the four words that best relates to the single word in the same way that the pair of words relate to each other.

Example: Snowflake:snowball *student:* **class**
team, crowd, school, class

1. Stromatolites:Precambrian trilobites: Cambrian
Permian, Pennsylvanian, Silurian, Cambrian
2. Cephalopod:nautilus gastropod: snail
snail, crab, clam, fish
3. Gastropods:snails crinoids: sea lilies
sea lilies, clams, millipedes, scorpions
4. Year:month era: period
epoch, age, period, millenium
5. Sea:armored fish land: lobe-finned fish
lobe-finned fish, bryozoans, trilobites, brachiopods
6. Pennsylvanian:swamps Permian: deserts
permafrost, deserts, rain forests, prairies
7. Insects:Silurian reptiles: Pennsylvanian
Ordovician, Devonian, Pennsylvanian, Permian
8. Dragonflies:Pennsylvanian wasps: Permian
Permian, Mississippian, Devonian, Ordovician
9. Trilobites:Cambrian jellyfish: Precambrian
Permian, Mississippian, Ordovician, Precambrian
10. Silurian:eurypterids Devonian: amphibians
reptiles, birds, amphibians, fish

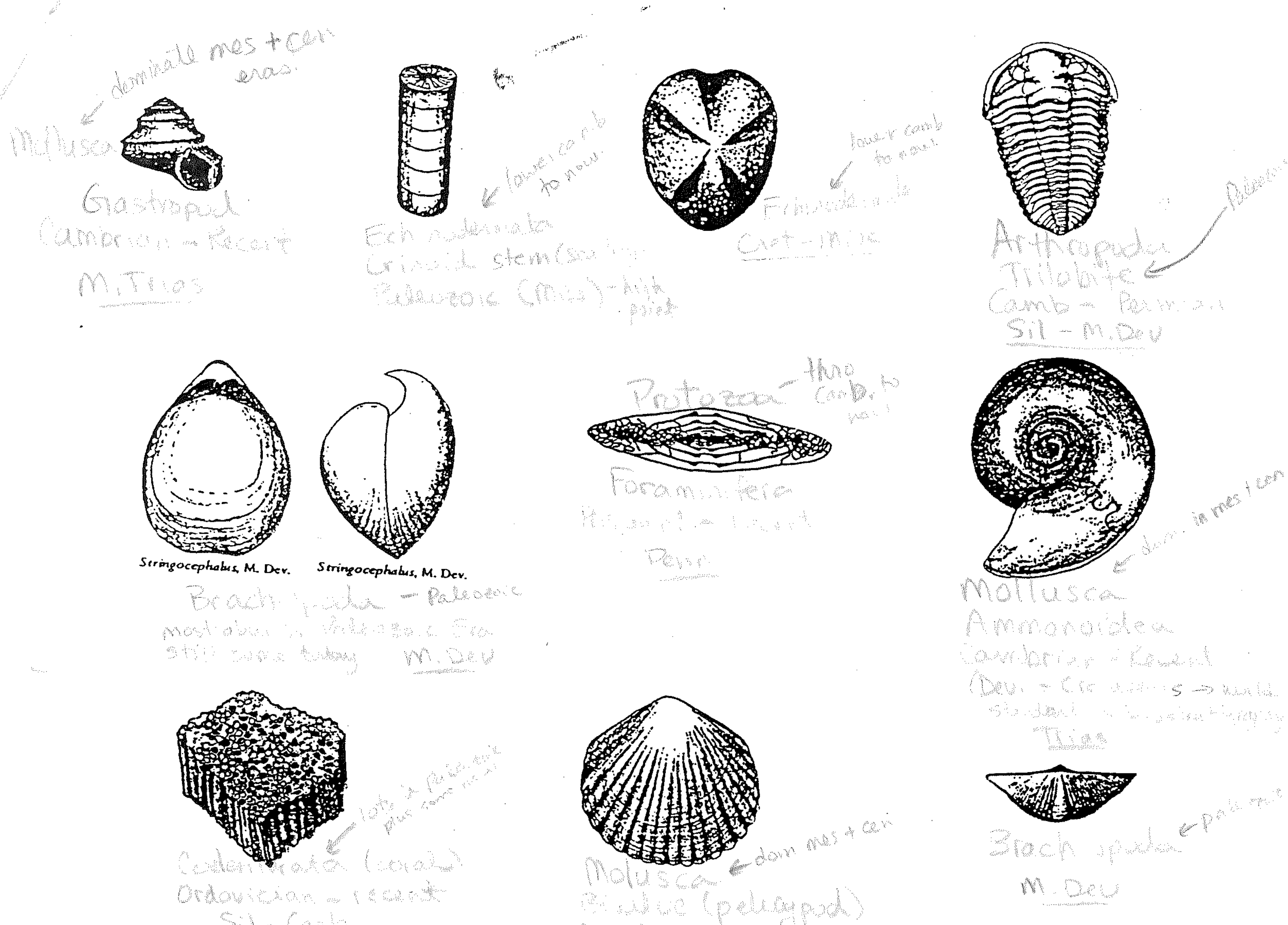
EXERCISE 6

Complete each of the following analogies by choosing one of the four words that relates to the single word in the same way the pair of words relate to each other.

Example: Snowflake:snowball *student:* **class**
team, crowd, school, class

1. Week:day period: epoch
age, era, epoch, stage
2. Navajo Sandstone:Triassic Dakota Sandstone: Cretaceous
Permian, Cretaceous, Jurassic, Cenozoic
3. Flesh-eaters:carnivores plant-eaters: herbivores
herbivores, omnivores, sauropods, trachedons
4. North America:Laurasia Africa: Gondwana
Pangaea, Tethys, Gondwana, Rhodesia
5. Mini:small saur: lizard
reptile, amphibian, chameleon, lizard
6. Sauropod:diplodocus first bird: archeopteryx
brachiosaurus, pteranadon, archeopteryx, triceratops
7. Tertiary:fifths Quaternary: halves
halves, third, quarters, tenths
8. Triassic:warm Pleistocene: icy
dry, icy, moist, warm
9. Lemuroids:monkeys hyracotherium: horses
whales, birds, tigers, horses
10. Paleocene:creodonts Miocene: grass
tracheodons, mastodons, grass, amblypods

te phylum and time frame for each of the following:
also include class name i.e. mollusca - gastropod)



2. Define:

a) a good index fossil
b) convergence
c) divergence
d) punctuated equilibrium
e) gradualism
f) extinction
g) adaptive radiation
h) natural selection

3. If the half life of a parent element is 2 million yrs, how old is a sample that contains 12.5% of the original # of parent atoms?

4. On a geologic time scale record the range of time each main phyla existed.