**Geology Learning Goals**

**Unit 1: Geology Basics & Scientific Method**

**How long will we be learning this?**

* ~ 1 week

**By the end of this unit you should be able to:**

* Locate all safety equipment in the laboratory and explain basic safety rules in the lab
* Describe & apply the steps of the scientific method
* Differentiate between a theory, law, and hypothesis
* Perform basic metric conversions
* Describe the characteristics and evolution of the earth in terms of the geosphere, hydrosphere, biosphere, atmosphere

**This is the vocabulary you should know:**

|  |  |  |  |
| --- | --- | --- | --- |
| Geology | Uniformitarianism | Accretionary heat | Radioactive decay |
| Hydrosphere | Atmosphere | Biosphere | Geosphere |
| Terrestrial Planet | Jovian Planet | Nebula | Theory |
| Law | Dependent variable | Independent variable | Control |
| Open system | Closed system | System |  |

**Geology Learning Goals**

**Unit 2: Matter & Minerals**

**How long will we be learning this?**

* ~ 2.5 weeks

**By the end of this unit you should be able to:**

* Describe how atoms serve as building blocks for all matter
* Apply the periodic table to determine the properties of an element and types of minerals
* Explain the geological processes that result in mineral formation
* Distinguish between the physical and chemical properties of minerals (luster, color, cleavage, fracture, Moh’s Hardness, Streak, specific gravity, acidic, magnetic, malleable)
* Identify unknown minerals based on properties
* Analyze the structure and geometry of crystals and classify minerals as silicates, native elements, carbonates, suflates, oxides, sulfides, or halides
* Identify common uses of minerals

**This is the vocabulary you should know:**

|  |  |  |  |
| --- | --- | --- | --- |
| Atom | Proton | Neutron | Electron |
| Compound | Element | Periodic table | Group |
| Period | Reactive | Gas | Metals |
| Nonmetals | Solvent | Mineralloid | Polymorph |
| Crystalline | Precipitate | Luster | Hardness |
| Streak | Cleavage | Fracture | Moh’s Hardess |
| Specific gravity | Density | Malleable | Tetrahedron |
| Single chain | Double chains | Sheets | Olivine |
| Ferromagnetism | Pyroxene | Amphibole | Mica group |
| Clay minerals | Feldspar | Quartz |  |

**Geology Learning Goals**

**Unit 3: Rock Cycle & Igneous Rocks**

**How long will we be learning this?**

* ~ 2 weeks

**By the end of this unit you should be able to:**

* Explain the rock cycle and identify missing steps when given a chart
* Differentiate between rocks and minerals
* Indentify and describe the three types of rocks
* Describe how each rock type is formed
* Distinguish between intrusive and igneous rocks
* Distinguish igneous rocks based on chemical composition and textures
* Identify unknown igneous rocks
* Use Bowen series reaction chart to predict types of igneous rock formed
* Distinguish between mafic and felsic magmas

**This is the vocabulary you should know:**

|  |  |  |  |
| --- | --- | --- | --- |
| Rock | Rock cycle | Sedimentary | Sediments |
| Metamorphic | Igneous | Weathering | Erosion |
| Magma | Lava | Compaction | Cementation |
| External | Internal | Extrusive | Intrusive |
| Coarse | Phaneritic | Fine | Aphanitic |
| Glassy | Porphyritic | Felsic | Andesitic |
| Mafic | Ultramafic | Viscosity |  |

**Geology Learning Goals**

**Unit 4: Weathering & Sedimentary Rocks**

**How long will we be learning this?**

* ~ 1.5 weeks

**By the end of this unit you should be able to:**

* Differentiate between erosion, mechanical weather, and chemical weathering
* Identify examples of mechanical and chemical weathering
* Predict how the rate of weathering will be influenced by rock characteristics and climate
* Explain how sedimentary rocks can be formed
* Identify that sedimentary rocks make up most of Earth’s surface
* Distinguish and classify sedimentary rocks based on their composition, clast size, and texture
* Identify sedimentary rock features such as stratification, fossils, graded bedding, ripple marks, and mud cracks

**This is the vocabulary you should know:**

|  |  |  |  |
| --- | --- | --- | --- |
| Erosion | Weathering | Mechanical weathering | Chemical weathering |
| Frost wedging | Unloading | Burrowing | Unfolding |
| Exfoliation | Root penetration | Oxidizing | Spheroidal weathering |
| Differential weathering | Clast | Strata | Clastic sedimentary |
| Chemical sedimentary | Biochemical sedimentary | Conglomerate | Breccias |
| Limestone | Coquina | evaporites |  |

**Geology Learning Goals**

**Unit 5: Metamorphic Rocks**

**How long will we be learning this?**

* ~ 1 weeks

**By the end of this unit you should be able to:**

* Compare and contrast contact and regional metamorphism
* Explain what conditions can lead to metamorphism
* Predict and describe gradational metamorphism based on index minerals and metamorphic rock types
* Differentiate between foliated and non-foliated metamorphic rocks
* Classify metamorphic rocks based on their texture & composition
* Identify the properties of metamorphic rocks such as gneiss, marble, schist, slate, and quartzite

**This is the vocabulary you should know:**

|  |  |  |  |
| --- | --- | --- | --- |
| Metamorphism | Contact metamorphism | Regional metamorphism | Recrystallization |
| Hydrothermal solutions | Lithostatic pressure | Tectonic pressure | Protolith |
| Low-grade metamorphism | High-grade metamorphism | Intermediate-grade metamorphism | Foliated |
| Non-foliated | Marble | Slate | Gneiss  |

**Geology Learning Goals**

**Unit 6: Earth’s Interior & Plate Tectonics**

**How long will we be learning this?**

* ~ 1.5 weeks

**By the end of this unit you should be able to:**

* Differentiate between different layers of earth’s interior based on properties such as composition, thickness, and temperature
* Describe the major evidence that supports the theory of continental drift and plate tectonics
* Identify and differentiate between different types of plate boundaries
* Explain how convection currents provide the driving force for plate movement
* Explain actions that occur at plate boundaries
* Differentiate between mechanisms of plate motion

**This is the vocabulary you should know:**

|  |  |  |  |
| --- | --- | --- | --- |
| Crust | Oceanic crust | Continental crust | Lithosphere |
| Asthenosphere | Mantle | Lower mantle | Upper mantle |
| Outer core | Inner core | Core | Pangaea  |
| Divergent | Convergent | Transform fault | Constructive boundary |
| Destructive boundary | Earthquakes | Volcanoes | Mountains |
| Subduction zones | Rift valley | Trenches | Seafloor spreading |
| Oceanic ridges | Slab-pull | Ridge-push | Convection currents |

**Geology Learning Goals**

**Unit 7: Crustal Deformations**

**How long will we be learning this?**

* ~ 2 weeks

**By the end of this unit you should be able to:**

* Identify and describe factors that affect deformation like temperature, pressure, rock type, and time
* Explain the difference between strain and stress
* Classify folds as anticlines, synclines, or monoclines and explain how each is formed
* Identify a sequence of rock from oldest to youngest in types of folds
* Classify and differentiate between types of faults (normal, reverse, thrust, and strike-slip) and explain the difference between a fault and joint
* Classify types of mountains based on formation and plate boundaries involved (folded, fault-block, uplifted)
* Explain principles of isostasy ans isostatic adjustment

**This is the vocabulary you should know:**

|  |  |  |  |
| --- | --- | --- | --- |
| Deformation | Brittle | Ductile | Stress |
| Strain | Tensional stress | Compressional stress | Shear stress |
| Fold | Anticline | Monocline | Syncline |
| Fault | Joint | Normal fault | Reverse fault |
| Thrust fault | Strike-slip fault | Graben | Horst |
| Accrectionary wedge | Terrane | Folded mountains | Fault block mounts |
| Uplifted mountains | Isostasy | Isostatic adjustment |  |

**Geology Learning Goals**

**Unit 8: Intrusive Igneous Activity & Volcanoes**

**How long will we be learning this?**

* ~ 2.5 weeks

**By the end of this unit you should be able to:**

* Differentiate between intrusive igneous plutonic bodies like sills, dikes, laccoliths, and batholiths
* Compare and contrast the three main types of volcanoes
* Differentiate between different types of volcanic magma and other features of volcanoes
* Identify different ways magma can form
* Differentiate between different types of pyroclastic materials
* Predict the effects of a volcanic eruption on an area and devise a hypothetical evacuation plan

**This is the vocabulary you should know:**

|  |  |  |  |
| --- | --- | --- | --- |
| Pluton | Sill | Batholiths | Dike |
| Laccolith | Pipes | Volcanic neck | Shield |
| Stratovolcano | Composite volcano | Cinder cone | Crater |
| Caldera | Vent | Fumaroles | Basaltic lava |
| Andesitic lava | Rhyolitic lava | Pahoehoe | Aa |
| Pyroclastic material | Nuee ardent | Lahar | Lava plateau |
| Lava dome | Fissures | Pumice | Cinders |
| Lapili | Blocks | bombs |  |

**Geology Learning Goals**

**Unit 9: Earthquakes**

**How long will we be learning this?**

* ~ 2.5 weeks

**By the end of this unit you should be able to:**

* Identify features of earthquakes (focus, epicenter, foreshock, main shock, aftershock) and explain why they occur based on the Elastic Rebound hypothesis
* Differentiate between surface, primary, and secondary waves
* Locate the epicenter of an earthquake when given P&S arrival times of 3 different seismic stations
* Locate the epicenter of an earthquake when the distance to epicenter from 3 locations
* Differentiate between earthquake intensity and magnitude and the scales that are associated with each
* Identify factors that lead to destruction from earthquakes and predict ways to reduce damage from earthquakes
* Explain the dangers, long term problems, and possible solutions to areas that are greatly affected by earthquake damage

**This is the vocabulary you should know:**

|  |  |  |  |
| --- | --- | --- | --- |
| Focus | Epicenter | Main shock | Aftershock |
| Foreshock | Surface wave | L wave | Primary wave |
| Secondary wave | Seismograph | Seismogram | Intensity |
| Magnitude | Moment magnitude | Richter Scale | Mercali Scale |
| Liquefaction | tsunami |  |  |