Learning objectives for GEOL-101 (Spring 2019 semester)

By the end of this course, you will be able to:

1. **Explain how the scientific process as a whole, including the formulation of scientific questions, making observations, systematic testing and data interpretation, is used to describe and decipher the natural world**
2. **Analyze data and generate graphical models to identify and interpret patterns and/or estimate the probability of future geologic events, like but not limited to floods, earthquakes and volcanic eruptions.**
3. **Interpret the geologic history of a landscape by placing observations of the natural world in the context of plate tectonic theory, the rock cycle, and the idea of deep time**
4. **Integrate and interpret map and cross-sectional data to identify plate boundaries and geologic structures and assign absolute or relative ages to features based on the data provided.**
5. **Evaluate how geologic components of the Earth system interact with other components (including human/anthropogenic components) to determine things like but not limited to resource availability, climate, and mass extinctions.**

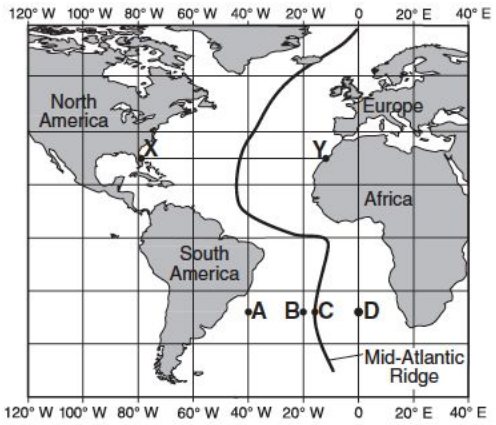
Name _____ GEOL 101 Pre-assessment S19

1. (LO5) What impact does an explosive volcanic eruption have on climate? Assume particulates make it into the stratosphere.
    a. The heat from the eruption causes an increase in global temperature
    b. The reflective aerosols from the eruption cause a decrease in global temperature
    c. CO_2 emissions from the eruption cause a brief but extreme (>2˚C) increase in global temperature
    d. Methane emissions from the eruption cause a brief but extreme (>2˚C) increase in global temperature

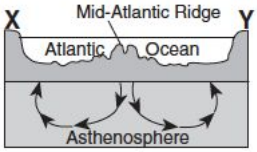
2. (LO1) The Earth is approximately 4.54 billion years old. What assumptions and measurements were used to determine that number?
    a. Measurement: Radiometric dating of Earth rocks and meteorites.
    Assumption: The entire solar system formed at approximately the same time.
    b. Measurement: Radiometric C-14 dating of fossilized bacteria
    Assumption: Life has always existed on Earth, albeit as simpler lifeforms
    c. Measurement: The concentration of salt in the oceans
    Assumption: Oceans have been on Earth as long as the Earth has existed
    d. Measurement: Radiometric C-14 dating of diamonds
    Assumption: Pressure-temperature conditions for diamond formation only occurred when Earth
    was forming, so all diamonds are as old as the Earth

Use the map below to answer the next question. The XY line on the map connects locations in North America and Africa, crossing the Mid-Atlantic Ridge

3. (LO4) Which cross section best illustrates the movement of the asthenosphere beneath line XY?



a.



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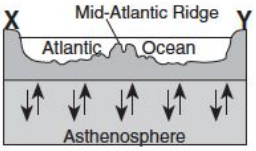

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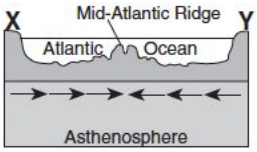

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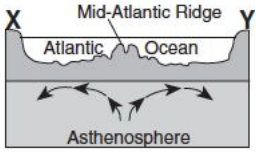

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4. (LO2) A 500-year flood:
    a. Has a 2% chance of occurring in a given year
    b. Will occur only once every 500 years
    c. Has a 0.2% chance of occurring in a given year
    d. Is less likely to occur in a given year if a 100-year flood occurs the same year

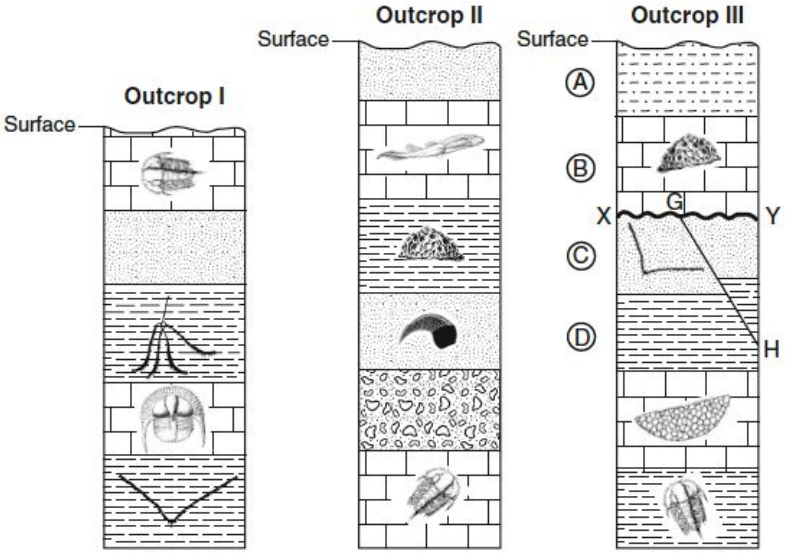
5. (LO2) In general, the annual probability of a magnitude 7 earthquake event along a plate boundary:
    a. Is less than the probability of a magnitude 5 earthquake event at the same fault
    b. Is directly related to the number of volcanic eruptions at the same boundary
    c. Is higher at a convergent boundary than a transform boundary
    d. All of the above

6. (LO1) A scientific theory:
    a. Results from a hypothesis being proven at least two times
    b. Is the opinion of a scientist, based on data collected in an experiment
    c. If proven, will become a scientific law.
    d. Is an explanation or interpretation of the natural world that has been repeatedly tested & confirmed

7. (LO5) Why are people so worried about CO_2 (carbon dioxide) in the atmosphere?
    a. It is 20x better at absorbing radiation than any other greenhouse gas
    b. The CO_2 concentration in the atmosphere has changed very quickly over a short time period
    c. CO_2 has a very short residence time in the atmosphere
    d. All of the above

8. (LO3) How did the southern Atlantic Ocean form?
    a. The African and South American continents floating above the dense, ocean crust
    b. The Atlantic Ocean formed at the same time as the Earth's crust originally formed
    c. New ocean crust being created between Africa and South America

d. Convection in the outer core of the Earth altering magnetic fields and allowing for basin formation



Use the diagrams to the left for this question

9. *(LO4) An outcrop is a rock formation that is visible from the Earth's surface.* Which one of the outcrops shown has the oldest rock at its topmost layer?
   a. Outcrop III
   b. Outcrop I
   c. Outcrop II & III are the same age
   d. Outcrop II

Use this diagram for question #10

10. (LO3) This is a passive margin, which is an "extinct" plate boundary. What type of plate boundary used to be active here?

a. Divergent b. Transform c. Convergent