Geology 1030

Exam I Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Each answer must be at least five sentences or more. You need to provide enough information to show you understand the concepts. You can use your text, class notes and the Internet if needed.

1. **Population and sustainability are two of the main concepts in environmental studies. Define sustainability and indicate how these two concepts are related.**

Sustainability and population are closely related. Population is the amount of people in a given area, or in this case on the earth. Sustainability is the limit of how high the population can get to without compromising either our, or the futures standard of living. This is a key term seeing as the population of the earth is going up at a steady rate. Eventually something will need to be done to stop the growth like what is being done in china.

1. **List the populations of the Earth, USA and Utah. List the population growth rates for each and indicate the year in which each population will double.**

The population of the world when I did this was 7,262,334,635. The population of the United States was 323,159,034. The population of Utah at the end of December last year was 2.9 million, so by now its most likely over 3 million. By the year 2100 the world population is predicted to not have yet doubled, but be around 10.8 billion.

1. **Describe the precautionary principle.**

The precautionary principle is a way of making decisions based off if they will harm the general population. Typically this is put into place when there isn't any scientific proof to show that it is or isn't harmful. It is in place to protect not only people, but the environment as well. If scientific proof is later found the rules can be removed.

1. **This class should help you get a perspective on humans in terms of our place in the universe and our place on earth. Briefly describe the origin of the universe, elements, earth, oceans, atmosphere and life. As part of your answer indicate the ages of the universe and earth and indicate approximately how long modern humans have existed. A timeline is recommended.**

The universe was created as a part of the big bang. This happened about 13.8 billion years ago. After this, everything that was compact into a single spot in the universe exploded and thats when everything else was created. Elements are created when stars explode and reach extremely high temperatures. The earth was created about 4.34 billion years ago. It’s estimated that modern humans have been on the earth for over 200,000 years.

1. **The scientific method is a process used to understand our world and solve problems, and will be applied throughout this class. Describe the scientific method, and as part of your answer describe the following: falsifiability, independence, repeatability, representativeness and uncertainty.**

The scientific method is used to prove if things are true or false. As a part of this there are some terms that apply to how it is conducted. Falsifiability is when you can 100% prove something backed by data, rather than doing something based on a “bad feeling”. Independence applies to the data being used to conduct an experiment. The data being used needs to be independent from the other data, this means data x cannot be determined by data y. Data x needs to be completely separate from data y. Representativeness means the data needs to be collected in the right place at the right time. Uncertainty is when you try to predict future data but you realize that you aren't certain.

1. **What is a system? Include information about energy in your answer.**

A system is a group of things that have individual jobs, but function as a whole. A main point of a system is that everything relies on each other. If something small and seemingly unimportant is taken out, it will make a noticeable impact if it is actually a part of the system. Sometimes in systems, energy is passed through. Very small organisms are the food for bigger organisms that are food for even bigger organisms all the way up to the top. So when something in the middle is taken out it will impact the rest of the system.

1. **Describe the plate tectonic system.**

The plate tectonic system is responsible for what our earth looks like today. It is responsible for things like earthquakes, volcanoes, and mountains. It happens because of the seemingly slow moving lithosphere of the earth. This is a part of the explanation of the ancient land mass pangea from long ago. Earthquakes happen when plates move together or apart, this is what explains volcanoes and mountains.

1. **Describe the hydrologic system.**

This is the system in Geology that studies the movement of groundwater in the soil and rocks. Some of the subsystems for this are glaciers, wind, streams, oceans, and rivers. This can often be a difficult thing to study because sometimes water doesn't move the way we would think it would, but rather from high pressure to low pressure.

1. **What is a biogeochemical cycle?**

This is how resources are recycled throughout the earth. The water cycle is an example of this. Even though it seems like we are using water for good, it is really just moving somewhere else where it will then be moved again and eventually make its way back to us. Some other cycles are the nitrogen cycle, carbon cycle, oxygen cycle, and phosphorus cycle.

1. **What are the three main types of rocks that make up earth’s crust and in what types of environments do they form?**

The earths crust is made up of many different types of rocks and soil. The primary types of rocks are igneous, metamorphic, and sedimentary. Igneous rocks form from the magma that is inside the earth but comes out from volcanoes. Metamorphic rocks are formed deep under the ground we are standing on by extreme pressure and time, it is important to note however that these rocks do not melt. Sedimentary rocks are formed under low pressure and are usually composed of previous rocks that have been chemically modified.

1. **What is uniformitarianism? How is it applied in environmental studies?**

This is the assumption that the earth laws and systems haven't changed over time. By applying our current geological processes to something like the rock record, we can learn a lot about the history of the earth. We can use this to assume that because things haven't changed from the past to now, that they won't change from now into the future. This can help us to make educated decisions that won't come back to hurt us later.

1. **Soil is essential to life on earth. Soil contamination and erosion reduce the amount of available soil and limit land use. What is soil, and how does soil form?**

Soil is earth material that has been modified by a physical, chemical, or biological process that is now capable of supporting plants. Soil is not to be confused with dirt that is the airborne dust in our houses. Soil is created from the erosion of rocks. When wind and rain hit rocks, there is sediment that falls off and that creates soil. This sediment that is excess of the rock is then modified and turned into soil.

1. **What are the two general categories of soil? Draw and label a typical soil horizon.**

Alluvial soil is made from material transported from where the sediment originated. Colluvial or residual soil is different, it form in place of the rock.

1. **Summarize the information in the text about agriculture and soil conservation on pages 78-80.**

Soil is eroding at a very rapid rate, much quicker than it is being created. A lot of this is tied to how we are cultivating our lands. The book says that a no till agriculture is the best way to reduce the soil erosion. This is because as the soil settles, it will be less likely to blow away with the wind or the water. Contour plowing is an alternative that involves plowing with the natural topography of the land. Terracing slopes is where you build an artificial retaining wall and farm on the flat ground. These are tough because they need to be maintained.

1. **Summarize the information in your text about land use and urbanization on page 82.**

Transitioning agricultural, forested, or rural land to urbanized land has many effects on the soil. Not only is the soil going to be disturbed, but out of nowhere there is going to be a lot of excess water that will need to go somewhere. In addition to that very rich soil will be disturbed and most likely not be able to return to its previous state. The soil that was either already there, or brought in will now be subject to soil pollution from chemicals that are dumped into the ground.

1. **Define the following terms: ecology, biosphere, biodiversity, population, community, habitat and niche. You don’t need five sentences for each.**

Ecology: controls the distribution and abundance of living things

Biosphere: places where life exist on the earth

Biodiversity: The number and abundance of species in a ecosystem

Population: The number of a certain species in a given area (ex: humans in a city)

Community: Groups of populations of different species living in a mutual area

Habitat: The place where a specific species lives

Niche: What a species eats and deos

1. **Summarize the information in your text on pages 94-95 about ecosystems (What is an Ecosystem and Natural Service Functions of Ecosystems).**

Ecosystems are very important to us. They are responsible for recycling the energy that we need. This ecosystem consists on the living things and the non living things. Human activity can destroy fully natural ecosystems. For example the pollution that goes into the air has theoretically modified every ecosystem on the earth, so technically none of them are fully natural.

Natural service functions of ecosystems is the idea that the earth provides some essential things for us and other living things to survive. The example the book gives are roots on a hill. Plant roots allow for soil on a hill to stabilize.

1. **Summarize the information about the “Golden Rule of the Environment” on page 104.**

This is a very interesting topic. Stephen Jay Gould is saying do unto others, what you would want done unto you. The only thing is that he is applying this to us and mother earth. He says that no matter what, the earth will live on with or without us, and that we need to do what we can to keep the earth in good shape which will hopefully prolong our extinction. He says that if we are looking at “Earth time” vs “human time” we really aren't that big of a deal, we aren't leaving that big of an impact on the earth.

1. **Summarize the information at this webpage about biodiversity.** [**http://www.sltrib.com/opinion/ci\_11095542**](http://www.sltrib.com/opinion/ci_11095542)

This article talks about how climate change is beginning to hurt our ecosystems. Utah is very prone to what is going on. So many species are on the verge or have the possibility of becoming extinct. Things like our forest may become more susceptible to fire, or the wetlands could be destroyed forever. We are learning how to slow these things down by doing more local buying to help reduce the amount of things that need to be transported.

1. **In class we discussed the concept of footprints and our impacts. What little things can you do to help improve our environment?**

I think that when people would read something like this they would immediately start to think they need to totally transform how they live their lives. And although this would work in most situations, hardly anyone is actually going to do this. Rather I think that everyone should just be conscious with what they are doing and think to turn off the sprinklers on days its raining, or take the bus when it is convenient. Its little things like this that really aren't hard for us to do, but will really make a difference in the long run.

1. **Extra Credit: What part of class interested you the most so far? Did you learn anything new or eye opening?**

I have really enjoyed this class. Even though I am just taking it as a general credit, I enjoy it when you apply the concepts into a construction aspect. They are things that at one point in my life I had wondered, but forgotten about. I never realized how much geological work went into preparing a site to build on.