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②

A Show part of the Earth's crust and the location where some Rock cycle processes take place.

a) Rock is broken by frost, rain and sun at A. What name is given to this process?

Ans The name given to this process is known as "Weathering". Frost wedging is the freezing and thawing of water in cracks.

b) How is sediment grains in a river changed during transport from A to B? State two differences in the likely appearance in the grains.

Ans The Prolonged transport of sediment by water and wind current affect the particles in two ways.

(2)

- 1) reduction in particle size
- 2) rounding of originally angular fragments.

The greater the distance of transport, the smaller and more rounded the grains.

Q How do loose sediments at C become changed into solid rock?

Ans Lithification is the process in which sediments compact under pressure, expel connate fluids, and gradually become solid rock. Essentially, lithification is a process of porosity destruction through compaction and cementation.

d) Rocks that are deeply buried in the Earth's crust may undergo metamorphism. Describe two changes that happen in rocks during metamorphism and explain part 1)?

Metamorphic rocks:

Rock that was once form but has changed to another under the influence of heat, pressure or some other agent without passing through a liquid phase.

1) Contact Metamorphism:

A type of metamorphism in which the mineralogy and texture of a body of rock are changed by exposure to the pressure and extreme temperature associated with a body of intruding magma.

2) Regional Metamorphism:

A type of metamorphism in which the mineralogy and



Texture of rocks are changed over a wide area by deep burial and heating associated with the large-scale forces of plate tectonics.

### Point 1) Explanation:

Rocks are formed on Earth as igneous, sedimentary or metamorphic rocks. Igneous rocks form when rocks are heated to the melting point which forms magma. Sedimentary rocks are formed from the cementing together of sediments or from the compaction of sediments, or from the recrystallization of new mineral grains which are larger than the original crystals.

Metamorphic rocks form from heat and pressure changing the original or parent rock can be either sedimentary or metamorphic rock.

B Figure : 2

Below shows the size and shape of typical sediment particles from the deposit produced.

- 1 clay mud
- 2 Rounded pebbles and sand
- 3 Sloping sand layers
- 4 Angular boulders

i) In Each box , write down the most likely number from the deposit produced column in the table .

The diagram shows three types of sediment particles, each with a handwritten number in a box below it:

- An angular boulder (irregular shape) with a box containing the number **4**.
- A rounded pebble (smooth, oval shape) with a box containing the number **2**.
- A small rounded pebble (smooth, oval shape) with a box containing the number **3**.



ii) In your own words explain how sediment particles change as they are transported downstream by a river.

Ans Sediment transport is the movement of organic and inorganic particles by water. In general the greater the flow the more sediment that will be conveyed. Water flow can be strong enough to suspend particles in the water column as they move downstream or simply push them along the bottom of a waterway. Transported sediment may include mineral matter, chemical and pollutants and organic material.

C Figure: 3

Show the structure of a volcano and the rock layers beneath.

i) What type of volcano is shown in the figure by shape and if eruption is more often which category it fits?

Ans Strato volcanoes show interlayers of lava flows and typically up to 50 percent pyroclastic material. which is why they some time called composite volcanoes. Pyroclastic flow are high density mixtures of hot dry rock fragments and hot gases that move from vent erupted high speeds.

ii) The eruption shown in figure 3 is producing an "Ash column" the rises thousand of meters above the volcano summit.

a) Explain how gases trapped in the magma help produce the ash column.



Ans An eruption column consists of hot volcanic ash emitted during an explosive volcanic eruption.

The ash forms a column rising many kilometers into the air above the peak of the volcano. In most explosive eruptions, the eruption column may rise over 4000m, penetrating the stratosphere.

Gases in the magma gives explosive characters because of volume of gas expand with the pressure is reduced. composition of gases involve in magma are  $H_2O$  (water vapor),  $CO_2$  (carbon dioxide), sulfur, chloride and fluorine gases.

b) Many people around the world live close to volcanoes so when a volcano erupts, thousand of live may be at risk.

(9)

i) Suggest ONE sign that might indicate if a volcano is about to erupt.

Ans Before a volcano erupts, there is normally an increase in earthquakes and tremors near and under the volcano. These are caused by magma pushing upward through the rock under the volcano. The ground may crack open and allow steam to escape. Gases such as carbon dioxide and hydrogen sulfide, a gas that smells like eggs gone bad, frequently are present and in the area escape in seams along the mountain. Hot springs in the area around the volcano may appear or change in appearance and temperature. These all are the signs which indicates volcano is about to erupt.

ii) Suggest Two dangers that result from Ash fall near a volcano.

Ans

- 1) Damage of forest.
- 2) Damage of Buildings.

D) Answer the following questions?

i) In the table below are statements that refers to either weathering or Erosion. Complete the table by writing weathering or Erosion in the space provided.

iii

Ans

Breakdown of rock without it being moved	weathering
Wearing away of rock during transport of rock particles	Erosion
A process caused by wind, running water and moving ice	Erosion
An effect of plant roots growing in rock joints and fractures	weathering



ii) A statue was made from limestone. Rain makes limestone weather more quickly than sandstone. What substance in the rainwater causes this?

Ans Rain-water is naturally slightly acidic because carbon dioxide from the air dissolves in it.

Minerals in rocks may react with the rainwater causing the rock ~~user~~ to be weathered. Some types of rock are easily weathered by chemicals.

iii) Why do igneous rocks never contain fossils?

Ans Fossils are the ~~remains~~ or petrified remains of past lived organisms. These are organic matter that are covered by sediments. As igneous rocks are formed directly from lava in other words from magma from inner layers of earth so fossils are not found in igneous rocks.

iv) Granite takes much longer to cool deep underground than basalt lava at the Earth's surface. How and why is the size of the crystals in granite different from the size of the crystals in basalt?

Ans Granite is intrusive which means that the magma was trapped deep in the crust, and probably took a very long time to cool down enough to crystallize into solid rock. This allows the minerals which form plenty of time to grow, and results in a coarse-textured rock in which individual mineral grains are easily visible. igneous rocks are formed by the crystallisation of magma. The difference between granites and basalt is in silica content and their rates of cooling. A basalt is about 53%  $\text{SiO}_2$ , where as granite is 73%. intrusive, slowly cooled inside the crust.

v) Describe one process that might be responsible for producing the large, angular, poorly sorted fragments in the scree sediment collecting at the bottom of the cliff?

Scree is a collection of broken rock mountain at the base of coars mountain cliffs, volcanoes or valley shoulders that has accumulated through periodic rock fall from adjacent cliff faces. Land forms associated with these materials are often called talus deposits. Talus deposits typically have a concave upwards form, while the maximum inclination corresponds to the angle of repose of the mean debris size.