

GRADE 5 GEOGRAPHY: TERM 4

Contents

Minerals and mining in South Africa	2
Minerals that are non-renewable resources	2
Activity 1	3
The main minerals mined in South Africa and their uses	3
Activity 2	4
Coal as a non-renewable resource	5
How coal is formed	5
Uses of coal	6
Where mineral and coal mines are found in South Africa.....	7
Where people settle in South Africa	8
Mining and the environment.....	8
Ways of mining.....	8
Types of mining.....	9
How mining impacts on the environment.....	10
Activity 3	12
Mining and people	12
Difficulties of deep shaft mining.....	12
Health and safety risks that miners face.....	13
Activity 4	14
Rules to protect the health and safety of miners	15
Activity 5	15

GRADE 5 GEOGRAPHY

TERM 4

Minerals and mining in South Africa

Minerals that are non-renewable resources

The earth is made of minerals and rocks. If you pick up a rock it is made of lots of pieces, or particles, which are called minerals. Minerals were made when the earth was formed about 4,6 billion years ago.

The earth is made up of different layers. The layers are made up of different minerals. When major geological events happen, such as volcanic explosions, minerals are made or moved. When people dig up or mine minerals, new minerals will not be made in the place they were taken from. Minerals will slowly get used up. This is the reason why most minerals are called **non-renewable**. Once minerals such as gold, copper and platinum are taken out of a mine, they cannot be found there again. Plants are **renewable** because once you have used a plant, you can plant a seed in the same spot and, over time a new plant can grow again.



An erupting Volcano

DID YOU KNOW:

The salt that you put on your food is a mineral. People use sea water to make salt. Sea water is put into shallow pools. The sun evaporates the water, leaving the salt behind. New sea water is then put into the pool. This happens over a short period of time, about a month, thus we say that salt is renewable.



A Salt Mine

Activity 1

Making sugar

You will need sugar, a plate, a bottle, water and a spoon.

1. Mix 2 tablespoons of sugar in a small bottle with water. Pour water onto the plate so that the water covers the bottom of the plate.
2. Leave the plate on a windowsill in the sun for a few days and see the sugar crystals grow as the water is evaporated.

The main minerals mined in South Africa and their uses

South Africa has very large amounts of valuable minerals. It has the largest amount of the following minerals, in the world:

- chrome
- manganese
- titanium
- aluminium
- gold
- platinum
- uranium

This makes South Africa an important country. Mining is also very important to South Africa's economy. The minerals are mined from deep under the ground. Mining provides jobs for many people. The raw materials and products that are made from minerals are sold to other countries.

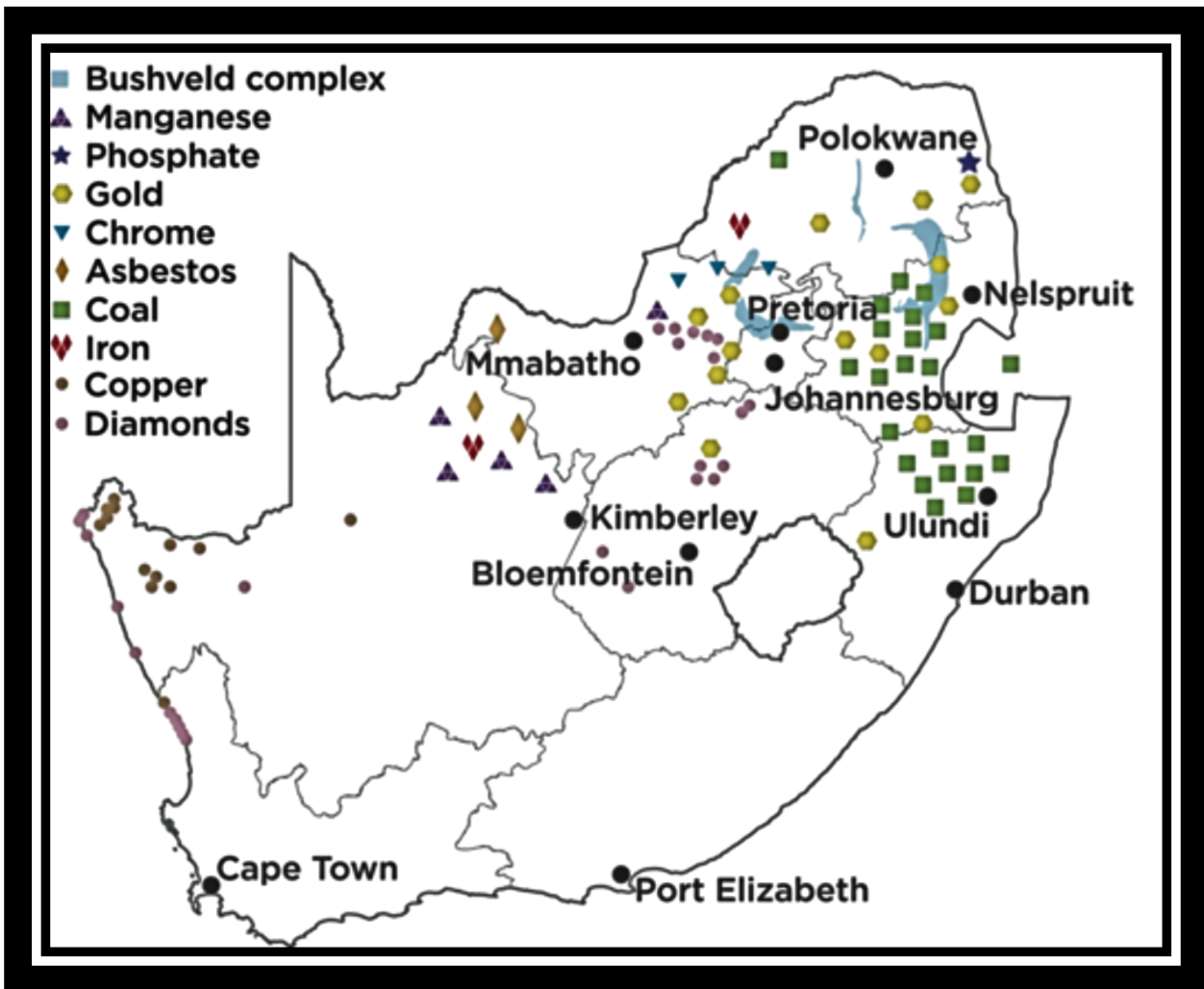
Table 1, below, is a list of South Africa's most important minerals as well as what they are used for.

Name	Colour	Major producers	Uses	Places in South Africa
Gold	Yellow	South Africa and China	<ul style="list-style-type: none"> • jewellery • money 	Gauteng, Free State, Mpumalanga and North West
Silver	Silver	China	<ul style="list-style-type: none"> • jewellery 	Gauteng, Free State, Mpumalanga and North West
Copper	Green	Chile	<ul style="list-style-type: none"> • electrical cables 	Phalaborwa in Limpopo and Northern Cape
Diamond	All colours from clear to black	South Africa and Russia	<ul style="list-style-type: none"> • jewellery • industrial drills 	Kimberly in the Northern Cape, Limpopo and Free State
Platinum	Silver to white	South Africa and Russia	<ul style="list-style-type: none"> • motor engines and exhaust systems • jewellery 	Bushveld Igneous Complex in Limpopo, Gauteng and North West
Chrome	Silver	South Africa and Kazakhstan	<ul style="list-style-type: none"> • making stainless steel 	Bushveld Igneous Complex in Limpopo and North West
Manganese	Silver to black	South Africa and Ukraine	<ul style="list-style-type: none"> • added to iron to make steel 	Hotazel, in Northern Cape and KwaZulu-Natal
Iron ore	Yellow to red	China	<ul style="list-style-type: none"> • making steel 	Sishen, in Northern Cape and Limpopo

Activity 2

Use Table 1 to answer the following questions.

1. Which minerals have the same colour? Do you think these minerals would look the same because they have the same colour?
2. Write down 2 things that are made from minerals in your classroom and school grounds.
3. Write down 2 things that are made from minerals in your home.
4. What types of objects made from minerals are not found at home or at school?
5. Which other country also has a lot of minerals?



Places where minerals are found in South Africa

Coal as a non-renewable resource

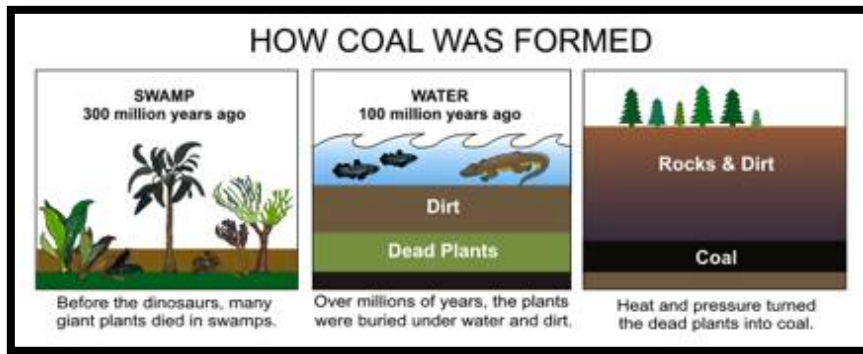
Coal is something that is formed over millions of years. Like most minerals, it is a **non-renewable resource**. It is formed from plant material and is therefore not a mineral.

How coal is formed

Millions of years ago some forests would have been covered with sand and mud during a flood. Then a new forest grew in the mud and sand on top of the old forest. A second big flood then covered the new forest with sand and mud. Then a third new forest grew on top of this one. This created layers of forest and sand.

The weight of the layers on top of each other causes pressure and heat and so the once living trees change to dead carbon.

Coal is found in layers with the oldest layers deep down and the youngest layers close to the surface. The best quality coal is found in the deepest layers because the coal has had the longest time to change into carbon. The youngest coal is about 1 million years old and the oldest is about 300 million years old.



Uses of coal

Coal has been used as a source of energy for cooking food and keeping people warm for thousands of years. It is the most important source of energy as it is used to make electricity throughout the world.

People who do not have access to electricity burn coal on fires and in ovens to create energy for heat to cook food and to keep warm. Approximately 800 000 homes still use coal as a main source of energy. This number is decreasing with the Government's programme of providing electricity to townships and informal settlements.



An informal settlement

When making iron and steel, burning coal is very important. The iron and steel is then used to make fridges, doors, motor vehicles, railway trains and many other things. The energy we get from coal is used in almost every aspect of our daily lives.

South Africa sells coal to other countries. South Africa makes a lot of money from selling coal to countries because the world needs coal and not all countries have their own.

Where mineral and coal mines are found in South Africa

Towns and cities grow or develop near mines. Mining towns are places where most of the people either work on the mine with equipment, food, housing and health care. Some South African towns and cities started because mining was happening there.

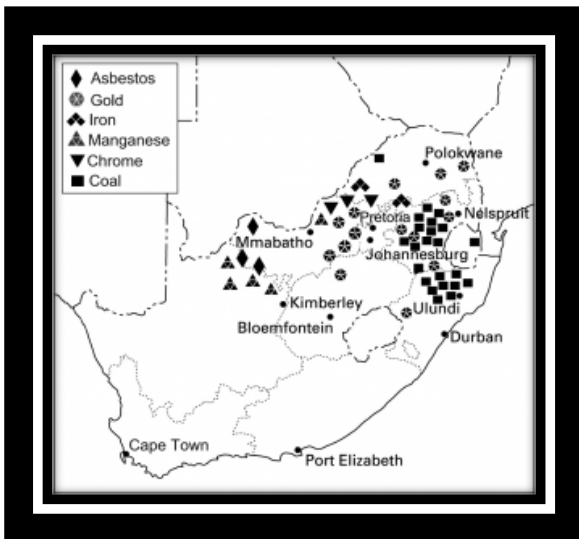
Kimberley was the first large mining town in South Africa. In 1871, a large diamond was found on a farm and lots of people moved to the area to search for more diamonds and to make a living. The town grew very quickly. Today Kimberley is still a mining town.



The Kimberley Hole

Johannesburg, the largest city in South Africa, started off as a mining town. Before gold was found there, it was a farm. When gold was discovered, lots of people moved there to work or in the hope of finding gold.

Today, mining is still an important industry in Johannesburg, but people do many other types of work as well.



Location of some coal mines in South Africa

Mining towns will be found where minerals and coal are mined. These towns will be linked to other towns where the mineral and coal is used to make manufactured products. Mining towns will also be linked to harbours where the minerals and coal are exported to countries overseas.



A train carrying ore

Where people settle in South Africa

Lots of people move to mining towns because they can find work there. The platinum mining town of Rustenburg, in the North West province, is the second fastest growing city in South Africa.

Mining and the environment

Ways of mining

Mining is the digging up and collection of minerals usually from deep under the ground. Soil and rocks must be removed before minerals can be collected. Often it is necessary to dig very deep into the crust of the earth to get the minerals.

Some of the activities that happen during the process of mining are:

- Drilling: holes are made and soil and rock is loosened.
- Blasting: they use explosives to break open the rock so the minerals can be taken out.
- Hoisting: the minerals are pulled to the surface in lifts. People also go down and up the mine shafts in these lifts.
- Transportation: the minerals are moved to factories and harbours.

Some facts about mining:

- Mining is very expensive.
- Mining impacts on the environment in a negative way.
- Mining pollutes the air and water and takes up a lot of land.
- Mines are very dangerous for the people who work in them. The Government has made laws to make them as safe as possible.

Types of mining

Open pit or surface mining

Open pit mining is used when the minerals or the coal layer is close to the surface of the earth. The covering of rock and soil is dug out and the hole gets larger and deeper. The hole is then left open. It is wide enough on the sides for trucks and lorries to drive in to collect the mineral or coal. Once the mineral or coal is reached, drilling and blasting break up the mineral or coal layer. The broken mineral or coal is loaded into big trucks and driven out of the pit.



An open pit mine with trucks

Shaft and deep level mining

Shaft mining or underground mining is used when the minerals or coal layers are deep under the surface. A shaft is drilled and blasted into the ground. Then tunnels are dug out horizontally from the shaft. A lift system is used to take the miners down into the mine and back to the surface again. The deeper we go into the earth, the hotter it becomes. Other shafts have to be drilled so that clean air can get into the mine. These are called ventilation shafts. Underground water has to be pumped out of the mine otherwise the mine will flood. All these things make mining very dangerous. Minerals are lifted to the surface in large buckets called skips.



A deep level mine with a shaft

How mining impacts on the environment

Pollution from mines

Mines are big polluters of air and water.

- When creating mines, the blasting and drilling releases a lot of dust into the air. Dust is also released when they move stone and sand, when they use trucks and when the wind blows over the mine dumps.
- Mines use a lot of electricity which is made from coal-burning power stations. This also pollutes the air.
- Poisonous gases such as methane escape when rocks are broken down in mines.
- The smoke from fires in mines cause pollution. These are sometimes caused by methane gas which has exploded.

- Water becomes poisoned when it comes into contact with minerals when they are mined. The water becomes acidic and cannot be used for drinking and growing crops. This water has to be released somewhere safe as it can kill plants and other living creatures.



A mine dump

Destruction of vegetation and wildlife

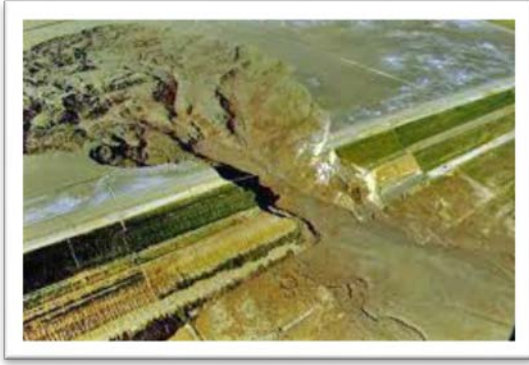
Mines use up a lot of space. The waste from these mines cover a large area of land. The mine buildings and mine towns also use up a lot of land. Sometimes the vegetation of an area is removed or covered up by this waste. The animals, birds or reptiles that live in this vegetation are left without homes and food to eat. The polluted water from the mines can poison rivers and stop plants from growing.



An environment damaged by a coal mine

Waste from mines

1. The biggest waste is the rock and soil that is taken out of the mine. This is left in big piles called mine dumps.
2. Polluted water, called acid water, is another big problem. Water is pumped out of the mines and kept in dams called slime dams. Polluted water sometimes flows into the rivers.
3. The old and broken machines and mining equipment is another type of waste.



A slime dam

Ways in which waste is controlled:

- Polluted water is treated with chemicals to make it clean so that it can be re-used.
- Old metal is sold as scrap to be made into new metal.
- The sand and rock from old mine dumps are used to make bricks. The bricks are then used to build homes, schools and hospitals.

Activity 3

Read the following article. Then, discuss the with your partner and write the answers into your workbooks.

In South Africa about 600 000 people work on mines. Another 600 000 people work in jobs that supply the mining industry and mining towns with food, machines, education and health care questions. The minerals from mines are sold to countries overseas. They are used to make things like cars, trains, fridges, knives and forks.

1. How many people work on the mines?
2. What type of work can you do if you work in a mining town?
3. Is it good to sell minerals such as coal, gold and iron ore to other countries?
4. If South Africa did not have so many minerals would things such as fridges and stoves be more expensive?
5. What would happen to a mining town if the mine closed down?

Mining and people

Difficulties of deep shaft mining

Deep shaft mining is difficult, dangerous and expensive. These are the reasons for this:

- Tunnels and working space in underground mines are very small.
- Very little fresh air underground.

- It is always wet underground.
- The temperature is very hot underground.
- There is dust caused by drilling and blasting.
- There is a danger of rock falls and rock bursts.
- There is a danger of fires and poisonous gases such as methane.
- Explosives are used underground.



Miners work in very tiny spaces

Health and safety risks that miners face

Miners work in cramped and uncomfortable conditions so they have to be fit and strong. Their health and fitness is checked regularly because miners need a lot of strength and fitness to do their work. They also receive training to get their bodies used to working in hot and small places. They are always on the lookout for possible problems as it is not easy to get out of a deep mine shaft quickly if something goes wrong. Mining is a difficult and dangerous job so all miners are trained to use machinery carefully. The reason for this is that the machinery is difficult, heavy and dangerous to use.

Miners have to wear protective clothing such as:

- Hard hats to protect their heads.
- Thick gumboots which are reinforced to protect their feet from water and from injuries caused by falling rocks.
- Goggles to protect their eyes.
- Masks to stop dust getting into their lungs.

Miners are in danger of getting lung diseases caused by mine dust. They also have to protect themselves from tuberculosis(TB) because this causes the lungs to weaken. They must know how to prevent these diseases from happening as they mine.



Protective clothing worn by miners

Dangers to miners' lungs:

- Dust gets into the lungs and this makes it difficult to breathe.
- Different types of dust cause different types of lung sickness such as asbestosis, asthma and silicosis.

Other health risks to miners are:

- Catching illnesses such as TB from other workers when working in small, hot spaces.
- Getting injured from using the machines.
- Rock falls
- Fires
- Poisonous gases
- Exhaustion from working in hot conditions.

Activity 4

1. What do miners use to protect the following parts of their bodies:
 - a. Head
 - b. Eyes
 - c. Lungs
 - d. Hands
 - e. Body
 - f. Feet?
2. You know that the temperature is very hot in a shaft mine. Can miners wear short pants and a short sleeve shirt to keep cool? Explain your answer.

Rules to protect the health and safety of miners

All mines, mine owners and mine workers have to follow rules. These rules are written in the Mine Health and Safety Act. These rules are to make sure that:

- the mine workers are trained.
- mine workers wear the correct safety clothing.
- mine workers work the correct number of hours so they don't become tired.
- the mine workers working areas are as safe as possible.
- the mine owners are running the mine correctly.
- the environment, air and water is being protected.
- the mine owners are looking at new ways to improve the safety of the mines.



**A mining company that supports
the community**

Activity 5

1. Why do so many people work in mines?
2. Name 2 lung diseases that miners can get.
3. Is the government worried about the safety of miners? How do you know this?
4. Do you think that mining is an easy or difficult job? Why do you think this?
5. Would you like to work in a mine? Give a reason for your answer.

Bibliography: K Angier, D Carr, J Cockburn, J Wallace, Our World, Our Society grade 5