Earth science study guide

Business

The Big Bang Theory is the theory that the entire universe was once confined to a dense, hot, super massive ball then 12-17 billion years ago huge expansions occurred and material in the ball began moving out in all directions. Then, instant cooling ensued due to the expansion and thus the universe was born.

b. Individuals Roles in the BBT: Edwin Hubble – Created the most powerful telescope of the time. Albert Einstein – Created E= mc2, but didn't believe it was true, and hypothesized the speed of light. Le Maitre – Was a Catholic Priest with a science degree from M. I.

T who provided faith in scientific theory and thought E= mc2 was true. It took all three of these men to develop the Big Bang Theory, then in the 1950's Penzias and Wilson produced evidence of the B. B. T 2. Potential Fates of the Universe: An ice age could occur due to precession varying Earth's motions.

Or the Earth could go through expansion and eventually implode. 3. Nebular Hypothesis: a. The Nebular Hypothesis is the hypothesis that states that the planets are formed when in a nebula gas and dust condense due to gravity and pressure, increasingly heating the center and causing the nebula to spin. Once the center of gravity and pressure heats significantly enough it will begin to grow and form a protostar. This protostar then becomes a real star when nuclear fusion starts.

Nuclear fusion continues in the core for as long as there's fuel. Then this newly formed star will start to affect the matter surrounding it because of instabilities in the nebula. Read also –CapSim Word Study GuideThis can

cause smaller, more localized areas of increased gravity which in turn form proto-planets. Overtime these proto-planets start to collect and loose debris from orbital baths.

Finally, as time goes on all the debris heat from the contractions around the gravitational center and eventually forms a molten planet, like Earth. Relationship to Big Bang Theory: The Nebular Hypothesis states how the solar system was formed and the Big Bang Theory states how our planet within the solar system was formed 4. Electromagnetic Spectrum a. The Electromagnetic Spectrum is the distribution of electromagnetic radiation through wavelengths. It shows the different types of radiation (gamma rays, x-rays, ultraviolet, visible light, infrared, microwaves, radio waves) and whether or not they are long or shortwave radiation. b.

Elemental signatures of stars – how do we view them: We cam view stars according to their brightness (apparent magnitude) and we can examine them through a telescope or satellite. 5. Doppler Effect a. How Doppler Effect is used in the study of astronomy: Astronomers use the Doppler Effect to find out precisely how fast stars and other objects in space move toward or away from Earth. b.

Red Shift vs. Blue Shift: In Red shift the source of light is being stretched, or lengthened, indicating that Earth and the source are moving away from each other. In contrast objects approaching Earth are having their light waves being shifted closer to the blue, creating a shorter wavelength. The amount of shift an object has can help calculate the rate at which movement is occurring. B.

Seasons & Earths Motions 1. Three major Earth motions and their causes: Earths three major motions are rotation, revolution, and precession. Precession causes the reversal of seasons every 13, 000 years. Rotation causes day and night, gravitational pull and changes in the tides. Revolution causes a variation in the length of day and night around the world, and it also causes the earth to have different seasons over the course of a year.

2. Causes of the seasons: The seasons are caused by the earth’s axial tilt. 3. Seasons and their relative locations in space: Earth in Space ; Seasons Polaris Perihelion Aphelion 4. Angle of isolation: The angle of Isolation is an angle used to measures the relationship between the intensity of light and the angle at which it hits the surface of Earth. SUNSUN Earth’s Surface a.

How angle of isolation affects the seasons: The angle of isolation affects the seasons through this process; when the northern hemisphere is having winter, the southern hemisphere is getting the most direct sunlight because the angle of isolation is greater due to the Earth’s axis tilt. On the other hand, in the summer the northern hemisphere is getting a bigger angle of isolation due to the tilt. C. Plate Tectonics 1. Earth’s Interior – layers, how behavior of each layer differs: The Earth has five major layers.

* Inner Core: Solid most inner part of the earth. Composed of iron and nickel * Outer Core: Thick layer of magma with properties of liquid. * Mantle: Located beneath the crust. * Asthenosphere: Weak layer below the lithosphere with rock that acts as plastic and is easily deformed. * Lithosphere: Includes crust (oceanic and continental) and the upper mantle 2.

Continental Drift Theory: Who and When: Alfred Wegner, 1915 What is it? A hypothesis that ~200 million years ago a “ super continent” (Pangea) began to break into smaller continents, that then began to drift into different positions. Evidence: Continents have a puzzle piece fit. * Fossils of ancient organisms found across the ocean from each other * Mountain belts with matching rock and structures terminate a one continent edge and begin at a different edge across the ocean. * Matching craytons found across the ocean. * Paleoclimates: Evidence of ancient glaciers in southern hemisphere locations and evidence of ancient tropical swamps found in currently cold/frozen areas.

This theory was not accepted because at the time other scientists had a hard time believing that the plates could move on their own. 3. Plate Tectonic Theory – When: 1968 What: A theory that Earth’s crust is broken into ~12 large plates that move over the Earth’s asthenosphere. This theory attempts to explain seismicity, volcanism, mountain building, and paleomagnetism. New evidence: * Paleomagnetism * Polar Wondering (Evidence of iron rich rocks showing poles not in the extreme north or south. * Magnetic reversals.

* Seafloor Spreading * Earth Quakes and Volcanic Patterns. Differences from CDT? The Continental Drift theory is the theory that the continents themselves drifted and came together, then drifted back apart. However, the P. T. T states that Earth’s tectonic plates shifted and brought all the continents together and then started shifting back. One is the continents themselves moving, the other the plates moving the continents.

a. Plates, plate types, dominant driving mechanism for plate motion: Tectonic plates are large piece of the lithosphere broken into sections. Plates can be made out of continental or oceanic crust and can be convergent, divergent, or transform. The main mechanism that drives the movement of the plates is convection currents. 4. Plate Boundaries: Types: Convergent: At convergent boundaries two pieces of Earth’s crust (it can be Continental vs.

Continental, Continental vs. Oceanic, or Oceanic vs. Oceanic) Collide. * Divergent: When two pieces of crust pull away from each other. * Transform: When two pieces of crust slide past each other.

Features created at each: * Convergent: Trenches, Continental and Island Volcanic Arcs, Mountain Ranges and Subduction Zones * Divergent: Rift Valleys, Seafloor Spreading, And Rifts. * Transform: Fracture Zones. (Crust is neither created nor destroyed) Oceanic-oceanic convergence Oceanic-continental convergenceContinental-continental convergence Transform Boundary Divergent Boundaries 5. Earthquakes – Faults, focus, epicenter, elastic rebound (explain ; relate each to each other) an earthquake occurs in a fault in Earth’s crust. A ripple effect then continues outward from the focus.

On land the place that gets direct impact from the earthquake is the epicenter because it’s the location directly above the focus. Elastic Rebound occurs when built up tension in strained rocks is suddenly released, this can also cause Earthquakes. 6. Measuring Earthquakes: Techniques: * Modified Mercalli Intensity Scale Richter Scale * Moment Magnitude: Amount of displacement that occurs along a fault zone. a.

Locating epicenters: to locate an epicenter you must use a time travel graph: -To do this you must first determine the interval between the first P and S waves, and then find the equivalent time spread between the S and P wave curves. The greater the interval between the first P wave and the first S wave, the greater the distance to where the Earth Quake originated. b. Prediction? Earthquakes can be predicted by Reviewing data collected from seismographs and the locations in which previous Earthquakes occurred. You can tell where an Earthquake may happen by looking for a location on a fault. D.

Minerals 1. Requirements of being a mineral: The requirements of being a mineral are as follows. * Must be a solid * Must form naturally * Must be organic * Must have a specific and unique chemical formula * Must have an orderly arrangement of atoms or molecules 2. Physical characteristics: * Crystal Form – cubic, rectangular prism, prism * Color * Luster – Shine/ Ability to reflect light * Texture (ex. Greasy, sandy) * Density, Mass, and Volume * Cleavage – Breakage pattern Streak – Color of mineral’s pattern * Hardness – Moh’s Hardness Scale 1-10 * Special Properties: * Magnetism * Odor * Taste * Conductivity Tests: You can test the streak with a streak plate or the hardness with anything as hard as your fingernail to the hardness of glass. You can also smell or taste the mineral to try and find any distinctive properties that will help you figure out what mineral it is.

3. Mineral Classification in families: * Silicate * Carbonate * Oxide * Sulfide * Sulfate * Halide E. Igneous Rocks and Volcanoes 1. Bowen’s Reaction SeriesMAGMA TEMPERATURE HOTTEST PLAGIOCLASE FELDSPAR OLIVINE

PYROXENE AMPHIBOLE BIOTITE POTASSIUM FELDSPAR MUSCOTIVE MICA QUARTZ COLDEST 2. Mafic vs.

Felsic a. Differences in composition and characteristics: MAFIC MINERALS| FELSIC MINERALS | Contain metals | Tend to contain lots of silicon and oxygen| Have a high density| Low density| Are dark colors | Are light colors| Form before felsic minerals| Form after mafic minerals | b. How mafic vs. elsic determines volcanic behavior: Viscosity plays a big role in the style of which a volcano erupts in. If magma is felsic it's very viscous and is not very fluid at all it's chunky and slow moving after an eruption.

If a volcano contains mafic magma that volcano's eruption will have fast moving runny lava 3. Textures: a. How to distinguish them ; what textures show about environment of formation: textures can tell you how fast a mineral cooled, and whether it cooled above or below the surface. If a mineral has a Porphyritic texture you can tell it cooled slowly at first then more rapidly over time. If bubbles are seen in the mineral it has a Vesicular texture and now you know while forming gas bubbles got trapped in the cooling lava. 4.

Major types of volcanoes ; how they differ from each other There are 3 major types of volcanoes: * Cinder cones * Shield Volcano * Strato Volcano A cindercone is the smallest volcano and is composed of ejected lava fragments that harden while in flight and take on the appearance of cinders. Shield volcanoes are very long and short and tend to have runny " quiet" explosions where as strato-cones are extremely tall and powerful with huge explosions. F. Sedimentary Rocks ; Processes 1. Processes of sedimentary

rock formation: Weathering – rock breaks into smaller pieces or sediments from forces such as wind, rain, or freezing water. Deposition – When sediments are carried to other places by wind, running water, or gravity.

These sediments are then deposited they are graded by size and the larger piece settle out first. Erosion – The combination of weathering and movement that conditions the sediment further. Lithification – When sediments turn into rock. There are two processes in lithification; compaction and cementation. Compaction – Results from the pressure of overlying layers and reduces the amount of pore space.

(Decreases volume, increases density) Cementation – Occurs when dissolved minerals collect in pore spaces and crystallize, binding the sediments together to form a rock. There’s an increases of temperature at this time. Calcite and silicon are the most common binders. 2. 3 Types of Sedimentary Rocks: Clastic, Chemical, and Biochemical.

Chemical Sedimentary rocks can then be broken down into either Evaporates or Carbonates. 3. Composition: Clastic rocks are composed of solid bits of preexisting rocks. Chemical rocks can be formed when minerals fall into a solution mixed with chemicals, then the solution evaporates to form crystals or when rock bits and chemicals fall into a solution and form crystals. Biochemical rocks can fall into the category of either clastic or chemical but are mainly composed of remains of dead organisms or plant fragments.

4. Environments of deposition ; energy involved in those environments: The main three environments of deposition are continental, shoreline, and marine. It takes strong energy to transport gravel sized sediments or

greater. Environments with energy great enough to transport large sediments are fast streams, strong waves, and glaciers. Moderate energy is needed to transports sand sized particles. Environments with moderate energy are most rivers, winds, glaciers, beach waves and currents.

Finally, mud, silt, and clay sized particles can be moved by low energy environments such as floors of a river valley or the open ocean floor. 5. Formation ; Environment of formation: Sorting and Rounding When wind and water currents transport and naturally separate different densities and sizes of sediments, they are being sorted. How well the grains are sorted in a sedimentary rock can give you clues as to what type of rock it is. As the rock travels further from its source it becomes more and more rounded.

You can tell how far a rock traveled from its source by how rounded it is. If the rock is angular, you know the rock didn’t travel very far from its original source. G. Metamorphic Rocks 1. Types of metamorphism ; conditions for each: There are two main types of metamorphism; contact and regional. Contact metamorphism occurs when a molten igneous body comes into the area and increases the temperature of the rock.

Then, alterations occur along the edge of the intrusion (baking). Regional metamorphism occurs during mountain building because during this time the rocks are subjected to large scale deformation – Direct pressure and high temperatures. 2. Parent rocks, potential compositional changes and why: The mineral composition of a parent rock may be changed during metamorphism due to changing pressure, changing temperature or the chemical action of hydrothermal fluids. 3.

Textures: Foliated and non-foliated. a. How to distinguish them and what textures show about environment of formation: if a rock is foliated you can see the parallel alignment of the mineral crystals. If it has a layered appearance, it’s foliated. Non-foliated metamorphic rocks have no obvious layering and are mainly noted as having a crystalline, microcrystalline, sandy, or glassy texture whereas foliated metamorphic rocks are known to be glittery and metallic and having bands of alternating colors.

If a rock has a foliated texture you can tell it was formed in a high pressure environment, and if a rock is non-foliated it was probably formed in a high heat environment.