**Earth and Space Science – Geology (M)**

**Student Name: \_\_\_\_Answers\_\_\_\_**

The following task consists of two parts. You will complete this task across two periods.

|  |  |  |
| --- | --- | --- |
| **Section** | **Activity** | **Marks available** |
| **A** | Looks at the theory behind the rock cycle. Answer the questions in the spaces provided. | **/30** |
| **B** | Is a practical assessment. Follow the instructions and write your answers in the space provided. | **/24** |
|  | TOTAL MARKS | **/54** |

**Section A: Rock Cycle Theory \_\_\_\_\_\_\_\_\_ /30 Marks**

The Rock Cycle can be displayed as a diagram that shows the slow, continuous process of rocks changing from one type to another.

A trip through the rock cycle takes millions of years.

1. Diagram, schematic

   Description automatically generatedComplete the rock cycle diagram below.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**IGNEOUS**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Sedimentary**

**Metamorphic**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. In each of the boxes, enter the type of rock. (3 marks)

Choose from the following words:

**Igneous Sedimentary Metamorphic**

1. Complete the table by labelling each of the processes indicated by the arrow in the diagram above. Choose from the following words: (5 marks)

|  |  |  |
| --- | --- | --- |
| *Weathering and erosion* | *Compaction* | *Cooling* |
| *Heating and Melting* | *Pressure* |  |

|  |  |
| --- | --- |
| Coloured arrow | Name of process |
| Icon  Description automatically generated | **Pressure** |
| Icon  Description automatically generated | **Heating or Melting** |
| Icon  Description automatically generated | **Weathering & Erosion** |
| Icon  Description automatically generated | **Cooling or Condensing** |
| Icon  Description automatically generated | **Compaction and Cementation** |

1. Label the following rocks with either metamorphic, sedimentary or igneous.   
    (5 marks)





A close-up of a bug

Description automatically generated with low confidence

**sedimentary**

**sedimentary**

**Igneous**



**Igneous**

**metamorphic**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Match the following words with their definition by drawing a line. (7 marks)

|  |  |
| --- | --- |
| **Word** | **Definition** |
| Magma | Liquid rock that can be found on the surface of the Earth in areas like volcanoes |
| Intrusive crystals | Breaking down rock into smaller pieces |
| Extrusive crystals | Liquid rock that is beneath the surface of the Earth |
| Lava | Crystals that have cooled while inside the Earth |
| Weathering | Carrying sediments away to another place |
| Minerals | Crystals that have cooled while on the outside of the Earth |
| Erosion | Building blocks of rocks |

1. An archaeologist was on a dig in Australia. She came across a number of fossils as shown below.

![Diagram

Description automatically generated]()

Most recent layer created

1. Which fossil is the oldest? (1 mark)

**D**

1. Explain why you gave your answer in part a). (1 mark)

**It is the bottom layer (first layer created)**

1. What rock type (metamorphic/sedimentary/or igneous) would she have been digging in? Why? (2 marks)

**Sedimentary (1)**

**Because it has layers (1)**

Use the following table to answer the following questions.

|  |  |  |
| --- | --- | --- |
| **Mineral** | **Hardness** | **Common object** |
| Talc | 1 |  |
| Gypsum | 2 | Fingernail |
| Calcite | 3 | Piece of copper |
| Fluorite | 4 | Iron nail |
| Apatite | 5 | Glass |
| Feldspar | 6 | Steel file |
| Quartz | 7 | Streak plate |
| Topaz | 8 | Scratches quartz |
| Corundum | 9 | Scratches topaz |
| Diamond | 10 | Scratches all common materials |

1. What mineral is the hardest mineral? (1 mark)

**Diamond**

b) What mineral is the softest mineral? (1 mark)

**Talc**

c) Name two minerals that will scratch topaz. (2 marks)

**corundum – 1 and diamond - 1**

1. Name two objects that will scratch fluorite. (2 marks)

**Glass/steel file / streak plate / diamond**

**Section B: Rock Cycle Practical \_\_\_\_\_\_\_\_\_ / 26 Marks**

**Student Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Materials:**

* 1 Cube of sugar
* 10 cm2 Foil
* 10 cm2 White paper
* Candle
* Hand Lens
* Wooden test tube peg

|  |
| --- |
| **Step 1: Examine the sugar cube with a hand lens** |

|  |  |  |
| --- | --- | --- |
| **Observations -** Describe what you see by completing the boxes below. | | **\_\_\_ / 3 Marks**  ½ mark each |
| Grain size | approx. 1mm or less |  |
| Grain shape | Cubish |  |
| How close the grains are? | Very close together |  |
| Are the grains cemented together? | yes |  |
| Overall shape of the sample | Cube |  |
| State of Matter (Solid, liquid, gas) | solid |  |

|  |  |
| --- | --- |
| **Conclusion - Relate your observations to the Rock Cycle** | **\_\_\_ / 3 Marks** |
| What rock type does this represent?  Sedimentary  Explain why.  Individual grains (rocks) (1) cemented together (1) | \_\_\_ / 1 Mark  \_\_\_ / 2 Marks |

**Step 2: Place sugar cube on white paper square and use the back of the tongs to crush part of the cube into a powder.**

|  |  |  |
| --- | --- | --- |
| **Observations -** Describe what you see by completing the boxes below. | | **\_\_\_ / 3 Marks**  ½ mark each |
| Grain size | Less than 1mm |  |
| Grain shape | irregular |  |
| How close the grains are? | Far apart, spread out |  |
| Are the grains cemented together? | no |  |
| Overall shape of the sample | irregular |  |
| State of Matter (s,l,g) | S |  |

**Step 3: Fold the edges of the foil over to make a small bowl. Pour the crushed sugar into the foil bowl.**

|  |  |
| --- | --- |
| **Conclusion - Relate your observations to the Rock Cycle** | **\_\_\_ / 2 Marks** |
| What process in the Rock Cycle does the **movement** from place to place, of the crushed sugar represent?  Erosion  Explain why and how:  Moving the particles from one place to another | \_\_\_ / 1 Mark  \_\_\_ / 1 Mark |

**Step 4: Use the metal tongs to hold the bowl over the candle flame. Write down what your observations are as the sugar begins to melt.**

|  |  |
| --- | --- |
| **Observation - Relate your observations to the Rock Cycle** | **\_\_\_ / 3 Marks** |
| What process in the Rock Cycle does this replicate?  Melting  Explain **how** this comes about in the Rock Cycle:  Rock is forced beneath the crust into the mantle (1) where temperatures are high enough to melt rock (1) | \_\_\_ / 1 Mark  \_\_\_ / 2 Marks |

**Step 5: Set the foil bowl aside and let the sugar cool and harden. Write down what your observations are as the liquid begins to cool.**

|  |  |  |
| --- | --- | --- |
| **Observations -** Describe what you see by completing the boxes below. | | **\_\_\_ / 1 Mark**  ½ mark each |
| Grain present? | No |  |
| Overall shape of the sample | Irregular, shape of the container |  |

|  |  |
| --- | --- |
| **Observation - Relate your observations to the Rock Cycle** | **\_\_\_ / 3 Marks** |
| What process in the Rock Cycle does this replicate?  Cooling of magma  Explain **how** this comes about in the Rock Cycle:  When magma is forced to the surface of the Earth and becomes lava it cools, becoming hard  Igneous rock is formed | \_\_\_ / 1 Mark  \_\_\_ / 2 Marks |

**Step 6: Break the hardened sugar into pieces by crumpling the cooled foil a little. Write down what your observations are as the sugar begins to break up.**

|  |  |
| --- | --- |
| **Observation - Relate your observations to the Rock Cycle** | **\_\_\_ / 6 Marks** |
| What process in the Rock Cycle does this represent?  Weathering  What is produced from this process in the Rock Cycle?  Sediments  What do you notice about what you did in step 2, and what you did in step 6?  Same action, both produce sediments  What does this say about the rock cycle and the paths a rock can take?  The rock cycle is a continuous cycle  Rocks can move through different paths in the cycle | \_\_\_ / 1 Mark  \_\_\_ / 1 Mark  \_\_\_ / 2 Marks  \_\_\_ / 2 Marks |