

COAL AND PETROLEUM SUMMARY SHEET

Learner Previous Knowledge	Deforestation, water and air as natural resources	
Target Knowledge for this Topic	Coal and Petroleum Understand fuels and their types, fossil fuels; Understand the process of formation of coal; List the different uses of coal; Understand the process of formation and refining of petroleum; Project: Predict what will happen if coal reserves of the world get exhausted	
Learning Goals		
<i>More Complex Learning Goal-</i> Students will be able to identify and explain logical errors in given situations related to coal and petroleum		
<i>Target Learning Goal-</i> Students will be able to describe exhaustible and inexhaustible natural resources, process of refining petroleum and explain the necessity of conserving natural resources.		
<i>Simpler Learning Goal-</i> Students will be able to list exhaustible and inexhaustible natural resources, uses of coal and list reasons for conserving natural resources.		
Period No.	Lesson Objectives	Teaching Learning Materials Required
1	Explain the meaning of exhaustible and inexhaustible natural resources.	- Board and markers - Worksheet 1 - Activity: 3 containers filled with consumable item such as peanuts or candies
2	Research on specific fossil fuels	- Board and markers - Worksheet 2 - Reference sheet 1

3	• Explain the process of petroleum refining and list the benefits of natural gas.	• Board and markers • Reference sheet 2 • Worksheet 3
4	• Find out information on why it is important to conserve fossil fuels and how it can be done.	• Chart Papers for each group • Board and markers
5	• Analyze what will happen if coal supply finishes in the world.	• Board and markers • Worksheet 4

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Lesson Plan 1

Lesson Objectives

At the end of this lesson students will be able to:

- Explain the meaning of exhaustible and inexhaustible natural resources.

Teaching Learning Materials required

- Board and markers
- Worksheet 1
- Activity: 3 containers filled with consumable item such as peanuts or candies

Details of Teaching Learning Experience

Seating Arrangement: - In groups of 6

Lesson Beginning <u>Time:</u> 5 min <u>Purpose:</u> • Activate the prior knowledge	<u>Introduction to the topic</u> • Introduce the topic by asking the students what are a few basic requirements that are either man made or are found in nature. Write the responses on the board. • Ask a few students to recap the meaning of resources. Now ask the students how many resources written on the board are natural and can be termed as natural resources. • Now ask verbally to each group to name a resource which over a period of time will gradually get over. Give an example such as; animals becoming extinct or some species of plants getting extinct. • Inform the students that they will now learn about how some natural resources are limited, through an activity.
Lesson Middle <u>Time:</u> 20 min. <u>Purpose:</u> • Develop conceptual understanding	<u>Instructions for Activity & Worksheet</u> • Divide the class into 3 large groups and name them A, B and C. • Divide each group into 3 sections so that you have a total of 9 groups. Name them A1, A2, A3, B1, B2, B3 and C1, C2 and C3. • Now announce that A1, B1 and C1 are first generation; A2, B2 and C2 are second generation and A3, B3, B and C3 are third generation.

	• Ensure that there are fewer students in A1, B1 and C1, more in A2, B2 and C2 and maximum in A3, B3 and C3. This is to represent that the population is growing. • Keep 3 large containers filled with either peanuts/corns or candy. • Tell the students that the food item represents resources such as coal, petroleum and natural gas and the container is the Earth. • Call the first generation students to come forward and pick up the food item and consume it. • Call the second generation to do the same thing. • Now call the last generation to repeat the act. • Distribute worksheet 1 to all the students and ask them to write the answers. • Let the groups now share their responses. Collect all the answers and ensure that they arrive at a common consensus. • Ask them to fill in the relevant answers in the annexure. • Let the groups now share their responses and brainstorm for the answers. • Collect all the answers and ensure that they arrive at a common consensus.
Lesson End <u>Time:</u> 10 min <u>Purpose:</u> • Finish up •	<u>Finish Up</u> • Clear doubts of the students.

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Worksheet 1

Skill: Comprehension

Activity

1. Which generation got maximum amount of resources?

2. What happened to the supply of resources when the third generation came in?

3. What does this activity tell you about natural resources which are limited?

4. Based on the activity, state how we should use natural resources.

I. Now define exhaustible and inexhaustible resources in your own words.

Lesson Plan 2

Lesson Objectives

At the end of this lesson students will be able to:

- Understand formation of coal.
- Understand the importance of useful products we get from processing of coal

Teaching Learning Materials required

- Board and markers
- Worksheet 2
- Reference sheet 1

Details of Teaching Learning Experience

Seating Arrangement: In groups of 4-5

Lesson Beginning <u>Time:</u> 5 min <u>Purpose:</u> • Activate prior knowledge.	<u>Recap</u> • Recap the knowledge of resources by asking them what are exhaustible and inexhaustible resources. • Collate the answers and ensure that all of them agree with them.
Lesson Middle <u>Time:</u> 25 min. <u>Purpose:</u> • Develop conceptual understanding	• Ask the students if an animal dies in a barren land and its body not gets decomposed fully, then what will happen to its body? • Ask them to think of the body of same after millions of years. • Introduce the term 'fossil' and fossil fuels with few other examples. • Use reference sheet 1 to discuss the story of coal. • Distribute worksheet 2 to all the students. • Tell the students to read 58 and 59 (up to petroleum) from NCERT book. • Let each groups collate their answers. Ask them to share their answers. • Have a whole class discussion for the answers of the questions.
Lesson End <u>Time:</u> 5 min <u>Purpose:</u> • Finish Up	<u>Finish Up</u> • Wrap up the class by clearing any doubts.

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Worksheet 2
Skill: Comprehension

Q1. Correct the following incorrect sentences.

1. Coal tar is extremely useful since it is an almost pure form of carbon.

2. Coal gas is obtained when coke is broken down.

3. Coke is used as fuel for several industries.

4. Whether it is coal tar or coal gas, all of them are obtained from coke.

Q2. Identify the product from the given clues.

1. It is thick, black liquid. _____

2. It is porous and tough. _____

3. It is gaseous in nature. _____

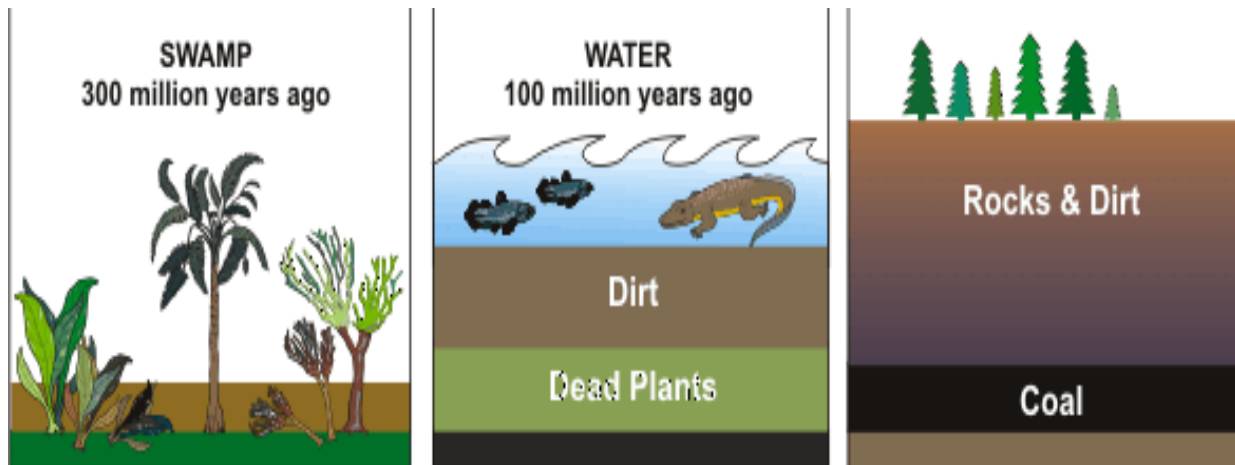
4. It is used in extraction of metals. _____

5. It is used as fuels for industries. _____

6. You can get naphthalene balls from this product. _____

Reference sheet 1

- 300 million years ago in swamp forests, even before the dinosaurs, giant plants and ferns died and these forests formed layers at the bottom of the swamps.
- Water and dirt began to pile up on top of the dead plant remains. Over centuries and millenniums, pressure and heat built up on top of the plant remains, undergoing chemical and physical changes and pushing out the oxygen and turned these remains into coal.



- The slow process of conversion of dead vegetation into coal is called carbonization.

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Lesson Plan 3

Lesson Objectives

At the end of this lesson students will be able to:

- Understand the formation of petroleum.
- Explain the process of petroleum refining and list the benefits of natural gas.

Teaching Learning Materials required

- Board and markers
- Reference sheet 2
- Worksheet 3

Details of Teaching Learning Experience

Seating Arrangement: - In groups of 4 or 5

Lesson Beginning <u>Time:</u> 5 min. <u>Purpose:</u> Recap the previous learning	<u>Whole Class Discussion</u> • Ask a few students to recap the different products obtained from coal • Ask them different uses of coal tar. • Collect responses and ensure that the students are on the same page.
Lesson Middle <u>Time:</u> 25 min. <u>Purpose:</u> Develop conceptual understanding	• Discuss the story of petroleum with the help of reference sheet 2. • Describe the different products obtained on refining petroleum. • Now distribute worksheet 3 to the groups. • Ask them to read the case study. • Let them discuss the scenario given to them in groups. • After the discussion of the scenario, ask them to attempt the questions in the worksheet. • Discuss about the CNG and its importance.
Lesson End <u>Time:</u> 5 min <u>Purpose:</u> • Finish Up	<u>Finish Up</u> • Finish up the discussion by clarifying any doubts.

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Worksheet 3
Skill: Drawing Inferences
Case study

When the water of the ponds was studied around Jharia coal mining area near Dhanbad, they found the water highly polluted and it contained thick population of E.coli bacteria. The bacteria is the prime cause for several diseases. Also due to excessive mining, the underground water table level is lowering. Sometimes the water flows into mines and when this water is channeled back into the streams and rivers it increases pollution in these water bodies too. The biggest challenge is that the water aquifers are getting affected due to the mining. However on the other hand, Dhanbad is a rich source of coal. Coal, a very important fossil fuel in India is vital for its energy requirements. Currently, it meets two-thirds of the country's energy needs. The energy is consumed mainly by industries and the major consumers are steel, cement, and brick-manufacturing units. Also, the mines are a huge source of livelihood for unskilled labour.

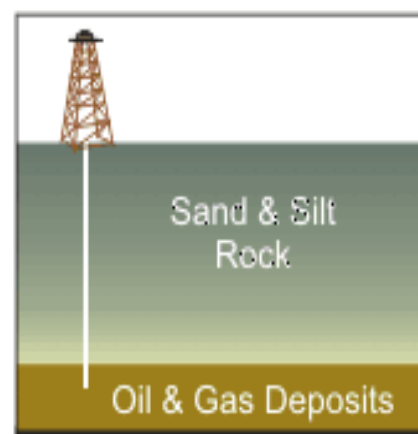
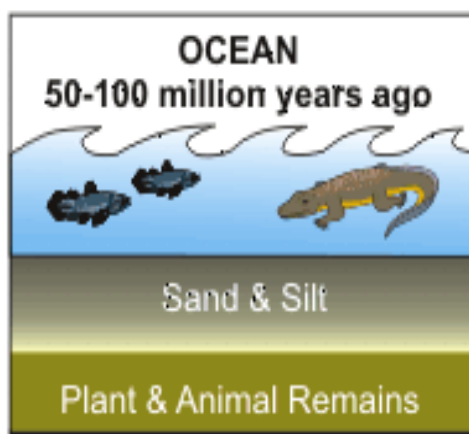
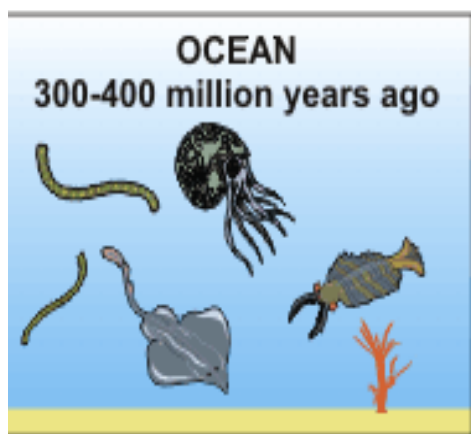
- 1. Do you think we should continue mining in Dhanbad and neglect its impact on environment?**

- 2. Is industrial progress more important than preserving the environment?**

Reference sheet 2

Story of Petroleum

- Millions of years ago, algae and plants living in shallow seas, died and sank to the seafloor.
- These dead matter material mixed with other sediments and was buried.
- Over millions of years under high pressure and high temperature, the remains of these organisms transformed into what we know today as fossil fuels.
- Petroleum is now found in vast underground reservoirs where ancient seas used to be. Petroleum reservoirs can be found beneath land or the ocean floor.



Period 4**Lesson Objectives**

At the end of this lesson students will be able to:

- Find out information on why it is important to conserve fossil fuels and how it can be done.

Teaching Learning Materials required

- Chart Papers for each group
- Board and markers

Details of Teaching Learning Experience

Seating Arrangement: - In groups of 4-5

Lesson Beginning <u>Time:</u> 5 min. <u>Purpose:</u> Recap the previous learning	<u>Introduce the topic</u> - Ask the students why they think fossil fuels are limited. Now pose the following questions: - What can you do at home to save on fuel? - What can you do at school to save energy? - What are the disadvantages of using inexhaustible sources of energy such as wind or sunlight? - Collect their responses and arrive at a common consensus.
Lesson Middle <u>Time:</u> 25 min. <u>Purpose:</u> Develop conceptual understanding	<u>Presentation</u> - Distribute chart papers to all the groups. - Ask them to collate their points and responses on how energy can be conserved and why should it be conserved. - Ask them to tabulate their responses on a chart. Encourage them to be creative. - Let the students make a presentation on the chart. They can make a concept map or a graphic organizer and even illustrate their work. - Let each group come forward and present their work.
Lesson End <u>Time:</u> 5 min <u>Purpose:</u> Finish Up	<u>Finish Up</u> Conclude by clearing their doubts

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Lesson Plan 5

Lesson Objectives

At the end of this lesson students will be able to:

- Analyze what will happen if coal supply finishes in the world.

Teaching Learning Materials required

- Board and markers
- Worksheet 4

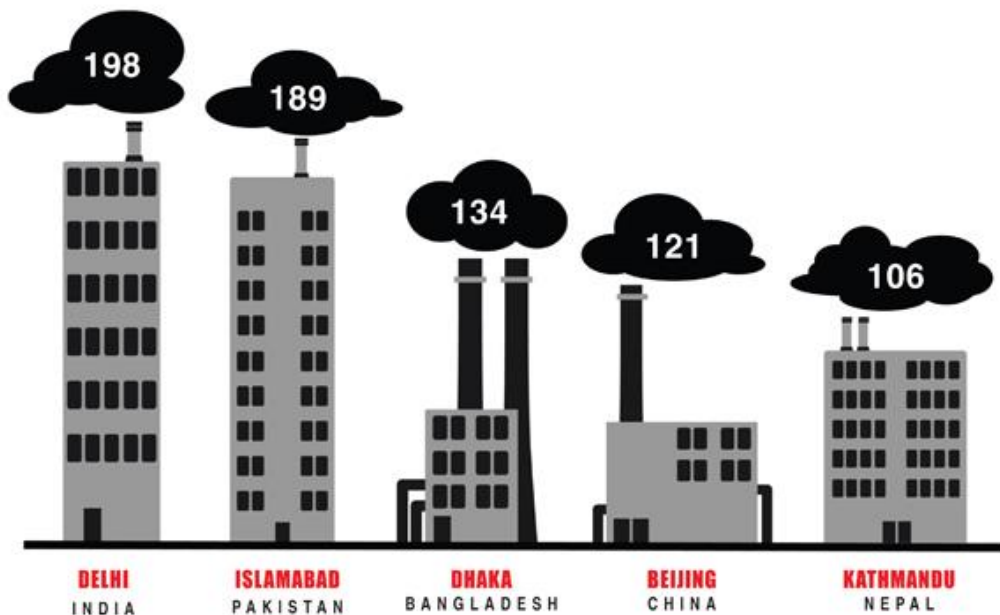
Details of Teaching Learning Experience

Seating Arrangement: - In groups of 4-5

Lesson Beginning <u>Time:</u> 5-7 min. <u>Purpose:</u> Recap the previous learning	<u>Class Discussion</u> • Ask the students to share their thoughts on what can happen as and when the fossil fuel supply finishes. • Ask them how people lived before coal and petrol was discovered. • Collate the answers and arrive at a consensus. • Inform the students that they will now analyze case studies and find out what will happen if coal supply finishes.
Lesson Middle <u>Time:</u> 25 min. <u>Purpose:</u> Develop conceptual understanding	<u>Analysis of case studies</u> • Distribute worksheet 4 to all the students. • They may then attempt the case studies individually. • Let there now be a whole class discussion on the observations and analysis and ensure that all the students arrive at a common consensus.
Lesson End <u>Time:</u> 5 min <u>Purpose:</u> • Finish Up	<u>Finish Up</u> • Clear any doubts that the students may have regarding the topic.

Worksheet 4**Skill Analytical Thinking****Case Studies**

1. Delhi is the fifth-most populated metropolis in the world and one of the most heavily polluted cities in India, having one of the country's highest volumes of particulate matter pollution. Particulate matter means suspended particles in air. These particles cause severe health problems such as asthma. How have the fossil fuels contributed to this state of Delhi? Based on your knowledge of fossil fuels, how can this problem be reduced in Delhi?

MOST POLLUTED CAPITAL CITIES IN ASIA

(SOURCE: WORLD HEALTH ORGANISATION REPORT 2008)

2.

I. Which city is the most polluted one in Asia?

II. Which Asian country is bigger than India but shows lesser pollution level?

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3. The most significant uses of coal are in electricity generation, steel production, cement manufacturing and as a liquid fuel. It is used worldwide in many day-to-day goods and services that we might sometimes take for granted in our modern society. For instance, coal is used as an energy source in the cement industry as large amounts of energy are required to produce cement. It is important to the building industry, and is used in many different applications – such as home and office buildings.

Given the above information of coal, what do you think will happen if coal supply finishes worldwide? List your thoughts here.
