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OEAS 110N: Earth Science

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Unite 1 Exam

Word Analysis:

Chapter 1-Question 2: *Core, mantle, lithosphere, asthenosphere*

A. The earth's layering can be described both by its chemical and physical properties. The chemical composition can be shown by the core which is the innermost layer composed of iron and nickel, the mantle which is high density solid rock. Lastly there's the crust which is the thinnest layer composed of low-density rock. The physical properties include the lithosphere which is part of the crust and upper mantle. So, it's low density, solid, and rigid. Then there's the asthenosphere which is part of the upper mantle and is solid but has a slow flow to it. It is also high-density rock since it's part of the mantle.

B. The word that does not fit with the group is lithosphere due to its size.

C. All the other words are earth layers that are large compared to the lithosphere layer. Plus, all the other layers are located beneath the crust.

D. Being part of the crust the lithosphere's size is significantly smaller when compared to the asthenosphere, mantle, and core.

Chapter 2-Question 3: *Single tetrahedra, single chain, double-chain, one plane*

A. Some minerals have specific bonding patterns between silicate molecules, which can help categorize when naming. Within a mineral four oxygens can bond with a silicon atom and form a single tetrahedra. This single tetrahedra can also bond to another single tetrahedra, and if it's in a single linear pattern it considered to be a single chain. These bonds also create two planes at 90 degrees which can be shown by cleavage on the mineral. When two single chains bond laying on top of each other it makes a double chain which consist of two planes at 60 and 120 degrees. Having multiple double chains stacked creates one plane which is a sheet like structure and shows one plane.

B. The odd word in this chapter is the single tetrahedra due to its lack of bonds and cleavage.

C. Whether it be a single chain, double chain, or one plane, each of these consist of silicates molecules bonding together creating planes in the minerals which is shown in cleavage.

D. The single tetrahedra within a mineral do not bond with each other thus not creating planes of cleavage like the other bonded molecules.

Chapter 3-Question 6: *Calcite, breccia, sandstone, shale*

A. Rocks and minerals can be classified by the grain size and chemical composition of the substance. They are also classified by how they are formed. Detrital rocks are formed by the accumulation of material which is transported by mechanical and chemical weathering. These include breccia, which is made up of angular sediment fragments, sandstone that consist of sand size grain fragments, and shale that has silt/clay size particles formed in layers that are finely grained. Then you have rocks and minerals created by chemical transmission of water. This can be shown in calcite which is formed by calcium carbonate.

B. The odd word in this group is calcite since it is a mineral which is formed by chemical means in water within other rock sediments.

C. Breccia, sandstone and shale are all detrital rocks and can be classified by the size of the grain sediments.

D. Calcite is a mineral formed by chemical sedimentary transmission in water. This means you do not look at the physical size of the sediments but rather you text the chemical composition of the rock.

Chapter 4-Question 7: *Ocean-drilling, hot spots, magnetic reversals, fossils*

A. By studying Earth and its functions you can look back in history and understand the process involved to explain certain geographic features. Ocean drilling is a man-made technique that collects core samples of sediments and fossils from the sea floor to see how it spreads. Fossils are the remains of microorganisms that naturally occur and can be found on the sediments being encrusted. Another naturally occurring process are hot spots which are where rising mantle plumes erode out of the surface creating a hot spot. Lastly the magnetic reversal is when the earth's magnetic field switches polarity and this also occurs naturally.
B. The odd phrase in this chapter is ocean drilling due to it occurring from a man-made process and not happing naturally within nature.
C. Hot spots, magnetic reversals, and fossils all occur naturally in nature and do not require assistance from humans to make it happen.
D. Ocean drilling is an effect caused by human technology and assistance. This could not occur naturally like the other effects.

Chapter 5-Question 9: *Seismic vibrations, ground subsidence, tsunamis, fire*

A. All around the world natural disasters occur affecting both the population and landscape of the area. One of these disasters are earthquakes which happen when one fault of a rock slip past another creating seismic vibrations in the ground. These vibrations travel shaking everything depending on the magnitude an intensity. If one of these faults were to slip beneath the sea creating an underwater earthquake, then it also creates a tsunami which is the waves created by

the vibrations. When the ground has so much vibration it loosens up the density and allows water to seep in which causing ground subsidence. This is when the ground undergoes liquefaction and has an effect of a landslide on the area. Earthquakes can even trigger fires which cause even more damage and can last up to days while being blown in the wind.

B. The odd word in the chapter would be tsunamis since this is a process that occurs underwater.
C. Seismic vibrations, ground subsidence, and fires are all disasters that can start occurring on land whereas tsunamis have to be formed from an earthquake starting underwater.
D. Due to the vibrations coming from underwater that initiates a tsunami it is different than the other words as they also can occur on land and does not need the earthquake to start underwater.

Critical Thinking:

Chapter 1-Question 2: *Swift Creek Landslide*

The swift creek landslide is located on the west side of Sumas Mountain in Washington State. Currently on average it can move 3-4 meters each year. When it comes to choosing a location to start building upon, it's important to take landforms into consideration. The earth is made up of multiple layers and some of those layers have flow to them. Not only do some of these layers have movement but events such as earthquakes also can disturb the area of the land. Choosing a sturdy solid area that has less potential risk factors when it comes to land shifts would be a key area for building. Unlike the west side of Sumas Mountain that constantly shifts each day. With this type of land, the building's structure would not only be at risk, but the location would also change.

Chapter 2-Question 3: *types of bonding*

By the octet rule atoms usually gain, lose, or share electrons to surround themselves with eight valence electrons. There are three commonly found bonds which are Ionic bonds, Covalent bonds, and Metallic Bonds. Ionic bonds are formed between atoms where one gives up an electron while the other one receives the electron, for example in table salt Na gives up one electron to ionically bond with Cl to form sodium chloride. The next type of bond is covalent bonding which occurs when one or more valence electrons are shared equally creating a strong attractive force and can be seen in the bonds between two hydrogen atoms. Metallic bonds differ in that all the bonds are packed tightly together sharing a common pool of electrons which can move freely throughout the molecule. This creates a strong bond and can be seen in examples like copper and silver who all share a common pool of electrons that are able to move freely.

Chapter 3-Question 6: *six types of igneous rock textures*

Glassy textures occur when molten rock is ejected into the atmosphere which rapidly cools the rock. This makes the unordered ions frozen into place making a glassy appearance. Porphyritic rocks are large masses of magma that took up to millions of years to solidify. This slow cooling left large crystals embedded within small crystals. Coarse-grained texture are large masses of magma that are slowly cooling at great depth. This leaves intergrown crystals that are large enough to identify without a

microscope. The next texture is vascular, and it forms in the upper zone of the lava flow where it rapidly cools and preserves the gas bubbles presented as voids within the rock. Pyroclastic texture rocks occur when angular fragments from in the volcanic wall break loose and are ejected out of the volcano which has rapid cooling. The final texture category is fine grained rocks which are small intrusive rocks located in the upper crust that have rapid cooling. This creates small crystals that require a microscope to differentiate.

Chapter 4-Question 8: *three plate boundary types.*

There is the theory of plate tectonics which states the Earth's outer layer has separate plates which can interact in numerous ways. The first boundary type is a divergent plate which is where the plates move away from each other causing an upwelling. The second type is convergent plate boundaries which is the opposite and two plates move towards one another. This often creates a mountain belt or the two eventually are reabsorbed into the mantle. The last boundary is a transform plate, and this is when the two plates start to grind together which does not affect or destroy the lithosphere. In the Northwest part of the U.S.A. at Juan de Fuca Plate you can find all three of these boundaries in proximity. It looks to be as if it's near the coast of California.

Chapter 5-Question 9: *P and S waves*

When it comes to body waves there are two main type which are primary waves and secondary waves. From the hypocenter the P wave travels first pushing and pulling its way through the Earth's interior. Since it compresses and stretches the rocks it can move throughout solids, liquids, and gases. After the P wave comes the S wave which is more of a shaking motion. Since these shaking motions does not temporally change the volume like the P wave motion it can only move through solid material. It will not transmit through liquids and gases.

Scientific Literacy:

A.

The scientific method is commonly used as it is a tested practice which provides data to prove theories correct or wrong. Everyone should care as we base natural world facts and laws in place pertaining data collected from these methods. We learn more about life daily and by testing our theories and understand how the basic mechanism work, we as humans can grow with our knowledge. This method is a way to test and have supported evidence that backs up your hypothesis.

B.

There are many steps involved within the scientific method, the first being is to raise a question on an observation. You may see an apple drop from a tree and wonder why did it go down? After this you collect some background data which pertains to the experiment, like was there any wind or did only a certain size/color drop? After this you can create a hypothesis to which the experiment will ether support or refute. Now it's time to test the hypothesis and collect data and observe the experiment. Once this is done you can now analyze the data to see if it supports your hypothesis, and if it doesn't then retry until you get evidence that supports your idea unless it needs to be changed. Even a failed experiment still gives data to use to lead you to a correct hypothesis.

C.

My article was an experiment to test lithification rates in shallow terrestrial environments using turtle shells. The question was raised, can you estimate the timing and depth at which this process occurs by observing turtle shell fossils. In the next part of the scientific method is to collect background research. In this experiment they used comparable environments and types of turtle shells to ensure accurate data. Once this was in place, they can now create a hypothesis, which was the relative depths at which certain fossilization and lithification processes occurred. To test this theory after collecting the turtle shells at different depths and analyzing the sediments encrusted on the shell, they now had the data to put together. Analyzing the data, they were able to create something called the Turtle Shell Index which showed and proved that at certain depths in the environment you will find these processes to start and undergo fossilization. Using this data, you can receive a sample fossil and test it amongst this index to provide depth and time information about its lithification and fossilization process.