



TEACHER GUIDE

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EASY MARKING™ ANSWER KEY 50

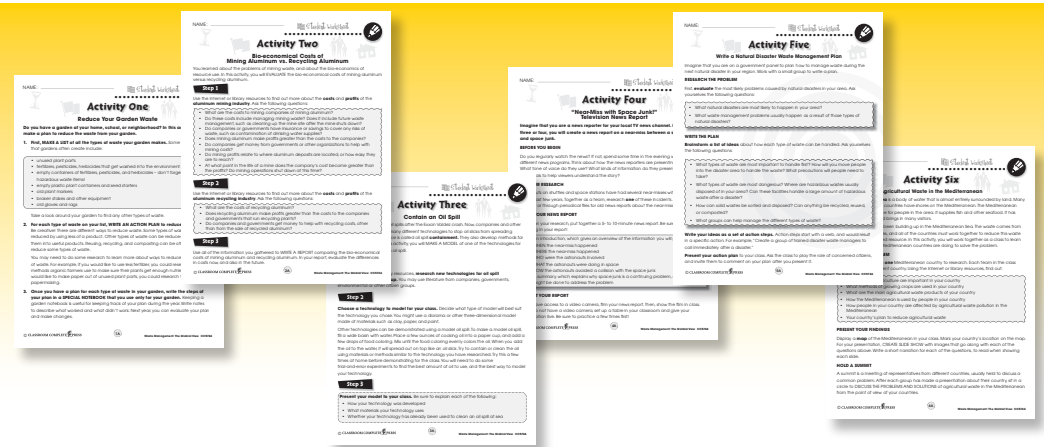
MINI POSTERS 55

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Waste from Mining

1. Think of a shiny metal. Now, think of a rock. Metal comes from rock. What do you think must be done to the rock to get just the metal?

2. Use a dictionary to look up the terms ORE and ACID. Write the definitions on the lines below.

a) The definition of **ore** is: _____

b) The definition of **acid** is: _____

3. Think of **FIVE** things that you used today that contain metal or other ores.

1) _____
2) _____
3) _____
4) _____
5) _____



Oil Spills

What is the effect of oil spills?

Oil is shipped around the world by huge tankers. When tankers have accidents at sea, large amounts of oil can spill out. Oil floats on top of water, creating a film called an **oil slick**. The oil slick can travel on the surface of the water until it reaches the shore. When it does, the oil can cover places where animals live and have young.



Oil is very difficult to wash out of an environment. It sticks to soil and rocks. When oil covers birds, it sticks to their feathers and makes them unable to fly. Oil sticks to fishes' gills and makes them unable to breathe. Oil can kill eggs and young of many types of animals. Oil kills tiny floating plants called **phytoplankton**, which provide energy for all of the animals in the ocean ecosystem. An oil spill can be one of the worst disasters ever to happen in an ocean or near-shore habitat.

STOP Describe the meaning of the term **oil slick**.

What is the **Exxon Valdez** oil spill?

In 1989, an oil tanker called the **Exxon Valdez** hit a reef off of the coast of Alaska. It spilled 11 million gallons of oil onto the water. The oil covered 1,300 miles of shoreline that was home to great numbers of wildlife, including bald eagles. The area of ocean covered by the spill was home to many types of fish and ocean mammals, including salmon, orcas, seals, otters, and whales. Huge numbers of animals were killed by the oil spill.

People worked hard to clean the area of oil. They washed oil off beaches with fire hoses. They cleaned off birds and mammals that they found still alive. But animals were killed in huge numbers, and it took many years for their populations to return to normal. Some species are still not back to the levels they were at before the spill. People suffered, too. The communities in the area depended on fishing, hunting, and tourism to make money. After the spill, none of these activities could take place for years. People estimate that the local economy lost almost 3 billion dollars. Many families lost their livelihoods.



Radioactive Waste

1. Circle the word **TRUE** if the statement is TRUE or Circle the word **FALSE** if it is FALSE.

- A) Radioactive substances are used in hospitals.
TRUE **FALSE**
- B) Hospital gloves that have touched radioactive substances must be handled as radioactive waste.
TRUE **FALSE**
- C) Uranium ore is high-level radioactive waste.
TRUE **FALSE**
- D) Radioactive substances can be used in power plants to make electricity.
TRUE **FALSE**
- E) High-level radioactive waste must be disposed of in a landfill.
TRUE **FALSE**
- F) Over 300,000 people had to be moved after the Chernobyl nuclear power plant exploded.
TRUE **FALSE**
- G) Radioactive substances can cause cancer.
TRUE **FALSE**

2. On the lines below, describe **four** ways that people use radioactive substances.

3. Circle the examples of high-level radioactive waste.

- used fuel rods old X-ray machines syringes used for cancer treatment
- fallout from a nuclear explosion wastewater from a uranium mine
- uranium ore hospital gowns used for CAT-scan patients



Waste Management Success Stories

3. How can you **apply** the lessons people learned in Kovalam, India, to your own town or local community?

4. Could your school have a program like the one at Westside Elementary? Explain how students at your school could change the way your school manages waste.

Extension & Application

5. Have a **zero-waste lunch day** at your school! First, make posters that explain the ways to lessen lunch waste, including:

- bringing food to school in reusable containers
- recycling all materials that can be recycled
- packing only the amount of food that you will really eat
- bringing uneaten food home to eat later instead of throwing it away

Then, have classrooms **compete** to have the least waste! Ask your principal or parents' group to donate a prize for the winning class. On the zero-waste day, students from each class should throw away their trash in separate class bins. At the end of lunch, a group of students can look in each bin to judge which class had the least trash.

Nuclear Fuel Debate

Set up a class debate about the use of nuclear energy to make electricity. Nuclear energy has **ADVANTAGES** and **DISADVANTAGES**. It does not create air pollution like burning fossil fuels. It does not add greenhouse gases to the atmosphere. However, it does have the problem of creating radioactive waste.

BEFORE YOU BEGIN

Have students choose whether they will argue **for** or **against** the use of nuclear energy to make electricity. Or, have students draw straws to be randomly assigned to one group or the other.

DO YOUR RESEARCH

Together as a group, research all of the advantages and disadvantages of nuclear energy. Read what experts have to say on both sides of the issue. Find out how much nuclear energy costs compared to other types of energy. Then, try to analyze the bio-economic costs of nuclear energy compared to other types of energy.

Write a list of **five main points** that your group would like to make in the debate. After you write your list, try to think of what the other group might say in response to your points. Talk about how you will respond to arguments about the points you are making.

Choose one person in your group to make each of the points. If there are more people left in your group, choose one person to respond to each of the other team's points.

CONDUCT THE DEBATE

In the debate, each side will have 2 minutes to make each of their points. Teams will take turns. Team A will make their first point, then Team B will have 2 minutes to make an argument against that point. Finally, Team A has one additional minute to respond to Team B's argument. Then, Team B has 2 minutes to make their first point. Team A will have 2 minutes to make an argument against that point. Then, Team B has one additional minute to respond to Team A's argument. This process continues until all of the points have been made.



Crossword Puzzle!

Word List

agricultural	bioeconomics
biomass	compost
contaminate	ethanol
incinerator	mine
natural	oil slick
orbit	ore
organic	pesticide
radioactive	tsunami
zero waste	

Across

1. the study of the costs of using natural resources
4. a substance used to kill insects
5. a furnace for burning waste
11. tidal wave
12. made by breakdown of food waste
13. fuel made from corn waste
14. place where rock is taken from the earth
16. space junk is in _____ around Earth

Down

1. plant waste that can be used to make fuel
2. farming method that doesn't use harmful pesticides
3. valuable mineral
6. to get into
7. activities related to farming
8. waste that releases harmful energy
9. result of an oil spill (2 words)
10. goal of sending nothing to a landfill (2 words)
15. a hurricane is a _____ disaster



Comprehension Quiz

25

Part A

1. Circle the word **TRUE** if the statement is TRUE or Circle the word **FALSE** if it is FALSE. 8
- A) Corn stalks are an example of agricultural waste.
TRUE FALSE
 - B) Hazardous mining waste can contaminate water supplies.
TRUE FALSE
 - C) When oil is spilled from a tanker, it spreads out on the ocean floor.
TRUE FALSE
 - D) High-level radioactive waste can remain harmful for thousands of years.
TRUE FALSE
 - E) Solid waste from Hurricane Katrina is still a problem.
TRUE FALSE
 - F) About 300 pieces of space junk can be found orbiting Earth.
TRUE FALSE
 - G) Bio-economics is the study of how much money it costs to dispose of organic wastes.
TRUE FALSE
 - H) Incinerators can cause air pollution.
TRUE FALSE

Part B

Put a check mark (✓) next to the answer that is most correct. 4

1. Which of these is high-level radioactive waste?
 - A uranium ore
 - B X-ray machines
 - C cancer medicines
 - D used fuel rods
2. Which of these substances are found in waste from metal mines?
 - A acids
 - B oil
 - C sewage
 - D fungicides
3. Which of these is an example of agricultural waste?
 - A cyanide
 - B acids
 - C fertilizer
 - D aluminum
4. Which facility will help a community practice zero waste?
 - A biogas
 - B incinerator
 - C landfill
 - D nuclear plant

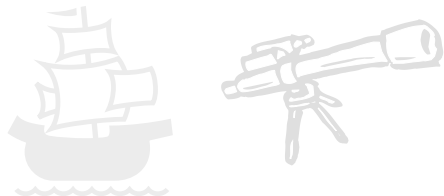
Agricultural Waste

(Farmer Spraying Pesticide on Rice Field)



NAME: _____

After You Read 



Oil Spills



3. Explain why an oil spill is so harmful to animals. Give examples to support your reasoning.

4. Explain how people can be harmed by oil spills.

Extension & Application

5. Learn more about the lessons people learned from the Exxon Valdez oil spill. Choose **one** of the topics below, or write your own topic. If you write your own topic, show it to your teacher before you start your research. Possible topics:

- How have laws that govern oil shipping changed since the Exxon Valdez spill?
- What did people learn about how to care for birds during an oil spill?
- What did people learn about how to care for ocean mammals during an oil spill?
- What new technologies did people develop to stop oil spills from spreading?
- What new technologies did people develop to make oil tankers safer?
- What did people learn about how to help habitats recover from an oil spill?

Use the Internet or library resources to find the answers to your questions. CREATE A POSTER to share the information you learned. Your poster should contain:

- A brief title that explains your topic
- Pictures or diagrams that explain your topic
- A short written answer to your topic question

Present your poster to the class, and explain what you learned during your research. Display the posters around your school.

3.
Answers will vary

1.
Answers will vary

2.
Placed in special containers that do not allow radioactive energy to escape.

4.
Low-level radioactive waste breaks down faster.

22

1.
A) TRUE

5.
High-level radioactive waste takes thousands of years before it will no longer cause harm to people.

4.
Answers may include loss of jobs

3.
a) landfill
b) X-rays
c) syringe
d) fuel rod

5.
Answers will vary

3.
e) CAT-scan
f) uranium
g) barrier

20

2.
Answers will vary

3.
Putting out high energy particles from the breakdown of atomic nuclei.

21

23
Circle: used fuel rods, fallout from a nuclear explosion

6.
Answers will vary

24

EZY

EASY MARKING ANSWER KEY