

School Recycling Club SHIP

(Supporting Home Instruction Program)



Lesson Plan 7

Grade Level: 4-6

Lesson: II—The Routes of Household Hazardous Waste -
Wading Through Water Pollution

Source: *Teaching Toxics*

Activity/Craft: Protect Your Groundwater (https://groundwaterorg.presencehost.net/file_download/inline/690e0742-7355-4887-bdb1-7d70110ce2bd)

Video Link: Water Pollution/Water Contamination (<https://www.youtube.com/watch?v=Om42Lppkd9w>)

Game Link: How Much Water Do You Use? (https://groundwaterorg.presencehost.net/file_download/inline/7265455c-5cd6-45b1-8969-994d3eeaoe52)



Lesson Matrix Grades 4-6

Teaching Toxics

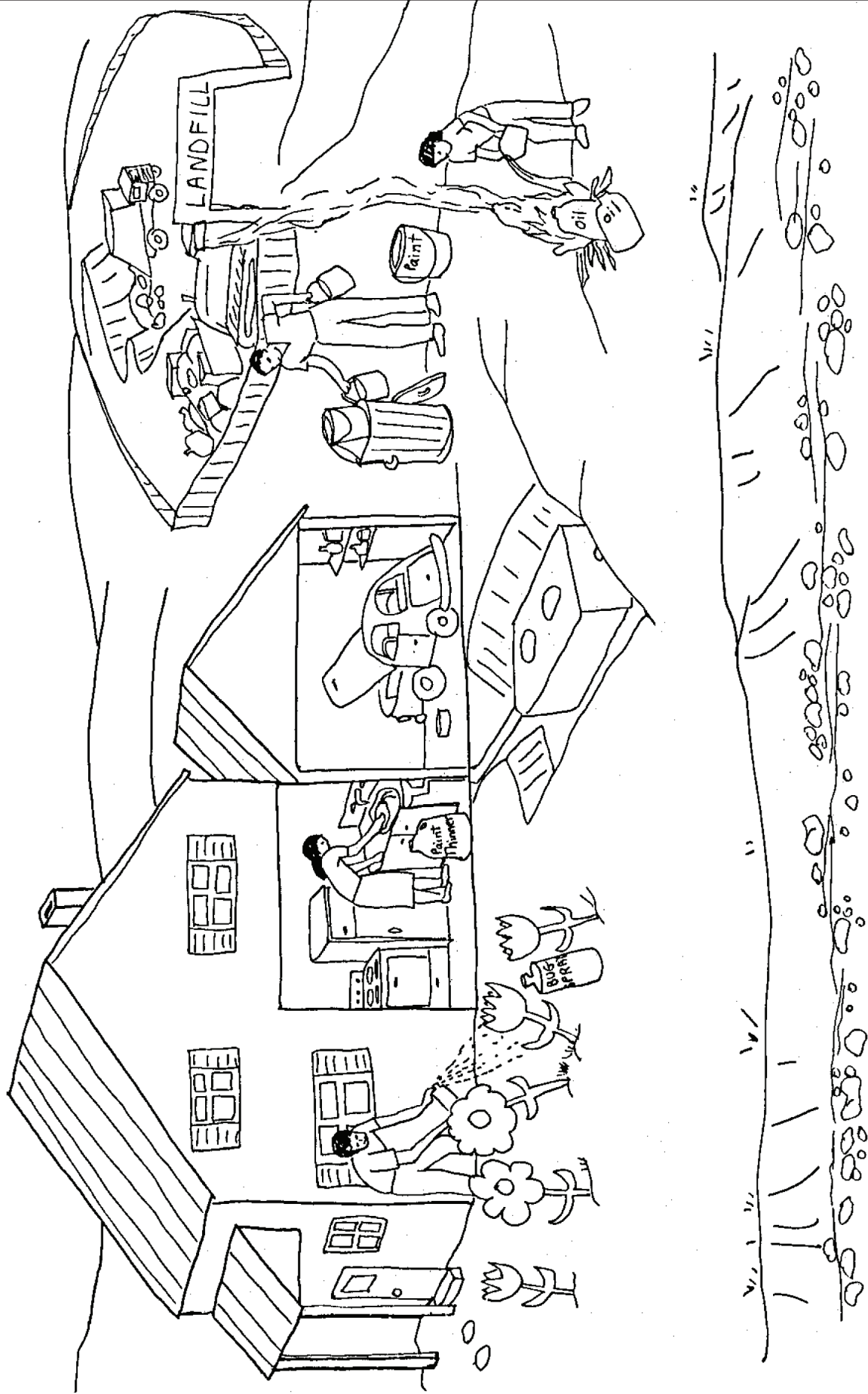
Lesson	Concept	Objective	Common Core Alignments	Skills
4-6 Hazardous Homes?	Products containing hazardous substances are commonly found in the home.	<ul style="list-style-type: none"> Become aware of the hazardous products in the home Conduct a home inventory of hazardous products 	Grade 4 CC.RI.4.1 CC.SL.4.1 CC.4.MD.4	<ul style="list-style-type: none"> Engaging in collaborative conversations Gathering data Interviewing Predicting
			Grade 6 CC.RI.6.1 CC.W.6.4 CC.6.SP.2	
4-6 Looking at Labels	Certain information must appear on hazardous product labels.	<ul style="list-style-type: none"> Identify a hazardous product by examining product labels 	Grade 4 CC.L.4.6 CC.RI.4.2 CC.W.4.4	<ul style="list-style-type: none"> Analyzing Designing Engaging in collaborative work Observing
			Grade 5 CC.RI.5.2 CC.SL.5.2 CC.W.5.4	
4-6 Getting to the Route of the Problem	Hazardous substances enter the environment during use and/or disposal of hazardous products.	<ul style="list-style-type: none"> Recognize the connection between home and environment Learn how household hazardous waste enters the environment 	Grade 4 CC.L.4.6 CC.RI.4.7 CC.W.4.1	<ul style="list-style-type: none"> Communicating solutions Explaining Predicting Problem solving
			Grade 5 CC.RI.5.7 CC.W.5.1 CC.W.5.4	
4-6 Wading Through Water Pollution	Chemical contamination is the most difficult type of water pollution to treat.	<ul style="list-style-type: none"> Determine the type of water pollution most difficult to treat 	Grade 4 CC.SL.4.1 CC.SL.4.4 CC.W.4.1 CC.4.MD.1	<ul style="list-style-type: none"> Carrying out investigation Evaluating Problem solving Using mathematics
			Grade 5 CC.SL.5.1 CC.W.5.1 CC.W.5.4 CC.5.MD.1	
		Grade 6 CC.L.6.6 CC.SL.6.4 CC.W.6.1 CC.6.SP.2		

Lesson	Concept	Objective	Common Core Alignments	Skills
4-6 Accidents Don't Have to Happen	Accidental exposure to hazardous household products can be prevented.	<ul style="list-style-type: none"> Identify methods to prevent accidental exposure to hazardous products 	Grade 4 CC.L.4.6 CC.RI.4.2 CC.SL.4.4 CC.W.4.7	<ul style="list-style-type: none"> Applying ideas to solve problems Evaluating Observing Recognizing patterns
			Grade 5 CC.L.5.6 CC.RI.5.2 CC.SL.5.4 CC.W.5.7	
4-6 How Dinosaurs Help Us Drive Our Cars	Motor oil is composed of a limited natural resource. To conserve natural resources and prevent pollution, used motor oil should be recycled.	<ul style="list-style-type: none"> Understand the sequence of events that occur to produce motor oil for cars Become familiar with recycling motor oil 	Grade 4 CC.L.4.3 CC.RI.4.1 CC.W.4.2 CC.W.4.4	<ul style="list-style-type: none"> Carrying out investigation Collaborating Communicating solutions Observing
			Grade 5 CC.L.5.3 CC.RI.5.1 CC.W.5.2 CC.W.5.4	
4-6 The Tomato HornWorm Blues	There are viable, nontoxic alternatives to using pesticides.	<ul style="list-style-type: none"> Become familiar with the alternatives to pesticides 	Grade 4 CC.RI.4.6 CC.RL.4.10 CC.SL.4.6 CC.W.4.3 CC.W.4.8	<ul style="list-style-type: none"> Analyzing Inventing Problem solving Sharing research and writing
			Grade 5 CC.RI.5.6 CC.RL.5.10 CC.SL.5.6 CC.W.5.3 CC.W.5.7	
			Grade 6 CC.L.6.6 CC.RI.6.2 CC.SL.6.4 CC.W.6.8	

Lesson Matrix Grade 4-6

Teaching Toxics

Routes to the Environment



4 - 6: Wading Through Water Pollution

Subjects

Science, Language Arts,
Mathematics

Skills

Carrying out investigation,
evaluating, problem solving,
using mathematics

Materials

Per small group: one quart jar
 $\frac{1}{2}$ filled with clean water, one
quart jar of polluted water, wash
basin, two coffee filters, one six
inch square piece of screening,
one eye dropper, one spoon, $\frac{3}{4}$
cup of filter sand, one medium
size funnel, one sponge, one
empty yogurt container (to hold
pollutants); pollutants: garbage,
vegetable oil, leaf litter, sand/
mud dish, detergent, food
coloring; student lab worksheet;
water cycle poster

Time

Two - three class periods

Vocabulary

Groundwater, contamination,
visible, invisible, leachate,
dilution

Related Teaching Toxics Activities

7 - 8 Hazardous Movements
7 - 8 Pondering Percolation

Source Adapted from

Water Pollution Clean Up
Hudson River Sloop Clearwater
724 Wolcott Ave.
Beacon, NY 12508
(845)265-8080
office@Clearwater.org
<http://www.clearwater.org/>

Concept

Chemical contamination is the most difficult type of
water pollution to treat.

Objective

Students will determine which type of water pollution
is the most difficult to treat by cleaning a sample of
polluted water.

Background

See Information Section, pages 121-124.

Pollution is not always visible. In fact, what we can not
see is often the most difficult to clean up. This activity
parallels how water is cleaned in septic and treatment
facilities. These systems are able to clean water of most
solid and biological wastes, but they are not able to
clean hazardous chemical waste. Although chemical
waste may be diluted so that it is no longer visible, it
does not mean the water is free from contamination.

Procedures and Activities

A Drop from the Sky: Guided Imagery

- Review the water cycle with students by drawing a
diagram on the board or by showing a poster.
- Have students close their eyes and listen to the
following guided imagery.

"I am a droplet of rain. I'm falling from a dense cloud,
high above the Earth. I'm a cold bubble of water, small
as the head of a nail. As I drop down from the sky, I can
feel the Earth's warmth. Lower and lower, faster and
faster I go. Swoosh, I slide onto a big sign that feels like
cold metal against my sides. Soon after sliding down the
sign, I roll off onto a large trash pile (take a whiff.) Phew!
It must be the town dump."

"There are so many layers of trash. I pass through last
night's coffee grinds, a laundry detergent bottle, old
fingernail polish, comic strips. UGH, now I'm oozing
through motor oil, old paint cans and antifreeze. I feel
myself getting heavier and heavier, weighed down.
As I travel through leftover watermelon rinds from the
July 4th parade and firecrackers that never exploded, I
hear a little voice. It is so soft. At first I can't hear. I strain
my ears to hear. The soft, squeaky voice says 'Take me,
take me... take me with you!!!!' Hmmm, 'Take me
with you?' What does that mean? I don't understand the
message."

Common Core Alignments

GRADE 4

CC.SL.4.1

Speaking & Listening:
Comprehension & Collaboration

CC.SL.4.4

Speaking & Listening:
Presentation of Knowledge &
Ideas

CC.W.4.1

Writing:
Text Types & Purposes

CC.4.MD.1

Mathematics:
Measurement & Data

GRADE 5

CC.SL.5.1

Speaking & Listening:
Comprehension & Collaboration

CC.W.5.1

Writing:
Text Types & Purposes

CC.W.5.4

Writing:
Production & Distribution of
Writing

CC.5.MD.1

Mathematics:
Measurement & Data

GRADE 6

CC.L.6.6

Language:
Vocabulary Acquisition & Use

CC.SL.6.4

Speaking & Listening:
Presentation of Knowledge &
Ideas

CC.W.6.1

Writing:
Text Types & Purposes

CC.6.SP.2

Mathematics:
Statistics & Probability

"Then, it clicks 'TAKE ME WITH YOU!' That's why I feel so heavy! Every single thing that I pass through is coming along with me little pieces of food, cleaners, motor oil, antifreeze. All are stuck to my sides and are traveling everywhere I go! I am so heavy, I am dirty! My, I am no longer just a drop of rainwater... I am... the dreaded, polluted, landfill leachate!"

"I think my journey through the landfill will never end. But finally, I reach the bottom. There is nothing to stop me, so I begin to ooze through the soil. Now I can go anywhere I want. Why, the possibilities are unlimited! Down, down, down, down I go. For a long time I travel down through the Earth. SPLASHHHH! I enter water underground. The same water that some people tap to drink from. But I don't stop there, oh no, this is just the beginning of the journey. I move very slowly while I am creeping along. But finally, I pop out. The sunshine feels warm, the birds are singing. I, the dreaded, polluted landfill leachate have become part of a spring. And my journey still is not over. Now I am in the water cycle. Who knows where I will end up?"

- Sitting in a circle, ask each student where they ended up as a water drop (what part of the water cycle).
- Discuss the following with students: "What is leachate? What makes it polluted? List different types of pollutants the raindrop encountered. What else pollutes water?"
- In small groups, have students create an ending to the story. The ending should describe the rest of the journey of the dreaded landfill leachate. Where did it go? What was its effect on the environment?
- Student groups should share their ideas with the class.

Water Pollution Clean-Up

Before class, prepare polluted water for each small group by placing all the listed pollutants in a quart jar half full of water. Assemble clean up equipment and put in wash basin (one set of equipment per group).

Pollute one sample in front of the class. Have students recall what types of things the raindrop encountered as it traveled through the landfill. As students call off items, add a representative pollutant to the water sample (e.g.: student says "motor oil," teacher adds vegetable oil to the sample, student says "household hazardous waste," teacher adds food coloring.)

Recipe for Polluted Water	
-	3 tbsp vegetable oil (motor oil)
-	2 tbsp leaf litter (sewage)
-	1 tsp sand or mud (erosion)
-	5 drops of dish detergent (soap)
-	3 drops of food coloring (HHW)
-	Garbage (garbage)

Water Clean-Up Simulation

- Student groups will have 20 minutes to try to restore a polluted sample of the dreaded landfill leachate to its original clean state. Everything students can use to achieve this goal is at their learning station. There are three rules:
 1. Students must pour everything over the wash basin.
 2. Everyone in the group must have a chance.
 3. Before students can begin the clean-up, they must design how they will do it and show the teacher written steps on their lab sheet.
- After completing the clean-up, have each group show a sample of their cleaned water and report on their success and hardships to the class. Ask students:
 - What ways worked the best to clean the water?
 - What were the hardest pollutants to remove?
 - What were the easiest?
 - Were you able to remove everything? If not, why do you think it was so difficult to get the water clean?
 - What other tools or materials do you think would have helped you clean up the leachate if you had them for your use?
 - Only three drops of food coloring (household hazardous waste) was added to the water. Even though it was only a small amount, it was still difficult to remove from your sample. What does this say about household hazardous waste in the environment?
 - If students tried to dilute their water sample to get rid of the food coloring, ask them what happened. Did the food coloring ever leave the sample?

Convincing Others

- Ask students if they know how water is cleaned from their homes (e.g.: septic system, municipal treatment facility)? How is this similar to the methods they just tried? How is it different?
- Have students write a persuasive paragraph to convince others not to pour hazardous waste down the drain. In the paragraph, students should state specific reasons why this should not be done.

Extensions

Dilution Is Not the Solution

- Materials needed: strong smelling mouthwash, water, six clear containers, two graduated beakers.
- This experiment shows that dilution is not the solution to cleaning up pollution. Set up the following experiment as an independent learning station. Have students record the color and odor of the solution as it becomes progressively diluted.
 1. Solution A: Mix 10 units of strong smelling mouthwash and 90 units of water.
 2. Take 10 units of Solution A and mix with 90 units of tap water (one unit of mouthwash/ 100 units of solution). This is now Solution B.
 3. Take 10 units of the Solution B and add 90 units of tap water. This is now Solution C.
 4. Take 10 units of Solution C and add 90 units of tap water. This is now Solution D.
 5. Take 10 units of Solution D and add 90 units of tap water. This is now Solution E.
 6. Take 10 units of Solution E and add 90 units of tap water. This is now Solution F.

STUDENT OBSERVATION SHEET

	Smell	Color
Solution A		
Solution B		
Solution C		
Solution D		
Solution E		
Solution F		

Discussion questions: Did the mouthwash ever leave the solution? Why were you no longer able to detect the mouthwash with your eyes? What does this say about pollutants in water?

STUDENT WORKSHEET

Experiment Guidelines for the Water Pollution Clean-Up Learning Studies

Congratulations! You have accepted the challenge to clean the polluted water.

Directions:

Look carefully at what pollutants are in the water and what equipment you have to use to clean the water. Decide as a group what equipment would work best for cleaning each pollutant BEFORE you begin. Write down the steps you will take to clean the water. Show these steps to your teacher.

Any waste you remove from the polluted water sample should be placed in the empty container.

Fill in the chart below.

Name of the Pollutant	How will I try to remove it?	Was it removed from the water?
1.		
2.		
3.		
4.		
5.		
6.		