16. Natural Resources

Let's recall.

1. What is meant by natural resources?
2. Give some examples of natural resources.

We get many substances from nature. They satisfy a variety of our daily needs. Soil, stones, minerals, air, water, plants and animals on the earth are all various kinds of natural resources.

Let's recall. What is meant by lithosphere?

Natural resources in the earth's crust

The earth's lithosphere is made up of land and the hard crust beneath it. The lithosphere is not homogeneous but is made up of many types of rocks. Resources in the earth's crust include minerals, ores, mineral oil and other fuels, rocks, water, elements, etc.

Minerals and ores

Mineral wealth has an important place among natural resources. Minerals are formed by various processes taking place in the environment.

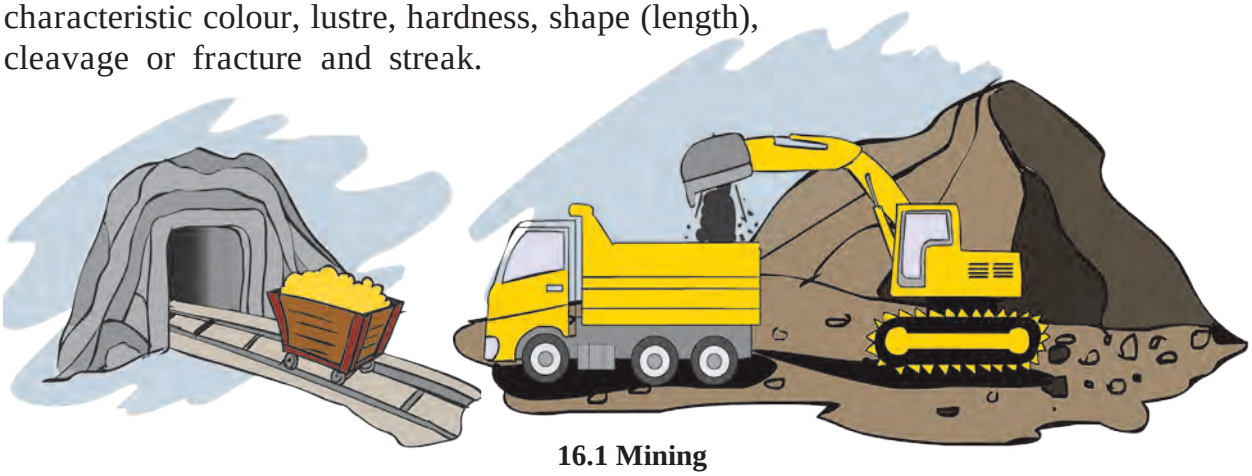
The rocks on the earth are mainly made of minerals. These minerals can be obtained by mining.

Only a few metals like, for example, gold, silver, copper, platinum and bismuth occur in the free state in nature. A majority of the metals occur in the form of compounds. Minerals that contain a high proportion of metal are called ores. It is economical to obtain metals from ores. The properties of minerals become clear from their characteristic colour, lustre, hardness, shape (length), cleavage or fracture and streak.

Metals are obtained from their ore by extraction and purification. Impurities of sand and soil in an ore are called 'gangue'.

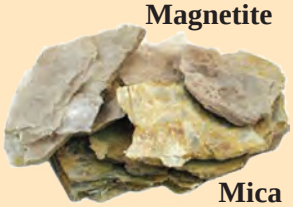
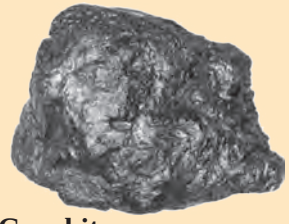
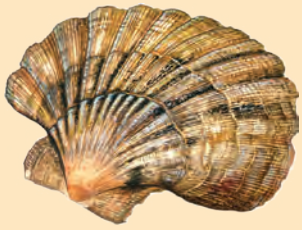
Use your brain power!

1. Why are all minerals not ores?
2. What is meant by 'metal mineral' and 'non-metal mineral'?



16.1 Mining

How are minerals formed?

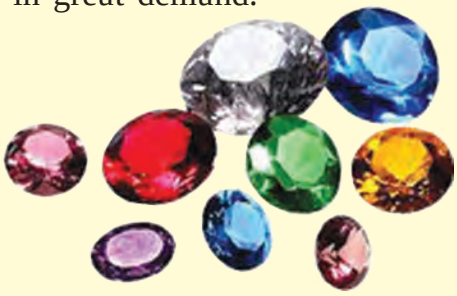
Minerals are formed from the magma in the earth's crust and the lava from the eruption of volcanoes, when they cool and get transformed into crystals.  Magnetite  Mica	Minerals are formed when solid crystals remain behind after the process of evaporation.  Halite  Gypsum	Minerals get transformed from one form into another due to large changes in temperature and pressure.  Diamond  Graphite	Some living organisms produce inorganic minerals. e.g., conches, shells, etc. formed for the protection of the body.  Shell

Classification of minerals according to their properties.

Non-metal minerals	Metal minerals	Energy minerals
Mica, sulphur, gypsum, potash, graphite, diamond, feldspar.	Iron, gold, silver, tin, bauxite, manganese, platinum, tungsten.	Coal, mineral oil, natural gas.

Gems and gemlike minerals

Some important minerals like diamond, ruby, sapphire, emerald, jade, zircon are used as gems. Gems are in great demand.



Do you know?

Deposits of common salt are also found in the earth. This salt is called rock salt. It is used in food and in some medicines.

National Institutions

The Indian School of Mines, Dhanbad, was founded in 1926 to impart education in mining. This institute has now been converted into an **Indian Institute of Technology**.

My friend, the internet!

Pictures of various minerals. www.rocksandminerals4u.com/mineral

Obtain videos related to mining from YouTube and present them in the class.

Some important minerals and ores

1. Iron ore : Iron occurring in the impure state is called iron ore. Iron ore is used to make a variety of articles from pins to heavy machinery. For example, farming implements, rails of railway tracks, etc.

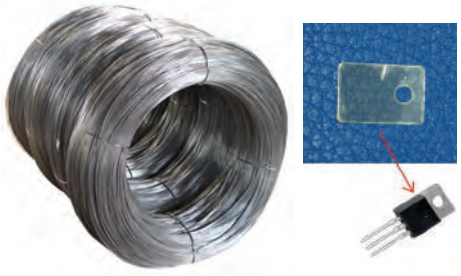
The four main ores of iron are magnetite, haematite, limonite and siderite.

2. Manganese : Manganese occurs in the form of its carbonate, silicate and oxide. Compounds of manganese are used in the preparation of medicines and for giving a pink tinge to glass. Manganese is also used in electrical appliances.

3. Bauxite : Bauxite is the most important ore of aluminium. It contains 55% aluminium. Bauxite consists mainly of aluminium oxide. Aluminium is a very good conductor of electricity and heat. Its density is low. Therefore, it is used mainly in aeroplanes, transport vehicles and to make electric wires.

4. Copper : Copper is found in the impure state in the vicinity of iron and other minerals. Copper is a very good conductor of electricity. Therefore, it is used to make electric wires as well as in radios, telephones, vehicles, and for making kitchen utensils and statues.

5. Mica : Mica is a bad conductor of electricity. Its value depends on the thickness of its layers. Mica has many uses such as in ayurvedic medicines, dyes, electric machines and equipment, wireless communication equipment, etc.



16.2 Uses of minerals

Find out.

How did the various ages of the prehistoric period get their names on the basis of the use of metals?

Fuel

Can you tell ?

1. What is meant by fuels?
2. Which natural resources do we use as fuels?

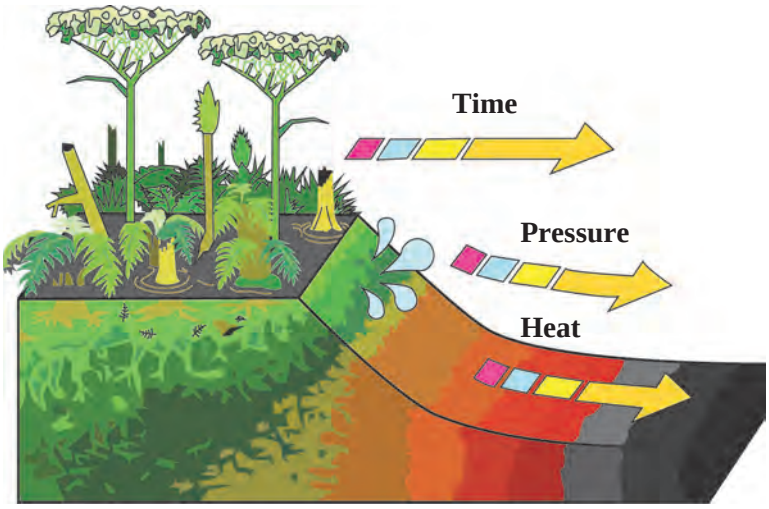
Various substances are used in day-to-day life for generating energy. These substances are called fuels. Fuels are found in the solid, liquid or gaseous state.

Coal

Millions of years ago, forests got buried underground as a result of certain natural events. Layers of soil kept getting deposited over them. The very high pressure from above and the heat from the earth's interior, slowly transformed the buried plants into fuel. Coal was thus formed from the remains of those plants. That is why coal is said to be a fossil fuel.

Coal is found in mines. Peat, lignite (brown coal), bituminous coal and anthracite are the various types of coal. Anthracite is the coal of the highest grade.

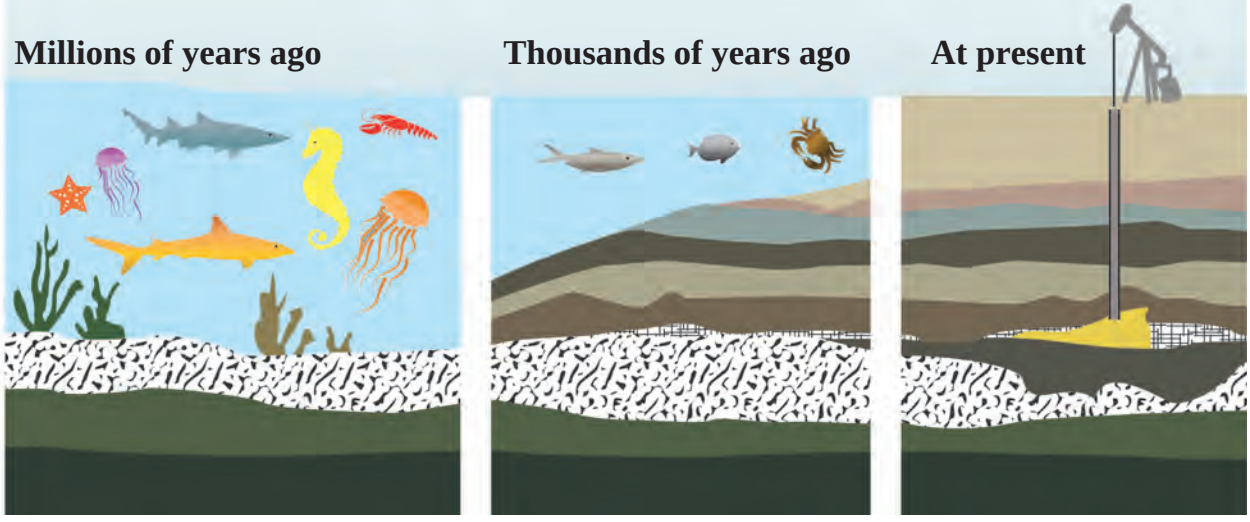
Coal is, in a way, a storehouse of carbon. It is burnt to obtain heat energy. Coal is used as fuel. It is used as a fuel in thermal power plants as well as to run boilers and railway engines. Coal is also used as a fuel for cooking and for baking bricks in kilns on a large scale. The gaseous fuels, producer gas and water gas, are obtained from coal. Coal, as an energy resource, contributes greatly to industrial development.



16.3 Formation of coal

Observe and discuss.

How were mineral oil and natural gas formed?



16.4 Formation of mineral oil and natural gas

National Institutions

The Oil and Natural Gas Corporation (ONGC) was established on 14th August 1956. It functions under the ministry of Petroleum and Natural Gas of the Government of India. ONGC is the largest oil and gas research and production company in India. Its head office is at Delhi. ONGC produces about 77% of the crude oil and about 62% of the natural gas produced in India. Of the seven commercially important underground oil reserves in India, ONGC has successfully explored six.

Mineral oil

Mineral oil is the liquid fuel formed by the decomposition of organic substances buried underground. Millions of years ago, bodies of dead sea organisms sank to the bottom of the sea. Layers of soil and sand collected on them. Due to high pressure and temperature the remains of the dead organisms were transformed into mineral oil.

The underground mineral oil is extracted through oil wells. Mineral oil is found mainly in oil sands, shale, sandstone and limestone at a depth of about 1000 to 3000 metres.

Mineral oil is also known as petroleum or crude oil. It is greenish brown in colour. Petroleum is a mixture of many compounds mainly of the hydrocarbon type. It also contains compounds of oxygen, nitrogen and sulphur. Petroleum is extracted through oil wells and refined by fractional distillation to separate other components. Aviation petrol, gasoline, diesel, kerosene, naphtha, lubricating oil, tar are all obtained from petroleum. They are used as fuel and for production of dyes, pesticides, perfumes and artificial fibres.

Natural gas

Natural gas is an important fossil fuel. It is found associated with petroleum in underground oil wells and in some places as natural gas alone. The main component of natural gas is methane (CH_4) while ethane (C_2H_6), propane (C_3H_8) and butane (C_4H_{10}) are present in small proportions.

Natural gas is formed from the remains of organisms buried deep underground and subjected to high pressure. This fuel can be carried over long distances by means of a gas pipe line. But in the absence of a network of pipelines, it is transformed under high pressure into compressed natural gas (CNG) and liquefied natural gas (LNG). This makes it possible to transport the gas.

Characteristics of CNG:

1. Catches fire easily.
2. No solid waste remains after combustion.
3. Carbon dioxide and water are formed in small quantities.
4. Other pollutants are not produced.
5. Can be transported easily.
6. Combustion can be controlled easily.

Do you know?

Fossils are the preserved remains of dead organisms in rock. Fossils are the signs of their existence left behind by organisms that got buried billions of years ago. Sometimes impressions of the organisms are seen on the surfaces of coal and stones.

Use your brain power!

1. Why is mineral oil called 'liquid gold'?
2. Why is coal called 'black gold'?
3. What would happen if underground mineral resources are exhausted?

Do you know?

Liquified Petroleum Gas (LPG)

Petroleum gas is obtained during refining of crude petroleum. Petroleum gas is transformed into a liquid by subjecting it to high pressure and reducing its volume to 1/240 of the original. It is stored in thick-walled steel cylinders so that under pressure it remains in the liquid state. As it comes out from the storage cylinder it is transformed back into a gas. This gas contains mainly two components, propane and butane, in the ratio 30:70. It is an odourless gas; but a small amount of a chemical called 'ethyl mercaptan' which has a strong characteristic odour is added to it. This helps to detect any leakage of LPG gas immediately and thus, avoid any accident.

Use your brain power! Why is natural gas an eco-friendly fuel?

The demand for fuels has increased greatly due to the rapidly growing population but the reserves of fossil fuel are limited. It is becoming difficult to meet the increased demand. The likelihood of these reserves getting exhausted is known as the energy crisis.

As the reserves of fossil fuels, namely, mineral oil and coal are limited and the demand is increasing, alternative fuels are coming into use. Hydrogen, biofuels, methanol or wood alcohol, ethanol or green alcohol are some of the alternative fuels.

Forest resources

Can you tell ?

1. What is meant by forests?
2. What are their uses?

An extensive area of land covered by a variety of plants is called a forest. A forest is a natural habitat of plants, animals and microbes. About 30% of the total land of the world is covered by forests. Forests perform certain specific protective and productive functions.

Protective functions of forests

1. To reduce the velocity of water flowing over the land.
2. To prevent soil-erosion.
3. To help percolation of water into the ground.
4. To control floods.
5. To reduce the rate of evaporation.
6. To protect wildlife.
7. To maintain the balance of atmospheric gases.

Thus, forests help improve and maintain the quality of the environment.

Books, my friends! From your Geography textbook and other reference books, collect information about the various forests in India and the extent of land covered by them.

Productive functions

Medicinal plants

Plant	Medicinal use : for treatment of
Adulsa	Cough and cold
Bel	Diarrhoea
Neem	Fever and cold
Periwinkle	Cancer
Cinnamon	Diarrhea, nausea
Cinchona	Malaria

Prepare a list of medicinal plants like *ashwagandha, shatavari, amla, hirda, behda, tulsi* and their uses. Take the help of your grandparents or people in your neighbourhood who have knowledge of plants to obtain this information.

Wood : We get strong and durable wood as also firewood from trees like teak, mahogany, neem, acacia, *subabhul*. Wood is used for making furniture, farming implements and various other articles as well as in construction work.

Forest wealth includes fibres, paper, rubber, gum and aromatic substances. We get fragrant essential oils from lemon grass, vanilla, *kewada*, vetiver (*Khus*), and eucalyptus. Sandalwood and oil of eucalyptus are used for making soaps, cosmetics and incense sticks. In addition, we get various fruits, bulbs and roots, honey, sealing wax, catechu, dyes, etc. from forests.

Use your brain power!

1. What useful things will we have to do without if rubber is no longer available?
2. What are the adverse effects of clearing of forests or cutting down trees?

How to conserve forests?

1. Young trees should not be cut.
2. Many more trees, than are cut down, should be planted and looked after.
3. The stringent restrictions/laws/regulations regarding use of forests should be strictly followed.

Ocean resources

Let's recall.

1. Name the oceans of the earth.
2. How is seawater useful to us, even though it is salty?

We have learnt that oceans occupy a greater part of the earth's surface than land does.

Energy can be obtained on a large scale from oceans. Sea waves at high and low tide and ocean currents are being used for generation of power. Last year, we have learnt something about this in Geography. There are reserves of a variety of natural resources in seawater, at the bottom of the sea and beneath the seabed, too. These resources available from seas and oceans are called marine resources.

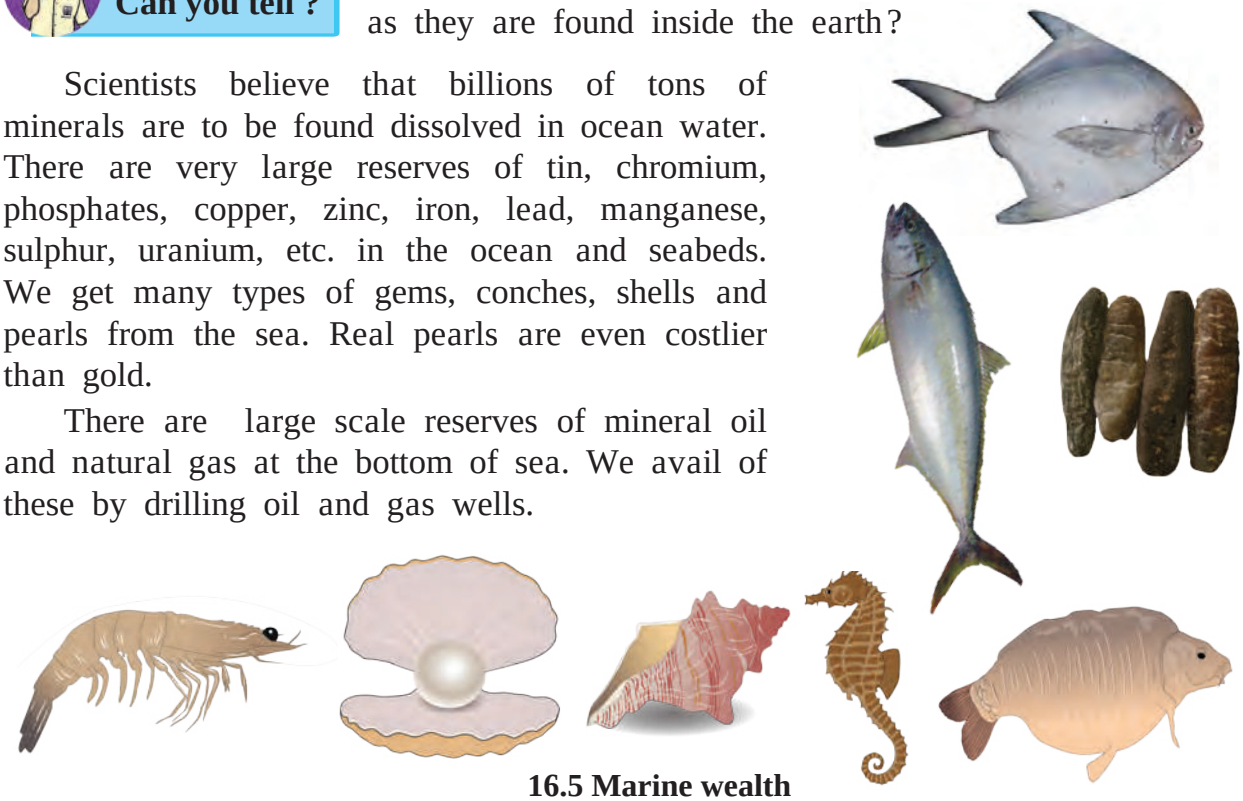
Mineral and bio-resources from oceans

Can you tell ?

Are minerals to be found in seas and on the seabed as they are found inside the earth?

Scientists believe that billions of tons of minerals are to be found dissolved in ocean water. There are very large reserves of tin, chromium, phosphates, copper, zinc, iron, lead, manganese, sulphur, uranium, etc. in the ocean and seabeds. We get many types of gems, conches, shells and pearls from the sea. Real pearls are even costlier than gold.

There are large scale reserves of mineral oil and natural gas at the bottom of sea. We avail of these by drilling oil and gas wells.



16.5 Marine wealth

In India, mineral oil well was drilled by drill-ship 'Sagar Samrat' in 1974 at the oilfield called Bombay High for obtaining mineral oil and natural gas from the bottom of the sea. The natural gas from this well is carried via a pipeline to a place called Uran.

Mineral resources from oceans	Bio-resources in ocean
Thorium – used in the production of atomic energy. **Magnesium –** used in the flash bulb of a camera. **Potassium –** the main ingredient in production of soap, glass, fertilizer. **Sodium –** used in the production of cloth and paper. **Sulphate –** used in making artificial silk.	**Fishes** like pomfret, seer fish as also shrimps and prawns – they are sources of proteins and vitamins, therefore, mainly used as sea food. **Dried shrimp, Bombay duck powder –** used as poultry feed and is a good manure. **Shells –** used for preparation of medicines, ornaments and decorative articles. **Fungi –** used for the production of antibiotics. **Shark and cod fish –** used for producing edible oil rich in Vitamins A, D and E. **Sea cucumbers –** used as medicine for treating cancer and tumours.

Marine occupations

1. Fishing – main occupation
2. Salt farming – a big industry
3. Transport business – transport by sea
4. Sea tourism – means of financial income
5. Manufacturing decorative articles

Always remember –

Natural resources are important for meeting our needs. Reserves of some resources are limited. There is a danger that excessive use will lead to their early depletion. We must keep a control on the use of natural resources to maintain the balance in nature.

Exercise

1. Describe natural resources with reference to the following three types.

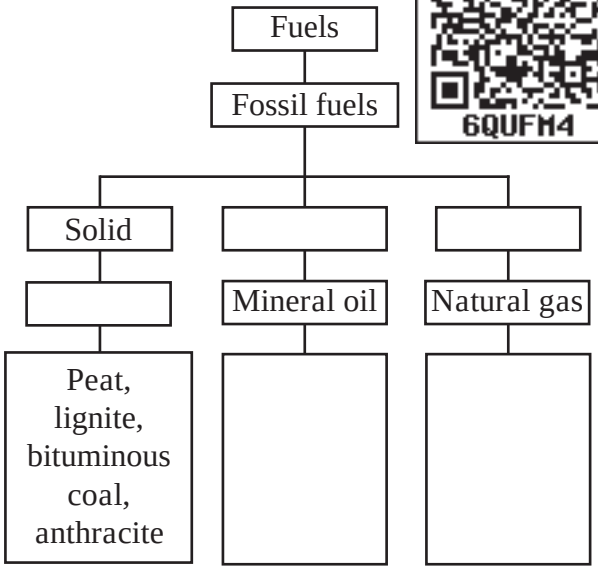
(a) Mineral resources
(b) Forest resources
(c) Ocean resources

2. Write answers to the following questions in your own words.

(a) What is meant by fossil fuel? What are their types?
(b) Make a list of the components we obtain from mineral oil.
(c) What do we get from forests?
(d) What are the items included in ocean resources? What are their uses ?
(e) Why should we prevent the wastage of fuel used for vehicles?
(f) Why is the diversity of plants and animals in the forests declining?
(g) Write the names of five minerals and the useful substances obtained from them.
(h) Name the two important stages in the process of obtaining metals from ores?

3. What steps are taken for protection and conservation of natural resources?

4. Complete the flow chart.



5. How does the economic condition of a nation depend on its natural resources?

6. Which medicinal pants will you grow on your school premises and near your house? Why?

Project :

1. Collect conches and shells of various shapes and colours and make a decorative article.
2. Collect information about the mines of various minerals.

♦ ♦ ♦