

Name: KEY

Date: February 12, 2010

TEST ID: A

WHITE

Physical Geology - Spring 2010 - Test 1

Multiple Choice

Identify the choice that best completes the statement or answers the question.

Anatomy of Earth

- ___ 1. Most of Earth's land surface lies between
A. between 2 and 3 kilometers above sea level. C. 1 and 2 kilometers above sea level.
B. 3 and 4 kilometers above sea level. D. sea level and an altitude of 1 kilometer above sea level
- ___ 2. The lithosphere is rigid and the asthenosphere is
A. granitic C. metallic
B. liquid D. plastic
- ___ 3. Which of the following statements about Earth's density is most correct:
A. Earth's density is constant with depth, despite major changes in composition and increasing pressure with depth.
B. Earth's density increases with depth, but the rate of increase is not constant: the center region is much denser.
C. Earth's density decreases with increasing depth, a result of a trade-off between increasing pressure (which causes materials to collapse) and increasing temperature (which causes materials to expand).
D. Earth's density increases gradually with depth, but decreases across the mantle-core interface because elemental iron in the core is less dense than peridotite, the main component of the mantle.
- ___ 4. The combined thickness of the crust, mantle and core is:
A. about 1600 km (or 1000 miles) C. about 25,600 km (or 16,000 miles)
B. about 6400 km (or 4000 miles) D. about 400 km (or 250 miles)
- ___ 5. Earth's surface is protected from solar wind and cosmic radiation by:
A. Earth's gravitational field, which results from the dense concentration of matter in the iron-rich core.
B. Earth's magnetic field, which results from convection in the inner core.
C. Earth's upper atmosphere (also known as the heliosphere) which outgassed from the core during differentiation of iron from the crust
D. Earth's magnetic field, which results from convection in the outer core.
- ___ 6. The two most common minerals on Earth are
A. helium and hydrogen C. oxygen and iron
B. silicon and aluminum D. nitrogen and oxygen
- ___ 7. The gas with the highest concentration in the atmosphere is _____. The density of the atmosphere _____ with increasing altitude.
A. carbon dioxide/increases C. nitrogen/decreases
B. oxygen/increases D. oxygen/decreases

- ___ 16. "Geochronology" refers to
A. using superposition to determine geologic ages
 B. using radioactive isotopes to determine geologic ages
C. using chronoscopes to determine ages
D. using fossils to determine geologic ages
- ___ 17. Which eon of geologic time is characterized by rocks containing abundant shelly fossils
A. Proterozoic B. Phanerozoic C. Hadean D. Archean
- ___ 18. In the 1800s Lord Kelvin estimated the age of the earth, utilizing a number of assumptions. Which wrong assumption was the primary reason why his estimate (approximately 20 million years) was so wildly inaccurate?
A. that Earth would lose heat over time through radiation into outer space.
 B. that no new heat has been added to Earth since its initial formation
C. that Earth was once much hotter than it is now
D. that Earth may have been molten when it first formed
- ___ 19. According to the principle of uniformitarianism:
A. there was once a uniform layer of sediment covering Earth
 B. physical processes operating today operated in the past
C. the future is the key to the present
D. all rock layers start out with roughly the same orientation

Plate Tectonics

- ___ 20. Which of the following statements about Wegener's reconstruction of the continents during late Paleozoic time is true?
A. Areas glaciated during the late Paleozoic were all in the Northern Hemisphere.
B. Areas that were coal swamps in the late Paleozoic were all at high (polar) latitudes at that time.
 C. Areas glaciated during the late Paleozoic were concentrated over the south polar region.
D. Areas that were deserts in the late Paleozoic were all in polar regions.
- ___ 21. Today, what is the favored explanation for apparent polar wander paths?
 A. Continents drift with respect to relatively fixed magnetic poles.
B. The Moon drags the magnetic poles with it as it orbits Earth.
C. Earth's magnetic poles wander rapidly around the surface, occasionally even crossing the equator.
D. The paths are an illusion. Apparent deviations of the paleopole positions from the present are caused by lightning strikes.
- ___ 22. Why can samples of basalt exhibit paleomagnetism?
A. Has the crystals forming basalt settle out of water, they align with Earth's magnetic field and then are cemented into place.
B. Large crystals of magnetite grow in the basalt long after the rock cools. These crystals act like magnets.
C. Earth's electrical currents flow through basalt, so it acts like an electromagnet.
 D. The dipoles of tiny magnetite grains in basalt align with Earth's magnetic field as the basalt solidifies from melt.

- ___ 23. The key difference between lithosphere and the asthenosphere that permits plate tectonics is:
 A. chemical composition (the lithosphere is felsic, and the asthenosphere is mafic)
 B. chemical composition (the lithosphere is mafic, and the asthenosphere is felsic)
 C. temperature (the lithosphere is cooler than asthenosphere)
 D. physical state (the lithosphere is solid and asthenosphere is liquid)
- ___ 24. Which of the following statements about hotspot tracks is correct?
 A. Hotspot tracks are parallel to deep ocean trenches.
 B. The youngest volcano of the track occurs at one end of the track.
 C. All of the volcanoes making up the track have erupted at roughly the same time.
 D. The track is perpendicular to the direction that the plate is moving.
- ___ 25. At _____, continental crust is being stretched apart; as a consequence, crust becomes _____ there, and volcanoes commonly erupt there.
 A. trenches/longer C. rifts/thinner
 B. trenches/shorter D. rifts/thicker
- ___ 26. The most likely cause of apparent polar wander is:
 A. high heat flow because of decompression C. continents drifting relative to the poles
 B. magnetic "north" reversals to the south D. movement of Earth's magnetic pole
- ___ 27. Earthquakes occur most frequently at
 A. the flanks of the Appalachian Mountains C. plate boundaries
 B. abyssal plains D. guyots
- ___ 28. In the Atlantic Ocean, where does the youngest oceanic crust occur?
 A. parallel to the paleomagnetic poles C. along the coastlines of the continents
 B. no set rule-could be anywhere in the Atlantic D. adjacent to mid-ocean ridges
- ___ 29. The oldest seafloor rocks are Jurassic in age (~200 million years), which is much younger than the age of Earth (~4.5 billion years). Why are there no seafloor rocks older than Jurassic age?
 A. the oceans are not very old either.
 B. all of the older seafloor rocks have been subducted at transforms
 C. older seafloor rocks have been converted to continental crust
 D. older seafloor rocks have all been subducted down trenches
- ___ 30. What is the difference between "passive continental margin" and an "active continental margin"?
 A. Passive margins are not plate boundaries, whereas active margins are.
 B. Crust is much thicker at a passive margin than it is in the interior of the continent.
 C. Wide continental shelves occur active margins, but not at passive margins.
 D. Earthquakes happen frequently at passive margins, but not at active margins.

Minerals

- ___ 31. All crystalline materials have:
 A. an orderly internal arrangement of atoms C. cleavage
 B. metallic luster D. external crystal faces

- ___ 32. We classify igneous rocks based on grain size and on
 A. silicate content
 B. paleomagnetic signature
 C. marine or continental origin
 D. color
- ___ 33. By far the most common minerals in the crust and in the mantle of the Earth are
 A. silicates
 B. sulfates
 C. oxides
 D. carbonates
- ___ 34. A polyhedron with four corners and four triangular faces is a(n)
 A. tetrahedron
 B. bipyramid
 C. octahedron
 D. pyritohedron
- ___ 35. Which of the following mineral formulas represents a solid solution?
 A. Quartz: SiO_2
 B. Spinel: MgAl_2O_4
 C. Ankerite $\text{Ca}(\text{Fe, Mg})(\text{CO}_3)_2$
 D. Siderite: FeCO_3
- ___ 36. In minerals, silicate atoms are surrounded by
 A. four carbon atoms
 B. a variable number of oxygen atoms
 C. three oxygen atoms
 D. four oxygen atoms
- ___ 37. The mineral olivine is a solid solution, and the formula for olivine is written $(\text{Fe, Mg})_2\text{SiO}_4$. Which of the following formulas cannot be olivine?
 A. Fe_2SiO_4
 B. $\text{Fe}_{0.5}\text{Mg}_{1.5}\text{SiO}_4$
 C. FeMgSiO_4
 D. FeCaSiO_4
- ___ 38. The most common or minerals mined for Zn, Ni, Cu, and Pb are classified as _____ minerals.
 A. carbonate
 B. oxide
 C. sulfide
 D. silicate
- ___ 39. In silicate minerals, silica tetrahedrons may be coordinated to form
 A. extensive two-dimensional sheets
 B. all of the above
 C. massive three-dimensional frameworks
 D. long one-dimensional chains
- ___ 40. Of the following, the least reliable property for mineral identification is
 A. specific gravity
 B. cleavage
 C. hardness
 D. color
- ___ 41. Which of the following is not a mineral?
 A. snow
 B. quartz
 C. calcite
 D. methane
- ___ 42. Which of the following is not a geological mineral?
 A. Ca (calcium)
 B. olivine
 C. pyroxene
 D. feldspar

Early Universe and Early Earth

- ___ 43. The key evidence that the Universe is expanding came from:
 A. the red shifts of light from both nearby and distant galaxies
 B. the red shift of light from nearby stars
 C. the blue shifts of light from both nearby stars and distant galaxies
 D. the blue shift of light from nearby stars

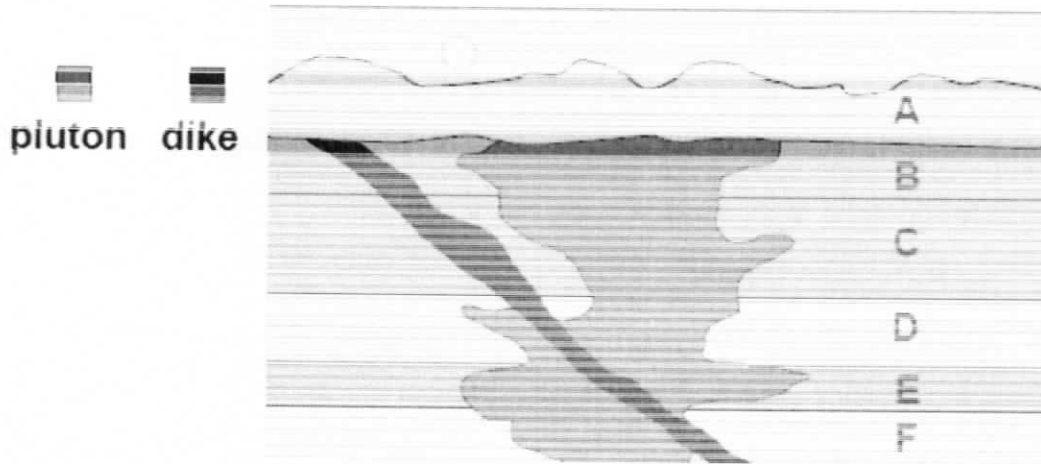
- ___ 44. Analysis of rocks on Earth and on the Moon suggest that:
- A. the Moon was pulled from within Earth when Earth was still soft, by gravitational attraction of a large passing object
 - B. the Moon was created near Jupiter and later wandered into Earth's orbit due to its higher gravity
 - C. the Moon formed early in the history of the solar system as a result of a collision between a proto-planet and Earth
 - D. the Moon was a large planetesimal that was captured by Earth's gravity
- ___ 45. Using radiometric dating of _____, geologists conclude that Earth is about _____ years old.
- A. fragments of meteorites / 4.57 billion
 - B. solar wind fragments / 4.57 billion
 - C. rocks from Wyoming / 4.57 billion
 - D. the Moon's surface / 3.8 billion
 - E. rocks in central Canada / 3.2 billion
- ___ 46. The carbon atoms that now comprise your body were:
- A. formed by fusion reactions that occur during volcanic eruptions
 - B. formed by chemical reactions on earth
 - C. formed by Big Bang nucleosynthesis
 - D. formed by stellar nucleosynthesis
- ___ 47. The Cosmic Microwave Background can be described as
- A. a one-hit-wonder band that toured the country in the Summer of Love 1969
 - B. a clear indication that the Big Bang will one day give way to a Big Crunch, in which the Universe collapses
 - C. a spectrum of energy, visible to the naked eye, at the edges of the Universe
 - D. an afterimage of the Big Bang, offering a window into what the Universe was like at the very beginning of time
- ___ 48. According to the Big Bang theory:
- A. the Universe is rapidly shrinking, and will ultimately collapse to a single point in a colossal implosion.
 - B. the Universe will end in a huge explosion 5 billion years from now.
 - C. our Sun is all that remains after the explosion of a much bigger star (known as a supernova).
 - D. everything that now comprises the Universe started at a single point about 13.7 billion years ago.
- ___ 49. Which of the following is most correct regarding element formation?
- A. supernova explosions are responsible for the Cosmic Microwave Background
 - B. fusion tends to create elements lighter than iron, whereas fission creates all of the heavier elements
 - C. hydrogen and helium formed during the Big Bang, but heavier elements formed later, through fusion reactions in stars and via the explosions of supernovae.
 - D. All elements now in existence formed during the Big Bang.
- ___ 50. Earth underwent differentiation
- A. in a single relatively short period very early in Earth's history
 - B. in phases as the crust slowly cooled
 - C. in a single relatively short period at the end of the Mesozoic
 - D. shortly after the moon was formed

- ___ 51. Because of the Doppler effect:
- A. a train whistle has a higher frequency as the train moves away.
 - B. wavelengths of light from galaxies moving away from Earth shift to red.
 - C. wavelengths of light from galaxies moving away from Earth shift to blue.
 - D. a train whistle has a lower frequency as the train approaches you.

Rocks

- ___ 52. The difference between lava and magma is that
- A. magma is light in color and lava is dark
 - B. magma is found beneath the Earth's surface whereas lava is found at the surface
 - C. magma usually has a mafic composition and lava usually has a felsic composition
 - D. magma is more fluid than lava
- ___ 53. One way to decompress rocks and cause melting is to
- A. subduct some seafloor down a trench.
 - B. bury the crust beneath a pile of lava flows.
 - C. bury some seafloor rocks beneath a pile of sediment.
 - D. open a rift in the seafloor or on the continent above them.
- ___ 54. A blob-like igneous rock body that has cooled beneath the surface of the Earth is called a
- A. andesite
 - B. guyot
 - C. lava flow
 - D. pluton
- ___ 55. It is possible to make already-hot rocks melt by _____.
- A. decreasing the heat flow to them
 - B. decreasing the pressure on them
 - C. adding magnesium to them
 - D. removing water from them
- ___ 56. Which of the following is a fine-grained volcanic rock with relatively low silica content?
- A. obsidian
 - B. gabbro
 - C. arkose
 - D. basalt
- ___ 57. The grain size of igneous rocks
- A. depends on how fast the magma cooled; if it cooled very fast, the grains are larger than if it cooled slowly.
 - B. has nothing to do with rock classification.
 - C. is generally larger in plutonic than it is in volcanic rocks.
 - D. is larger in rhyolite than it is in granite.
- ___ 58. Igneous rocks
- A. can crystallize above or below ground.
 - B. form in the solid state.
 - C. always crystallize deep underground.
 - D. crystallize from sedimentary rocks.

Refer to the following diagram for the next 2 questions.



- ___ 59. According to the principle of crosscutting relations, which of the following features in the cross section is the youngest?
- A. sedimentary layer F
 - B. sedimentary layer A
 - C. the dike
 - D. the pluton
- ___ 60. According to the principle of crosscutting relations, which of the following features in the cross-section is the oldest?
- A. sedimentary layer A
 - B. sedimentary layer F
 - C. the pluton
 - D. the dike