

Rocks and Geology 1

You must be able to:

- Understand the difference between porous and non-porous rocks
- Identify the three types of rock: sedimentary, igneous and metamorphic
- Understand how the different types of rock form.

What are Rocks?

- All rocks are made up of grains and every grain is a **mineral**.
- The grains in the rock can be different shapes, sizes and colours, and how they fit together decides whether it will be a hard or soft rock.
- **Porous** rocks with round grains have spaces or gaps. Water gets into them and the rock is often soft and crumbly.
- **Non-porous** rocks have tightly fitting grains and water cannot get in.

Key Point

To name a rock and understand how it is formed a geologist asks: 'What minerals does it contain, and how are the minerals held together?'

Types of Rock

Sedimentary (7% of the earth's crust)

- **Sedimentary** rocks are formed from deposits originally from older rocks and living organisms:
 - 1 Rocks (could be igneous, metamorphic or other sedimentary rocks) are weakened by weathering and worn away by erosion.
 - 2 Worn away material is transported away by ice, gravity, wind, sea and rivers.
 - 3 Material being transported might be as fragments or can be dissolved in water.
 - 4 Transported material is eventually deposited (laid down) in shallow seas, lakes or hollows in the landscape. These deposits form beds of sediment (layers).
 - 5 Some beds might be the remains of living things. For example, coal beds are formed from the remains of trees.
 - 6 Beds of sediment are compacted (pressed and squeezed together) as the weight of sediment increases. In the end all the loose sediment is **lithified** (stratified) and cemented (joined) into solid rock.
This process can take millions of years.
- Examples: chalk, limestone, sandstone, shale, clay, coal, conglomerate, breccia.



Carboniferous sandstone

The sandy grains in this rock leave spaces between one another. It is soft, crumbly and porous. This specimen formed during the carboniferous period 299 to 358 million years ago and shows a fossilised fish.

Igneous (65% of the earth's crust)

- **Igneous** rocks are formed when **magma** cools and solidifies.
 - 1 The inside of the earth is very hot – hot enough, in fact, to melt rocks! Molten rock is called **magma**.
 - 2 Magma tends to rise upwards in the earth's crust. If it spills onto the crust it is called **lava**.
 - 3 As magma cools it forms igneous rocks.
 - 4 As magma cools its mineral crystals begin to grow.
 - 5 The slower the magma cools the bigger the crystals that grow.
 - 6 Igneous rocks are hard and **crystalline**. There are no obvious pores/spaces in igneous rocks.
- Examples: granite, gabbro, basalt, pumice, obsidian, volcanic ash

Key Point

Extrusive igneous rocks have cooled quickly outside the earth.
Intrusive igneous rocks have cooled slowly inside the earth.

Metamorphic (28% of the earth's crust)

- **Metamorphic** rocks are formed when heat and/or pressure cause rocks to change.
 - 1 Movements in the earth can cause rocks to be deeply buried, squashing them or moving them closer to molten magma.
 - 2 Heat and pressure cause the chemical elements in the original rock to react and re-form into new minerals.
 - 3 As metamorphism occurs, no elements are taken and none added; they are simply rearranged.
 - 4 Remember that metamorphic rocks do not form from melted rock – melting causes igneous rocks to form.
 - 5 The new minerals in metamorphic rocks have crystals that are arranged in layers.
 - 6 Metamorphic rocks can be formed from sedimentary or igneous rocks.
- Examples: marble, slate, schist, gneiss



Shap granite

The grains fit tightly together so this rock is hard and non-porous. This rock formed 354 to 417 million years ago.

Quick Test

1. Which type of rock tends to be softer – porous or non-porous?
2. Rearrange these terms into the correct order so they show the processes by which sedimentary rocks form: lithification / transportation / erosion / deposition.
3. What is molten rock called?
4. Which type of rock forms from melted rock?
 - a) sedimentary
 - b) igneous
 - c) metamorphic

Key Words

mineral
 porous and non-porous
 sedimentary
 lithified
 igneous
 magma and lava
 extrusive and intrusive
 crystalline
 metamorphic

Review Questions

Urbanisation

- 1 Define a HIC and a LIC. [2]
- 2 Which group of countries are experiencing rapid urbanisation now? [1]
- 3 What are push / pull factors? Give examples of both. [4]
- 4 Why did people start to move away from cities? [3]
- 5 Name **two** processes that illustrate this movement away from city centres. [2]
- 6 Name **four** characteristics of urban decline. [4]
- 7 What is urban regeneration? [3]
- 8 Define a megacity. [2]
- 9 Where are megacities growing most rapidly? [1]
- 10 Give **two** other names for shanty towns. [2]
- 11 What is meant by a 'grassroots' approach? [3]
- 12 What **three** areas must be considered when managing cities? [3]
- 13 How does street lighting help a city to be attractive? [2]
- 14 How can homes be energy efficient? [4]



Development

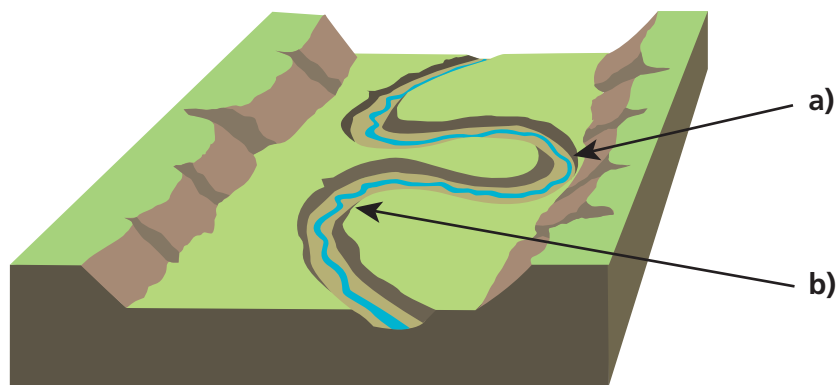
- 1 Which one of the following could be described as a developing country?
a) Ethiopia b) France c) Australia [1]
- 2 What do social indicators measure? [2]
- 3 Define life expectancy. [2]
- 4 Define GDP per capita. [2]
- 5 Give an example of a secondary industry. [1]
- 6 What does NIC stand for? [1]
- 7 Why are many LIC's in debt? [3]
- 8 Define the Brandt Line. [3]
- 9 What does HDI stand for? [1]
- 10 Name **four** of the Millennium Development Goals. [4]
- 11 What is 'tied aid'? [3]
- 12 Define sustainable development. [3]
- 13 Explain one benefit of Fairtrade for the farmer. [1]
- 14 Explain one benefit of Fairtrade for the local community. [1]



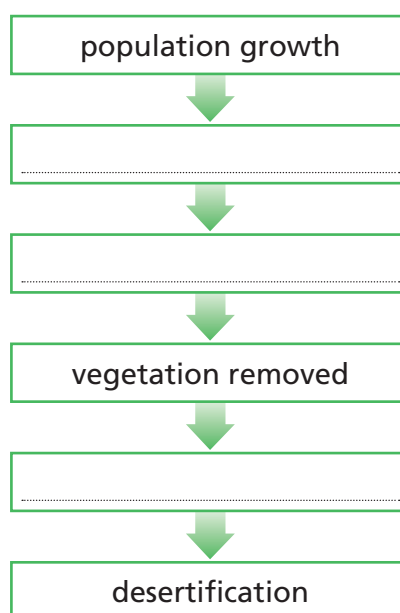
Practice Questions

Rivers and Coasts

- 1 Name the **three** processes that take place to shape the landscape around rivers and coasts. [3]
- 2 Describe the erosional process of abrasion. [2]
- 3 Name one common landform found in the upper course of a river. [1]
- 4 Name the feature below and identify the processes occurring at **a)** and **b)**. [3]

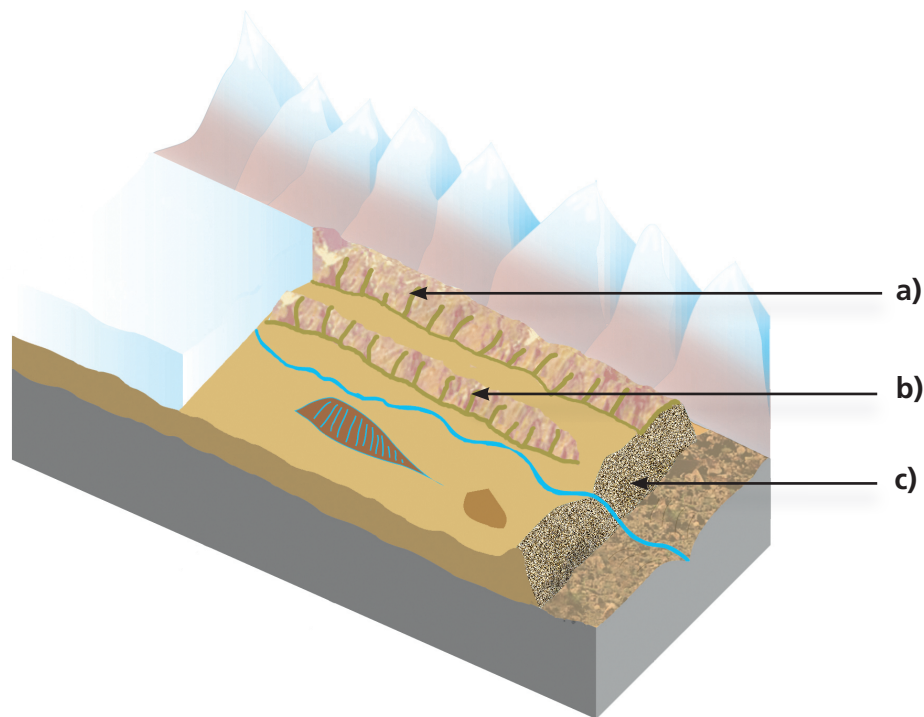


- 5 Explain what causes a river to flood its banks. [4]
- 6 Describe the formation of waves. [5]
- 7 Copy and complete the flow diagram to explain why an increasing population can contribute to desertification: [3]



Glaciation

- 1 Define what a glacier is. [2]
- 2 Name **three** places in which glaciers can be found. [3]
- 3 What was the Pleistocene? [1]
- 4 Describe how glaciers are formed including the following key terms in your description:
 - **accumulation**
 - **compacted**
 - **firn**
 - **advance**
 - **gravity.**
 [5]
- 5 Name the **three** main processes of glacial weathering and erosion. [3]
- 6 Name the **three** types of moraine labeled **a)**, **b)** and **c)** below: [3]



- 7 Explain **three** ways in which tourists can have a negative impact on glacial landscapes. [6]

Mixed Test-Style Questions

1 Why are visitor centres important in the protection of glacial landscapes?

2 What are the four main processes of erosion?

- a)
- b)
- c)
- d)

Mix it Up

- 3 Study the images below and describe the features that characterise a sustainably planned city.



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☐
6 marks
TOTAL
☐
14

Mix it Up

9