

GROW YOUR PALS PROGRAM GUIDE



THE NATIONAL FFA MENTORING PROGRAM

Sponsored by



LESSON 3.34

Hazards to Our Health

Unit:
MISCELLANEOUS

PRECEPTS

E. Awareness

E1. Address issues important to the community



Lesson Type:
Small Group

NATIONAL STANDARDS

CS.07.04.02.a. Handle chemicals and equipment in a safe and appropriate manner.

ESS.04.05.01.c. Describe the procedures for the treatment and disposal of hazardous materials and hazardous waste.

NL-ENG.K-12.12 – Applying Language Skills

STUDENT LEARNING OBJECTIVES

As a result of this lesson, the student will ...

- Cite examples of how *aquifers* can become polluted.
- List alternatives to *pesticides*.
- Describe the importance of properly storing chemicals.





TIME

Instruction time for this lesson: **25-30 minutes.**



RESOURCES

National FFA Organization. (2003). LifeKnowledge Precepts and Signs of Success.

What is an aquifer? (2009). What Is An Aquifer? Retrieved March 2, 2010, from Idaho Museum of Natural History website: <http://imnh.isu.edu/digitalatlas/hydr/concepts/gwater/aquifer.htm>

Aquifer review. (2009). Aquifer Review. Retrieved March 2, 2010, from Idaho State University website: http://wapi.isu.edu/envgeo/EG7_water/aquifer_review.pdf

About pesticides. (2009). About pesticides. Retrieved March 1, 2010, from EPA website: <http://www.epa.gov/pesticides/about/>

Aquifer in a cup. (2004). Aquifer In A Cup. Retrieved March 2, 2010, from EPA website: http://www.epa.gov/safewater/kids/pdfs/activity_grades_k-3_aquiferinacup.pdf



TOOLS, EQUIPMENT AND SUPPLIES

- ✓ One clear plastic cup
- ✓ Modeling clay or play-dough
- ✓ White play sand
- ✓ Aquarium gravel
- ✓ Red food coloring – one small bottle
- ✓ Bucket of clean water
- ✓ PALS3.34.SG.AS.A – one per student
- ✓ One tube of body powder
- ✓ Oscillating fan
- ✓ PALS3.34.SG.ASSESS.A – one per student

KEY TERMS



The following terms are presented in this lesson and appear in ***bold italics***:

Aquifer

Pesticide



CONTENT OUTLINE

Objective 1. | Cite examples of how *aquifers* can become polluted.

- I. Polluted *aquifers*
 - A. *Aquifer* – an underground body of rock through which water can easily move
 - 1. Rain water soaks through the ground
 - 2. As water seeps through the ground, it enters an *aquifer*
 - 3. A well may be drilled into the *aquifer* to retrieve water (called ground water)
 - 4. Groundwater is generally clean because rocks in the *aquifer* act as a natural filter, trapping sediment and other particles
 - 5. Here are many uses for groundwater
 - a. Irrigation
 - b. Drinking water
 - c. Household water supply
 - B. How *aquifers* become polluted
 - 1. Any pollutants that dissolve in rain water will be carried into the *aquifer*

Objective 2. | List alternatives to *pesticides*.

- I. Alternatives to *pesticides*
 - A. *Pesticide* – any substance used for preventing, destroying, or repelling pests
 - B. Examples of *pesticides*
 - 1. Insect destroyer
 - 2. Weed killer
 - C. Alternatives to *pesticides*
 - 1. Beneficial insects
 - a. Lady bugs eat aphids
 - 2. Pull weeds by hand

Objective 3. | Describe ways to remain safe near chemicals.

- II. Safety around chemicals
 - A. Chemicals may come in liquid, granular or powder form
 - B. Chemicals can become airborne, which can be dangerous to people
 - C. Practice safety when using chemicals
 - 1. Wear gloves
 - 2. Use a ventilation mask
 - 3. Wear safety goggles

INTEREST APPROACH

In this interest approach, you will facilitate a discussion about things that students are afraid of. This lesson is about safety, and this interest approach will help students make the connection about being afraid of things that threaten their personal safety.



There are many things that we are scared of. Think of something that is frightening.

Pause for a few seconds and allow students to think.



Who will share what they are afraid of?

Allow a few students to share and then continue.



Great examples! There are many things that we should fear, but what about water? This is probably something that most of us are not afraid of. We use water for many different reasons: to drink, to bathe, to brush our teeth. Hopefully the water we use is clean, but it is possible for water to become polluted. Today, we will discuss how the water we use, which comes from an **aquifer**, can get polluted by different chemicals and some ways that we can protect ourselves and our water. This is important because the cleanliness of water can have an effect on our personal safety – especially if the water is polluted. There is a lot of information to discuss, so let's keep our heads above water as we start our discussion about **aquifers**.

SUMMARY OF CONTENT AND TEACHING STRATEGIES

OBJECTIVE 1. | Cite examples of how **aquifers** can become polluted.



*Students may or may not be familiar with aquifers. This objective will provide students with a brief overview of what an **aquifer** is and how the water can become polluted. After explaining concepts to students, you will use the “**aquifer** in a cup” activity to help demonstrate the material presented.*

I. Polluted **aquifers**

In this part of the lesson, use PALS3.34.SG.AS.A. After an introduction to the topic, students will be given an activity sheet. You can have a student or a few students in the class help distribute these sheets. This activity sheet will be used by students to record information as you present it.



We may have heard the word **aquifer** before. Or, we may never have heard the word. Whether we have or have not heard the word is not important, but knowing what an **aquifer** does is important. Before we talk about this, each person will receive an activity sheet that pictures a diagram of an **aquifer** and has seven statements about **aquifers**.

Hold up the activity sheet and show to students.



Each statement has a word or two that have been omitted. As we talk about **aquifers**, fill in the blanks for each statement. What questions are there before we receive the sheets?

*Answer any question for clarification and then pass out the activity sheet. As you present information about **aquifers** to students, speak slowly enough for them to fill in the blanks and put emphasis on the words where a blank should be filled in.*



Now that we all have an activity sheet, let's continue. Look at the **aquifer** diagram on the sheet.

Pause for a few seconds while students look, then continue.



An **aquifer** is an underground body of rock through which water can easily move, but how does water get into an **aquifer**?

*Pause and allow a few students to respond. The correct answer is that rain water soaks through the ground, and as water seeps through the ground, it enters an **aquifer**. If the correct answer is not given, provide the answer to students and then continue.*

- A. **Aquifer** – an underground body of rock through which water can easily move
1. Rain water soaks through the ground
 2. As water seeps through the ground, it enters an **aquifer**



As we all know, water is very important and has many uses. So, in order to retrieve water from an **aquifer**, a well may be drilled. The water that we get from an aquifer is called groundwater. Groundwater is usually clean because the rocks in an **aquifer** act as a natural filter, trapping sediment and other particles.

3. A well may be drilled into the **aquifer** to retrieve water (called ground water)
4. Groundwater is generally clean because rocks in the **aquifer** act as a natural filter, trapping sediment and other particles



Think about all the things we use water for. What are some reasons we use water?

Allow a few students to respond, and then continue.



Nice work! There are many uses for groundwater that comes from an **aquifer**, such as irrigation, drinking water or a household water supply.

5. There are many uses for groundwater

- A. Irrigation
- B. Drinking water
- C. Household water supply



Think about the water we drink. It is important for the water we drink to be clean, but, not all water that comes from an **aquifer** is clean. Sometimes **aquifers** become polluted. This is because any pollutants on the ground that dissolve in the rain water will soak through the ground and be carried into the **aquifer**.

B. *How **aquifers** become polluted*

1. *Any pollutants that dissolve in rain water will be carried into the **aquifer***

Now, we will demonstrate how **aquifers** can become polluted.

*The “**Aquifer In A Cup**” activity will demonstrate the information just presented. You should complete this activity by yourself before attempting it with students to make sure you understand how it works. With your small group, complete the “**Aquifer In A Cup**” activity by following these directions (use PALS3.34.SG.AS.B for step by step visual instructions for setting up this activity):*

1. *Pour 1/4” of white sand in the bottom the cup completely covering the bottom of the container. Pour water into the sand, wetting it completely (there should be no standing water on top of sand). Let students see how the water is absorbed in the sand, but remains around the sand particles as it is stored in the ground and ultimately forming part of the **aquifer**.*
2. *Have a student flatten the modeling clay (like a pancake) and cover 1/2 of the sand with the clay (have a student press the clay to one side of the container to seal off that side). The clay represents a confining layer that keeps water from passing through it. Pour a small amount of water onto the clay. Let the students see how the water remains on top of the clay, only flowing into the sand below in areas not covered by the clay.*

3. *Use the aquarium rocks to form the next layer of earth. Place the rocks over the sand and clay, covering the entire container. To one side of your cup, slope the rocks, forming a high hill and a valley. Explain to students that these layers represent some of the many layers contained in the earth's surface. Now pour water into your **aquifer** until the water in the valley is even with your hill. Students will see the water stored around the rocks. Explain that these rocks are porous, allowing storage of water within the pours and openings between them. They will also notice a "surface" supply of water (a small lake) has formed. This will give them a view of both the ground and surface water supplies which can be used for drinking water purposes.*
4. *Use the food coloring and put a few drops on top of the rock hill as close to the inside wall of the cup as possible. Explain to students that often old wells are used to dispose of farm chemicals. Trash and used motor oils and other pollutants from above their **aquifer** can end up in their drinking water. They will see that the color spreads not only through the rocks, but also to the surface water and into the white sand at the bottom of the cup. Explain that this is one way pollution can spread throughout the **aquifer** over time.*



Thank you for being so cooperative with this activity. We talked about different examples of chemicals that can be pollutants. One such chemical is **pesticides**. Next, we will consider some alternatives to using **pesticides**.

OBJECTIVE 2. | List alternatives to **pesticides**.



Depending on your location, students may be familiar with pesticide usage on farms or on lawns. If you are in an urban setting where many students do not have a lawn, this concept may be difficult for some students to understand. Also, some students may hear the word "pesticide" and automatically assume that a pest is an insect. Keep in mind that a pest is anything that is potentially damaging such as weeds, rodents, or insects.

II. *Alternatives to **pesticides***



A **pesticide** is any substance used for preventing, destroying, or repelling pests. These typically come in powder, granular or liquid form. There are many different types of **pesticides**, such as an insect destroyer, referred to as an insecticide, or a weed killer, frequently called a herbicide.

- A. **Pesticide** – any substance used for preventing, destroying, or repelling pests

B. Examples of **pesticides**

1. Insect destroyer
2. Weed killer



While **pesticides** are often efficient to take care of the pests, there are alternatives that we can use instead of **pesticides**. A common insect that we view as a pest is an aphid. Think of an alternative to getting rid of aphids other than by using a **pesticide**.

Pause for a few seconds while students think.



Who will share an answer?

Pause and allow students to respond. The correct answer is to use lady bugs because they eat aphids but do not destroy plants. If the correct answer is not given, provide it to students and then continue.

C. Alternatives to **pesticides**

1. Beneficial insects
 - a. Lady bugs eat aphids



Great guesses. Now, here is another question. How could we get rid of weeds other than by applying a **pesticide**?

Pause and allow students to respond. The correct answer is to pull the weeds by hand. If the correct answer is not given, provide it to students and then continue.

2. Pull weeds by hand



Nice work today! We should consider alternatives to **pesticides** if they are available. However, if we are using **pesticides**, it is important that we think about our safety around the chemicals.

OBJECTIVE 3. | Describe ways to remain safe near chemicals.



III. Safety around chemicals



As discussed, chemicals, such as **pesticides**, can come in liquid, granular or powder form. Sometimes, these chemicals can become airborne, which is dangerous to people.

- A. Chemicals may come in liquid, granular or powder form
- B. Chemicals can become airborne, which can be dangerous to people



What are some things that we can do to practice safety when using chemicals?

Pause and allow a few students to respond. A variety of answers may be given. If the safety practices shown below are not given by students, tell them the three practices.

- C. Practice safety when using chemicals
 1. Wear gloves
 2. Use a ventilation mask
 3. Wear safety goggles



Nice work today. We can see how different pollutants, such as **pesticides**, can be harmful to people if they are airborne or get into our water supply. It is important that we be mindful of the effects that using different chemicals can have on people and the environment so that we can ensure our own personal safety and the safety of others.



REVIEW / SUMMARY



To review what we discussed, we will demonstrate how a chemical can become airborne, eventually landing on the ground and then potentially seeping into an **aquifer**.

*The following activity will help illustrate the concept of **pesticides** and safety near chemicals. Remind students that **pesticides** may come in powder form during this activity. You will want to complete this activity by yourself before completing it with students to ensure your own understanding. Also, cleaning materials (a broom and dustpan or wet cloth depending on how much powder you use) will be necessary at the conclusion of this activity. With your small group, complete the review activity by following these directions:*

1. Using powder, sprinkle a little on a tabletop. Have students imagine that the powder is a highly dangerous chemical.
2. Place the fan on the table, aiming it at the powder. Have a student turn the fan on, watching as the powder is spread into the air.
3. The powder will be highly visible, but explain to students that this trait is not exhibited by all chemicals



Thank you for being so cooperative with today's activities. Today, we have talked about how aquifers can become polluted, alternatives to **pesticides**, and protecting ourselves around chemicals. It is important that we understand how groundwater can become contaminated so that we can take steps necessary to prevent pollution. Furthermore, knowledge of pesticide usage and how to work with chemicals is important to maintaining our personal safety. Now that we are aware of how our actions can potentially be harmful, we should share this information with others to help prevent pollution to aquifers and help others be safe.

APPLICATION



One-on-One Idea

*Have student draw a picture of an **aquifer** becoming polluted and then ask the student to explain what is happening in the picture.*



Large Group Idea

*Discuss with students other activities that could pollute their **aquifer** or pollute water in general and what we can do to prevent water pollution.*



PALS3.34.SG.ASSESS.A | EVALUATION ANSWER KEY

1. a
2. b
3. b
4. a
5. Wear gloves, use a ventilation mask, wear safety goggles

PALS3.34.SG.AS.A

Name _____

Directions: Shown below is a diagram of an **aquifer**. Beneath the diagram are statements about **aquifers**. Fill in the blanks of each statement.

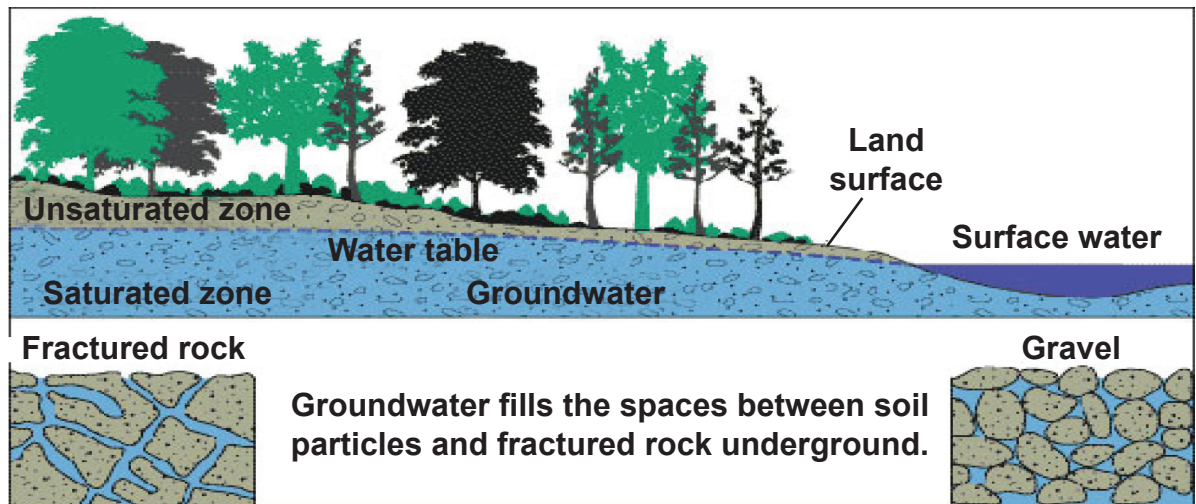


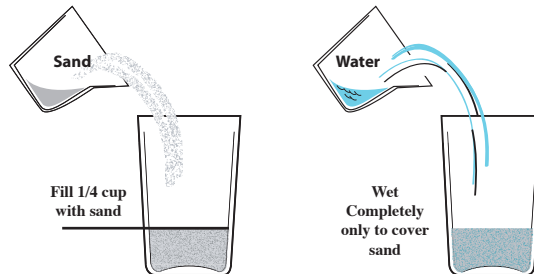
Image compliments of US Geological Survey, adapted by the Groundwater Foundation.

1. An aquifer is an _____ body of rock through which _____ can easily move.
2. When rain falls from the sky, rain water _____ through the ground.
3. To retrieve water from an aquifer, a _____ may be drilled.
4. We refer to water that comes from an aquifer as _____.
5. The rocks in an aquifer act as a natural _____, trapping sediment and other particles. This is why ground water from an aquifer is generally clean.
6. Groundwater has many uses including irrigation, _____, and household water supply.
7. Aquifers become _____ when harmful materials dissolve in rain water and seep through the ground.

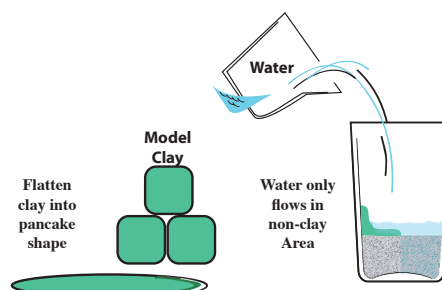
PALS3.34.SG.AS.B

Aquifer In A Cup

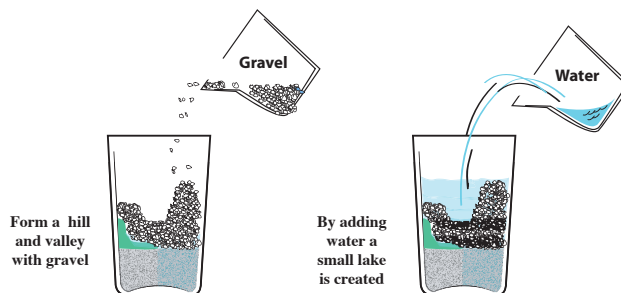
1. Pour 1/4" of white sand in the bottom the cup completely covering the bottom of the container. Pour water into the sand, wetting it completely (there should be no standing water on top of sand). Let students see how the water is absorbed in the sand, but remains around the sand particles as it is stored in the ground and ultimately forming part of the **aquifer**.



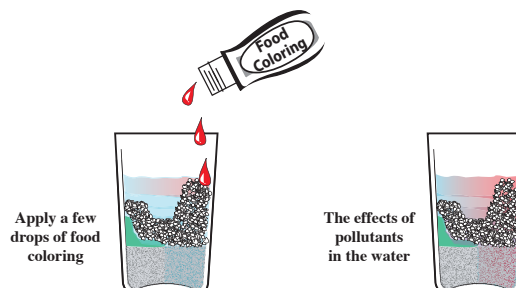
2. Have a student flatten the modeling clay (like a pancake) and cover 1/2 of the sand with the clay (have a student press the clay to one side of the container to seal off that side). The clay represents a confining layer that keeps water from passing through it. Pour a small amount of water onto the clay. Let the students see how the water remains on top of the clay, only flowing into the sand below in areas not covered by the clay.



3. Use the aquarium rocks to form the next layer of earth. Place the rocks over the sand and clay, covering the entire container. To one side of your cup, slope the rocks, forming a high hill and a valley. Explain to students that these layers represent some of the many layers contained in the earth's surface. Now pour water into your aquifer until the water in the valley is even with your hill. Students will see the water stored around the rocks. Explain that these rocks are porous, allowing storage of water within the pores and openings between them. They will also notice a "surface" supply of water (a small lake) has formed. This will give them a view of both the ground and surface water supplies which can be used for drinking water purposes.



4. Use the food coloring and put a few drops on top of the rock hill as close to the inside wall of the cup as possible. Explain to students that often old wells are used to dispose of farm chemicals, trash and used motor oils and other activities above their aquifer can end up in their drinking water. They will see that the color spreads not only through the rocks, but also to the surface water and into the white sand at the bottom of the cup. Explain that this is one way pollution can spread throughout the aquifer over time.



PALS3.34.SG.ASSESS.A

Name _____

Directions: Read each statement and decide whether it is true or false.

1. _____ An aquifer is an underground body of water through which water can easily move.

- a. True
- b. False

2. _____ Aphids are a beneficial insect because they eat ladybugs and ladybugs destroy plants.

- a. True
- b. False

3. _____ Chemicals only come in liquid form.

- a. True
- b. False

4. _____ Groundwater is used for drinking water.

- a. True
- b. False

Write an answer to the following question.

5. What are three ways you can practice safety around chemicals?