**Student worksheet 1: Think/Pair/Share**

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| --- | --- | --- | --- |
| **Question** | **What I thought** | **What my partner thought** | **What we will share** |
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**Student worksheet 2: The formation of sedimentary rocks**

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| --- | --- | --- |
| **Process** | **How does it occur?** | |
| **In the model** | **in real life** |
| **Weathering** |  |  |
| **Erosion** |  |  |
| **Deposition (sedimentation)** |  |  |
| **Compaction and cementation** |  |  |

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| To complete this worksheet you will need access to books and/or the internet. Some useful web links are listed below.  <https://www.geolsoc.org.uk/ks3/gsl/education/resources/rockcycle/page3446.html>  <https://www.learner.org/interactives/rockcycle/change3.html> This interactive will not work on an iPad.  <https://www.learner.org/interactives/rockcycle/types.html> This interactive will not work on an iPad. |

1. Write a description of sedimentary rocks.

1. Give two examples of sedimentary rocks.

1. Summarise the types of weathering in the table below.

|  |  |  |  |
| --- | --- | --- | --- |
| **Type of weathering** | **Definition** | **Where does it occur?** | **How does It occur?** |
| Physical weathering |  |  |  |
| Chemical weathering |  |  |  |
| Biological weathering |  |  |  |

1. Describe the four methods by which erosion can occur.

|  |  |  |  |
| --- | --- | --- | --- |
| Gravity |  | Water |  |
| Wind |  | Ice |  |

**ANSWERS Student worksheet 2: The formation of sedimentary rocks**

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| --- | --- | --- |
| **Process** | **How does it occur?** | |
| **In the model** | **in real life** |
| **Weathering** | Grated the crayons onto the paper towel. | Rocks are broken down at, or below, the Earth’s surface by physical, chemical or biological means. |
| **Erosion** | Picked up crayons. | Wind, water, gravity or ice move weathered particles to new locations. |
| **Deposition (sedimentation)** | Dropped crayon shavings onto aluminium foil and folded into a packet. | The sediment carried by wind, water, or ice is laid down, usually in a riverbed or ocean. |
| **Compaction and cementation** | Put the packet between my hands and applied pressure. | Sediments buried deep in the ground are placed under pressure squashing the grains together.  Minerals from water bind the grains together. |

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1. Write a description of sedimentary rocks.

Sedimentary rocks are formed when deposits from weathering and erosion are compacted and cemented together.

1. Give two examples of sedimentary rocks.

conglomerate, limestone, sandstone, mudstone

1. Summarise the types of weathering in the table below.

|  |  |  |  |
| --- | --- | --- | --- |
| **Type of weathering** | **Definition** | **Where does it occur?** | **How does It occur?** |
| Physical weathering | Physical weathering is caused by physical changes such as changes in temperature, freezing and thawing, and the effects of wind, rain and waves. | Where there is little soil and few plants e.g. tundra, mountains and deserts. | 1. Melting and freezing (freeze-thaw) Occurs on mountains or tundra. 2. Expansion and contraction of the surface layer of rocks baked by the sun (exfoliation). Occurs in hot deserts. 3. Abrasive action of wind and movement of waves. |
| Chemical weathering | Chemical weathering is weathering by chemicals, such as water, reacting with mineral grains in rocks. | Warm, damp climates have the best conditions for chemical weathering. | 1. Solution—removal of rock in solution by acidic rainwater. In particular, limestone is weathered by rainwater containing dissolved CO2. 2. Hydrolysis—the breakdown of rock by acidic water to produce clay and soluble salts. 3. Oxidation—the breakdown of rock by oxygen and water, often giving iron-rich rocks a rusty-coloured weathered surface. |
| Biological weathering | Biological weathering is caused by animals and plants wearing away rocks. | Anywhere there are plants and animals looking for food, water or shelter. | Trees put down roots through joints or cracks in the rock.  Animals boring into rocks.  Bacterial, algae and lichens breakdown the rocks the live on. |

1. Describe the four methods by which erosion can occur.

|  |  |  |  |
| --- | --- | --- | --- |
| Gravity | The movement of loose rock and soil due to gravity. For example, soil creep, rock falls, landslips, mudflows | Water | Flowing water and waves in rivers and oceans pick up and transport sediment. |
| Wind | Wind picks up fine particles of soil and transports them to a new location. For example, dust storms, sand dunes. | Ice | Glaciers move slowly down valleys eroding the surface of the Earth. |

**Student worksheet 3: The formation of metamorphic rocks**

|  |  |  |
| --- | --- | --- |
| **Process** | **How does it occur?** | |
| **In the model** | **In real life** |
| **Pressure** |  |  |
| **Heat** |  |  |

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| To complete this worksheet you will need access to books and/or the internet. Some useful web links are listed below.  <https://www.geolsoc.org.uk/ks3/gsl/education/resources/rockcycle/page3446.html>  <https://www.learner.org/interactives/rockcycle/change3.html> This interactive will not work on an iPad.  <https://www.learner.org/interactives/rockcycle/types.html> This interactive will not work on an iPad. |

1. Write a description of metamorphic rocks.

1. Give two examples of metamorphic rocks.

**Student worksheet 3: The formation of metamorphic rocks**

|  |  |  |
| --- | --- | --- |
| **Process** | **How does it occur?** | |
| **In the model** | **In real life** |
| **Pressure** | Wrapped sedimentary crayon and place it under my foot and applied pressure. | Pressure caused by being buried deep underground and from movements in the Earth’s crust. |
| **Heat** | Placed the crayon in a foil tray and placed it in a beaker of hot water until it just started to melt. | Metamorphic changes do not involve melting (higher temperatures are needed for that), nor any change to the chemical composition of the rock. However, mineral grains (like quartz and clay) react chemically with each other to form new minerals (like mica and garnet) and new rock textures. |

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1. Write a description of metamorphic rocks.

Metamorphic rocks are rocks that have been changed (metamorphosed) as a result of intense heat and/or pressure within the Earth’s crust.

1. Give two examples of metamorphic rocks.

slate, gneiss, schist, marble, quartzite

**Student worksheet 4: The formation of igneous rocks**

|  |  |  |
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| **Process** | **How does it occur?** | |
| **In the model** | **In real life** |
| **Melting** |  |  |
| **Cooling** |  |  |

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| To complete this worksheet you will need access to books and/or the internet. Some useful web links are listed below.  <https://www.geolsoc.org.uk/ks3/gsl/education/resources/rockcycle/page3446.html>  <https://www.learner.org/interactives/rockcycle/change3.html> This interactive will not work on an iPad.  <https://www.learner.org/interactives/rockcycle/types.html> This interactive will not work on an iPad. |

1. Write a description of igneous rocks.

1. Igneous rocks can be divided into two groups, depending on where they are formed. Summarise these two groups in the table below.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Group** | **Where they are formed** | **How fast they cool** | **Size of the crystals** | **Two examples** |
| Intrusive (Plutonic) |  |  |  |  |
| Extrusive (Volcanic) |  |  |  |  |

1. How does the cooling rate of the molten rock affect the size of the crystals formed?

**Student worksheet 4: The formation of igneous rocks**

|  |  |  |
| --- | --- | --- |
| **Process** | **How does it occur?** | |
| **In the model** | **In real life** |
| **Melting** | Heated crayon in foil tray until all colours had mixed. | The rock of the Earth’s mantle layer begins to melt in areas where it is disturbed. For example, mid ocean ridges, ocean edges, mountain belts. |
| **Cooling** | Cooled molten crayon using one of the following methods:   * poured onto ice * poured into ice water * poured into warm water | The rate at which magma cools controls the grain size of igneous rocks. More rapid cooling produces finer-grained rocks. |

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| To complete this worksheet you will need access to books and/or the internet. Some useful web links are listed below.  <https://www.geolsoc.org.uk/ks3/gsl/education/resources/rockcycle/page3446.html>  <https://www.learner.org/interactives/rockcycle/change3.html> This interactive will not work on an iPad.  <https://www.learner.org/interactives/rockcycle/types.html> This interactive will not work on an iPad. |

1. Write a description of igneous rocks.

Igneous rocks are mostly crystalline (made up of interlocking crystals), and usually hard to break. They are formed from molten rock called magma.

1. Igneous rocks can be divided into two groups, depending on where they are formed. Summarise these two groups in the table below.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Group** | **Where they are formed** | **How fast they cool** | **Size of the crystals** | **Two examples** |
| Intrusive (Plutonic) | Inside the crust | Slowly | Large | Granite, gabbro |
| Extrusive (Volcanic) | On the Earth’s surface | Quickly | Small | Basalt, pumice |

1. How does the cooling rate of the molten rock affect the size of the crystals formed?

The faster the molten rock cools, the smaller the crystals/The slower the molten rock cools, the larger the crystals.