

Chemicals in Rural Areas

background information & activity book

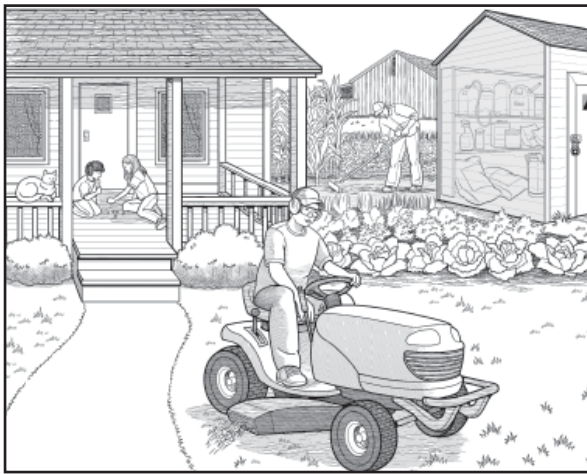


Rural Chemical Safety Educational Packet

Chemicals are all around us and can be very beneficial if used correctly. This English and Spanish packet is about chemical safety on the farm, within the rural environment, and in the house. The packet is intended for use by the presentation leader, either an older youth or an adult. Older students make great instructors. Younger kids look up to the older ones as role models and the older students gain skills in the topic and program delivery.

The packet includes:

- ▶ Background reference material
- ▶ Lesson plans to make presentations interesting and interactive for many age groups
- ▶ Puzzles that are easy to reproduce



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Refer to the Farm Safety for Just Kids web site at www.FarmSafetyForJustKids.org for additional information.

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Where are chemicals in rural areas found?

The farm continues to be one of the most hazardous places to live and work due to the nature of the farm's environment, work tasks, and conditions. Because the farm serves as both a work place and a home children are often exposed to farm work at an early age. A large number of children perform relatively hazardous tasks on the farm and many are hurt in the process.

The 2010 childhood Agricultural Injury Fact Sheet from the National Children's Center confirms that children and youth are at risk.

- ▶ There are approximately 2.2 million farms in the United States, with 1.12 million youth living on these farms.
- ▶ More than half of all youth living on these farms performed work or chores.
- ▶ In 2006, an estimated 23,074 injuries occurred to children and youth on U.S. farms.
- ▶ Two-thirds of injured children were not actively working when the injury occurred.

Children's lack of experience, knowledge, training, strength and body size, combined with curiosity and feelings of invincibility put them at great risk. Other factors also expose children to hazards within the farm environment: children working because of economic necessity; parents wanting to instill a sense of responsibility and work ethic; a lack of available child care; and cultural tradition of the farmstead as a playground for children. Many farm tasks make the farm hazardous including the use of chemicals.

Chemicals are found in food, in clothing, in water, on our lawns, and in fields to help produce crops. Chemicals and chemical reactions are found naturally within our environment. Mold grows on a piece of bread or corn, yeast grows when sugar and water is added to make bread rise, and vinegar and baking soda is added to a drain for cleaning purposes. These chemical related actions happen all the time, and we use them to our advantage.

Chemicals can also be created in a synthetic form and used to destroy organisms. Household examples include: dandelion killer, ant and roach killer, toilet bowl cleaner, and mildew remover. Pesticide refers to any substance intended to

control, destroy, repel, or attract a pest, and can be either plant or animal based.

Chemicals have been used since the beginning of time, with an increase in the use of synthetic chemicals in recent years. Concern has been expressed about the possible harmful health effects to humans due to the increased use of chemicals, potency of some chemicals, and uncertainty of effects on humans. Likewise, there is cause for concern about the impact of chemical use on the environment. Many claim the amount of chemicals used today may have a detrimental effect on future generations.

Agriculture is a large user of chemicals to increase yields at a lower cost, grow new and more bountiful grains, and prevent illness in livestock. The 2005 USDA Regional Pest Management Center report showed how much fertilizers and pesticides are used on certain crops. For example: Of all the corn producers, ninety seven percent used herbicides and twenty percent used insecticides. Ninety seven percent of cotton producers used herbicides and eighty four percent of them used insecticides. Chemicals are applied by both farmers and custom applicators. Whether the farmer does the chemical application or it is done commercially, may have an impact on the exposure to family individuals.

Some farmers have implemented alternative agricultural practices which do not rely on the use of chemicals commonly known as organic farming. Organic farmers are growing in numbers. The demand for food produced without the use of chemicals is increasing, but farmers may find it difficult to produce the quality and quantity of food which consumers have come to expect. Food safety and the effect of chemical by-products and residue have caused concern for the health of the general public. Chemical proponents also point out that chemicals can positively impact reduced bacteria count and longer shelf life.

CHEMICALS AND FOOD

In spite of the chemicals used on crops, the food we eat has never been safer. Government regulations require food be tested to insure there

is very little chemical residue. Still, food eaten raw may contain trace amounts of chemicals. Because a healthy diet includes fresh fruits and vegetables, children need to understand the importance of removing the trace amount of chemical residue that may be present.

Chemicals may be introduced into food during production. Regulations require a period of time before harvest when chemicals cannot be used. Even so, residue may be present if not removed from the food product prior to going to market. Most residues will be on the outside surface of the food product. Washing will remove most residue.

To ensure safety of the food we eat:

- ▶ Wash all fruits and vegetables before eating
- ▶ Peel fruits and vegetables to remove surface residue
- ▶ Throw away outer leaves of leafy vegetables
- ▶ Cooking food reduces some, but not all, chemical residue so it is important to wash all fruits and vegetables before cooking.

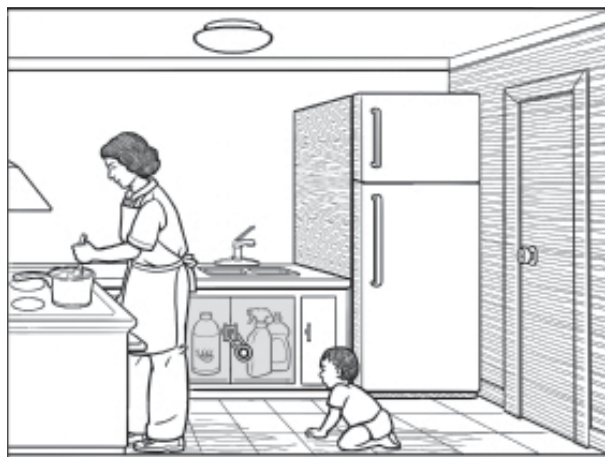
CHILDREN AND CHEMICALS

Children's ability to process chemicals is different than adults. While scientists don't have all the answers to how chemicals affect children, they do know their mental, emotional, and physical development is unique.

Differences that impact chemicals' effects on children include:

- ▶ Chemical exposure can start at conception when the fetus is in a critical period of development
- ▶ Children's bodies are immature with underdeveloped detoxification mechanisms
- ▶ Brain and organ systems are in developmental stages
- ▶ Children breathe faster and drink more in proportion to their body size which results in greater exposure
- ▶ Children spend a lot of time outside and often play close to the ground
- ▶ Children place their hands and other objects in their mouths that may have been exposed to chemicals
- ▶ Children are less aware of the potential risks around themselves

Chemicals are in every household, and therefore children can be exposed to many chemicals each day. According to the American Association of Poison Control Centers, children younger than 3 years of age were involved in 38.7% of poisoning cases and children younger than 6 years accounted for over half of all human exposures. The home is a place that young children can relate to and learn the concepts of poisoning prevention. When children are older, we hope they will remember the concepts of staying safe around chemicals taught within this packet and apply it to chemical use on the farm. It is also important to take training in safe chemical application before youth begin applying chemicals.



Prevention Tips

- ▶ Lock cabinets, drawers, and closets where chemicals are stored
- ▶ Place chemicals in areas beyond the reach of children
- ▶ Use child-proof lids
- ▶ Discard chemicals that are not being used
- ▶ Supervise young children closely
- ▶ Keep all chemicals in their original, labeled containers

Chemical safety suggested scope and sequence

	Suggested Concepts	Suggested Activities	Objectives
Play Age (3 to 4)	<ul style="list-style-type: none"> Importance of rules and guidelines Staying away from chemicals Household chemical barriers 	<ul style="list-style-type: none"> Safe habit enforcement Establish safe play areas Set play yard limits 	<ul style="list-style-type: none"> Identify and use safe play areas on the farm Recognize dangerous play areas Seek help if needed
School Age (5 to 11)	<ul style="list-style-type: none"> Danger word/symbol recognition Staying away from chemicals Household chemical identification Chemical uses 	<ul style="list-style-type: none"> Establish safe play areas Categorize signal terms Warning decals on chemical storage areas Emergency planning 	<ul style="list-style-type: none"> Interpret chemical information on labels Understand the importance of staying away from chemicals
Early Adolescence (12 to 14)	<ul style="list-style-type: none"> Yard chemical use Exposure issues Reading labels First aid Environmental issues 	<ul style="list-style-type: none"> Proper storage identification First aid training Environmental discussion 	<ul style="list-style-type: none"> Determine effects of chemical use on individuals and the environment Use chemical label information to identify proper prevention procedures
Late Adolescence (15 to 18)	<ul style="list-style-type: none"> Appropriate clothing (PPE) Results of excessive exposure Costs and benefits of chemical use Chemical storage Preventing chemical exposure incidents First aid 	<ul style="list-style-type: none"> PPE/clothing selection Symptom identification Math problems/cost factors Chemical misuse First aid training Adolescents teaching peers and younger youth 	<ul style="list-style-type: none"> Identify proper response for chemical contamination Examine results of improper use of chemicals Analyze the current use of chemicals on the farm

How do rural chemicals work and affect us?

Chemicals are used in the production of agricultural products to destroy various pests that inhibit crop growth and increase production.

Listed below are terms related to rural chemical use and their definitions:

- ▶ Chemical – substance that creates a reaction
- ▶ Pesticide – a substance used to destroy any pest
- ▶ Herbicide – a substance used to kill unwanted plants
- ▶ Insecticide – a pesticide used for controlling insects
- ▶ Fungicide – a substance which destroys fungi
- ▶ Rodenticide – a pesticide which controls rodents such as mice and rats
- ▶ Other “cides” are available to control pests, each having its own target (example: algacide, bactericide)
- ▶ Fertilizer – substance added to soil to improve fertility
- ▶ Hazard - risk of harmful effects
- ▶ Toxicity – how poisonous the chemical is
- ▶ Exposure – amount of contact with a chemical
- ▶ Non-target effects – destruction of unintended organism in the process of chemical application

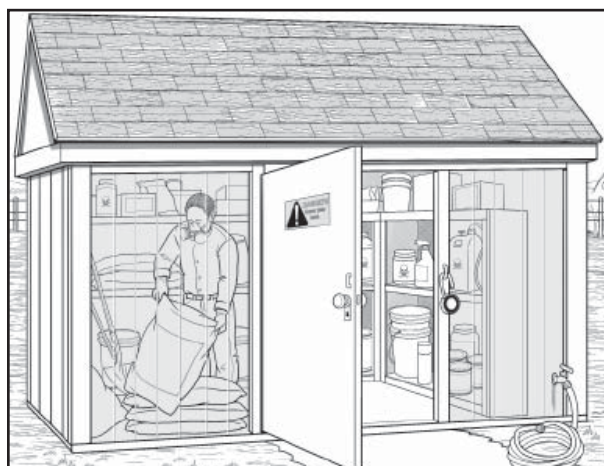
Because some pests have systems similar to the human system, some chemicals can harm or kill humans if mishandled. Insecticides attack internal organs or other systems inside the body and poison the pest. Some pesticides are highly toxic, and even a small exposure can cause harmful effects. Escape harmful effects by avoiding exposure to pesticides, using personal protective equipment (PPE), or selecting the least toxic option.

Other chemicals used on the farm such as cleaners can be dangerous if used in concentrations higher than recommended or used improperly. Dairy pipeline cleaner, which is used to kill bacteria in the pipelines that transport milk in the milk house, is an example. These chemicals can have serious effects on the mucous membranes and skin if swallowed or can be lethal.

Fertilizers are substance used for their plant nutrient content to promote plant growth. Anhydrous ammonia is a common fertilizer that is a source of nitrogen. Exposure to anhydrous ammonia might lead to eye damage, lung damage,

severe burns, cell destruction, and death. Make sure tanks are in secure locations to avoid accidental exposure to children. Children are curious and may explore in “forbidden” locations.

Chemicals can be toxic in two ways: chronic (continuing and lingering) and acute (reaching a crisis rapidly). A chronic toxic effect is usually noted after repeated exposures to a toxic substance or after an extended exposure. Chronic toxic effects include cancer and reproductive problems or disorders. Acute toxic effects occur promptly upon exposure, or within a few hours and may include blindness or sudden death. The main precautionary measure for toxins is to minimize a person’s exposure to them.



EXPOSURE

Toxic substances can enter the body by:

- ▶ Inhalation – toxins entering the body through the nose or lungs
- ▶ Injection – cuts from contaminated, broken glassware or a sharp knife or a needle used in livestock vaccination
- ▶ Absorption through the skin – (dermal exposure) usually the hands, which leads to transfer to other part of the body; for example, transfer to the genital area (the most susceptible part of the body) when using the bathroom
- ▶ Ingestion or oral exposure – drinking a liquid chemical or eating a sandwich with chemically contaminated hands
- ▶ Ocular (eye) exposure – splashes and spills

Ninety seven percent of chemical spraying exposure happens through contact with the skin (dermal).

Prevention Tips

- ▶ Do not enter a field posted as a restricted-entry interval zone
- ▶ Prevent chemical exposure to family members by changing clothes and showering after chemical use
- ▶ Wash work clothes separately from family clothes
- ▶ Leave an area that has a strong ammonia or other chemical odor
- ▶ Stay clear of hose and valve openings on spraying equipment
- ▶ Store chemicals in original containers and in locked areas
- ▶ Secure anhydrous ammonia tanks to avoid accidental exposure to children
- ▶ Do not allow children in chemical mixing and loading areas
- ▶ Do not use empty chemical containers for other uses

CHEMICAL HAZARDS

Generally, chemicals have the potential to be dangerous in four ways:

- ▶ Flammable – capable of bursting into flames
- ▶ Corrosive – capable of eating away a surface
- ▶ Toxic – capable of poisoning
- ▶ Reactive – ability to respond to other substances – possibly violently

A chemical may present more than one hazard.

Safe response if chemical exposure takes place:

- ▶ Have water close by to wash exposed area
- ▶ Wash exposed areas with water and soap immediately
- ▶ Seek medical attention if symptoms listed on chemical label associated with exposure are detected

ENVIRONMENTAL ISSUES

Children must be aware of the environment and become wise stewards of it. The use of all chemicals, including farm chemicals, impacts the environment. Chemicals released into the environment can have adverse effects on ecological and human health. Some chemicals are potential or suspected carcinogens and may be toxic to human and wild life.

Environmental concerns

- ▶ Water soluble pesticides and fertilizers may contaminate lakes, rivers, and ground water.
- ▶ Some chemicals bind to soil particles and can enter the water sources from soil erosion.
- ▶ Residues of pesticides can be found in surface water in both urban and rural areas.
- ▶ Concentrations of herbicides, insecticides, and fertilizers are usually highest during the spring and summer, the usual application period for agricultural pesticides.

Most farmers who use chemicals in the production of agricultural products do so wisely. People that apply chemicals on their own farm or commercially for a living are required to take training about safe chemical handling, use, and discarding. Training for homeowners and gardeners in safe chemical use and sustainable lawn and garden maintenance, while not required, is available.

DISPOSAL OF LEFTOVER CHEMICALS AND CHEMICAL CONTAINERS

Leftover household products that contain corrosive, toxic, ignitable, or reactive ingredients are considered to be "household hazardous waste" or HHW. Products, such as paints, cleaners, oils, batteries, and pesticides that contain potentially hazardous ingredients require special care when you dispose of them.

Improper disposal of household hazardous wastes include pouring them down the drain, on the ground, into storm sewers, or in some cases putting them out with the trash. The dangers of such disposal methods might not be immediately obvious, but improper disposal of these wastes can pollute the environment and pose a threat to human health.

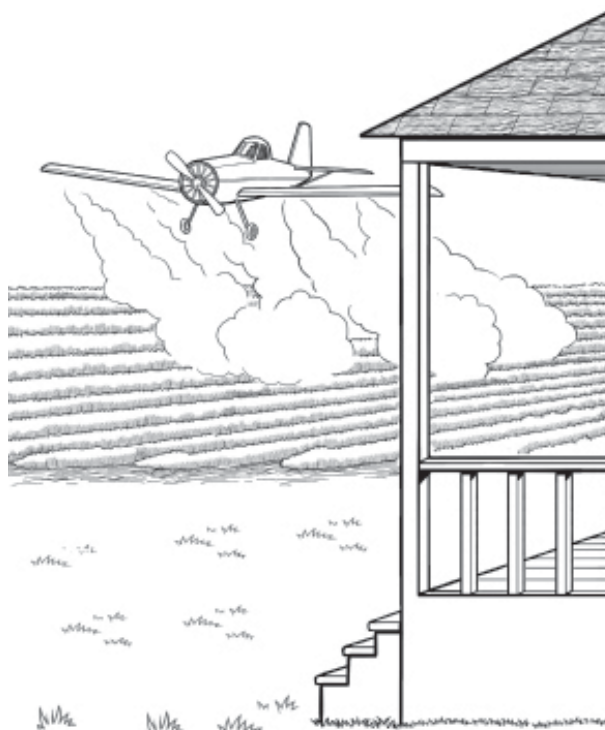
Many communities have collection programs for HHW to reduce the potential harm posed by chemicals. Call your local environmental, health, or solid waste agency for the time and location of your HHW collection program. Read product labels for disposal directions to reduce the risk of products exploding, igniting, leaking, mixing with other chemicals, or posing other hazards on the way to a disposal facility. Check with your community if HHW product containers may be recycled. Farmers should check with their state agency or local Extension center to learn about collection programs for unwanted chemicals. They are usually operated at reduced or no cost.

When chemicals are used on the farm, the containers may contain residual amounts of the chemical when it is empty. At the time the farmer or applicator is mixing the pesticides for application, pesticide containers should be rinsed three times or pressure-rinsed with a special nozzle. The rinse water should be drained into the chemical mixing tank. The pesticide containers are then ready to be recycled. Products such as industrial pallets, agricultural drain pipe, and speed bumps are made out of the plastic from these recycled containers. This helps the environment by preventing pollution from burning and saving space in landfills.

Groundwater can be the source of water used for public consumption. Concern about chemical contamination in groundwater is often strong in rural communities due to agricultural chemical use and waste product disposal.

Prevention Tips

- ▶ Use chemicals according to label instructions
- ▶ Check city, county, state, or provincial regulations concerning chemical disposal
- ▶ Dispose of chemical containers properly



How can rural chemicals be used safely?

The use of farm chemicals by children is not being advocated. If adolescents are using chemicals in situations such as weed control in the yard, supervision and training by adults is needed.

SAFE HOUSEHOLD CHEMICAL USE

Chemicals are found in every household. While most of this use is intended for adults, children often come into contact with these same products.

Many household chemicals look like other nonhazardous household products. Children who cannot read may easily mistake items of the same size, weight and color. A child might think: It looks the same, why not try it? Unfortunately, a can of tomato bug dust can easily be mistaken for a can of parmesan cheese.

Young children are constantly exploring and investigating which can also lead to trouble. Very young children have a tendency to put everything in their mouths. Seventy-four percent of all exposure for human poisonings in the home came from eating the chemical.

Household chemical, cleansers, and medicines normally stored in these areas should be placed out of children's reach or the doors shut and locked. Never store chemicals in bottles or jars other than the original container with the label.

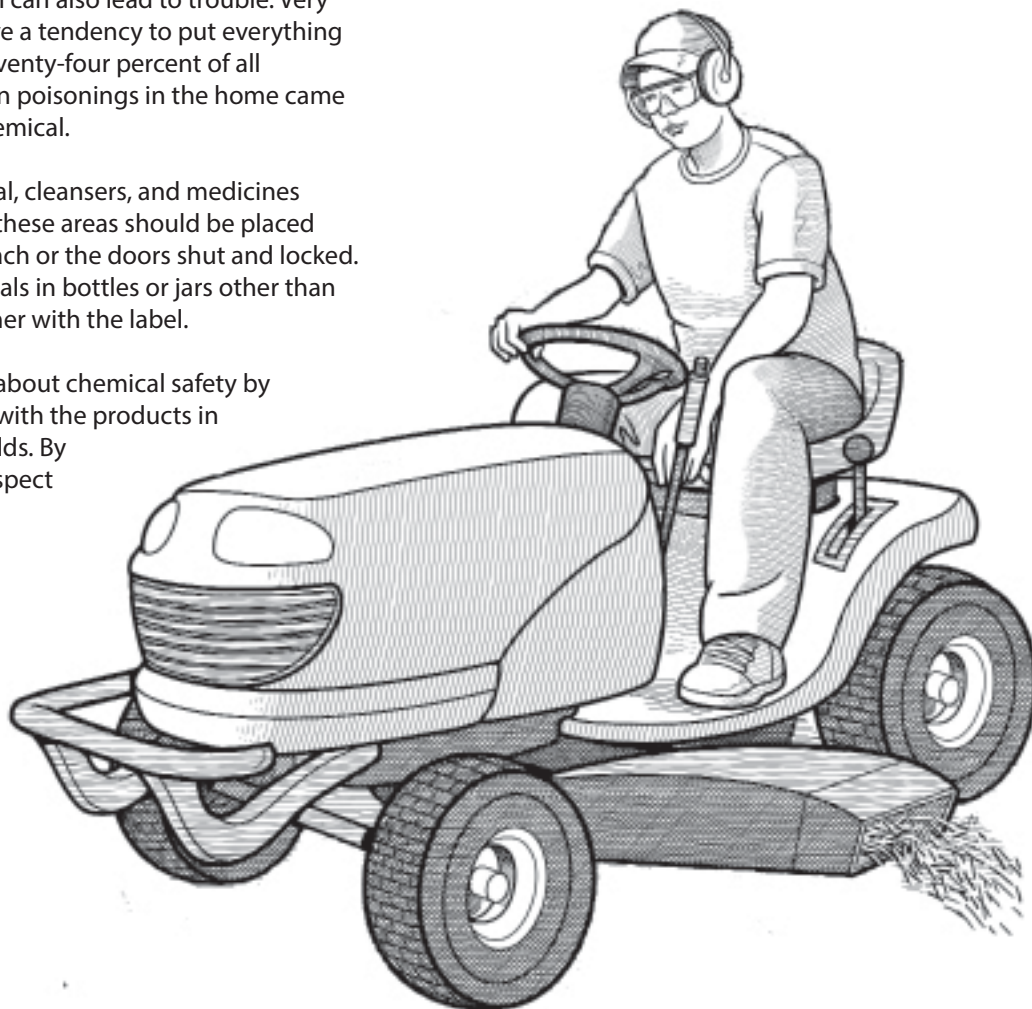
Children can learn about chemical safety by becoming familiar with the products in their own households. By teaching proper respect

for common household chemicals you are helping children develop safe habits around all chemicals, whether in the house or on the farm.

Children who are too young to talk can't tell you they have ingested a dangerous item. Some children may be reluctant to admit they have eaten something they should not have eaten. Close supervision of children is important.

If you suspect a child has consumed dangerous chemicals watch for the following signs:

- ▶ Vomiting
- ▶ Drowsiness or sluggishness
- ▶ Uniquely colored substance around the mouth or teeth
- ▶ Burns around the lips or mouth from corrosive materials
- ▶ Smell of the product on the child's breath



LAWN CHEMICAL SAFETY

Often, one of the first tasks adolescents are assigned is mowing the yard. Lawn chores can teach youth responsibility. However, lawn care often involves chemicals. Gasoline fuels the mower engine, fertilizers nourish the grass, and herbicides destroy weeds. Adolescents need to be taught the proper use of these chemicals so they do not become victims of exposure.

These products must be selected, used, and stored with care to protect the environment, the gardener, and family. This may be the first time adolescents are responsible for selection and administration of chemicals. Teach young people the proper procedures and precautions when using them.

Consider the following when applying chemicals to a yard or garden:

- ▶ Proper product – Is the least toxic product used to do the job to avoid harming the applicator, other people, plants, animals, or the environment?
- ▶ Site – What else is close to the application site where other vegetation, animals, or children may be exposed?
- ▶ Equipment – Is special equipment such as a sprayer required? If the proper equipment is not available it may increase the cost of application as well as the danger.
- ▶ Personal Protective Equipment (PPE) – What (PPE) is required on the label? The label will indicate how to protect the applicator from chemical exposure.
- ▶ Chemical Form – Does the product come premixed? This can reduce the risk of exposure.
- ▶ Disposal of containers – Does the product come in the amount required for this application? Purchasing only the amount needed will eliminate storage concerns. Is disposal procedure of the containers followed by all who use the chemicals? The label will recommend how to properly dispose of any unused or unwanted pesticide and the pesticide container.

Prevention Tips

- ▶ Read the label carefully to be sure the chemical is correct for the intended use
- ▶ Store all chemicals in original containers
- ▶ Follow all instructions on chemical labels
- ▶ Lock up household chemicals, medicines, and cleansers away from young children's reach
- ▶ Purchase products in child-resistant packaging
- ▶ Keep a listing of all emergency phone numbers by each phone

FARM CHEMICAL USE AND HANDLING

Chemical Exposure Dangers

Labels indicate the toxicity of the product. These signal words will indicate the degree of hazard involved in the specific chemical used.

- ▶ Danger – Highly toxic
- ▶ Warning – Moderately toxic
- ▶ Caution – Low toxicity

Chemicals may produce illness or injury if used incorrectly.

External signs of pesticide exposure

- ▶ Redness, swelling, or blistering of the skin
- ▶ Shortness of breath
- ▶ Rapid breathing
- ▶ Excessive saliva
- ▶ Nausea
- ▶ Diarrhea

Internal signs of pesticide exposure

- ▶ Stinging and swelling of the eyes, nose, mouth, and throat mucous membranes
- ▶ Headache
- ▶ Dizziness
- ▶ Mental confusion

HANDLING AN EMERGENCY RELATED TO CHEMICAL EXPOSURE

If chemical poisoning takes place in your home:

- ▶ If you suspect pesticide exposure, call Poison Help at 1-800-222-1222. This national number automatically forwards the call to the closest poison center. Be ready to give details to the medical personnel.
- ▶ Stay calm and call 9-1-1 or emergency personnel number. Be prepared to give the victim's age, weight, and health condition; facts about the incident to the emergency personnel and the victim's physical signs of exposure and the person's symptoms
- ▶ Have the label ready to read to the medical personnel on the phone. If the container is contaminated, place it in a double plastic bag when seeking medical attention.
- ▶ Do not give anything by mouth until advised by Poison Control Center or attending medical personnel. Keep syrup of ipecac on hand but do not use unless advised by the Poison control Center or the attending medical personnel.



STORAGE

If farm chemicals must be stored, they should be kept in locked storage areas, marked with warning decals indicating danger. Children need to be taught the meaning of warning decals and given clear instructions to stay away from these areas.

Chemical Storage should have:

- ▶ Locked storage units
- ▶ Water resistant floors
- ▶ Well ventilated building
- ▶ Never stored near food, feed, fertilizer, or seed because of the risk of contamination
- ▶ One way to prevent chemical storage problems is by disposing of any unused or outdated chemicals.

PERSONAL PROTECTIVE EQUIPMENT (PPE) [ADULT AND OLDER YOUTH INFORMATION]

Personal protective equipment (PPE) is worn by adults during chemical application to prevent the applicator from exposure to chemicals. All PPE should be disposable or easy to clean and sturdy enough for repeated use.

A football player wouldn't go out on the field to play without a helmet. The same protection is needed to reduce risk when working with chemicals. Each container label has specific requirements for PPE based on the ingredients in the chemical. This may include a respirator or dust mask, eye protection, chemical resistant apron, and waterproof gloves. At a minimum, wear clothing that covers the entire body, including long sleeve shirts and pants, jeans, or coveralls.

PPE does not come in sizes that will fit children's small body sizes because they should not be handling pesticides. Stress to children the importance of the PPE listed on the product label. Knowledge about PPE can help children prepare for when they may be using chemicals during adulthood.

LAUNDRY AND CHEMICALS

Protective clothing worn during chemical application will be contaminated.

When this clothing enters the house the contamination can expose others in the household to the hazards by direct contact, washing machine residue to other clothing, and indirect contact of placing garments on furniture/floors/counters.

It is difficult to remove all traces of residue from clothing worn during chemical application. Chemical residue needs to be removed from the washer before other clothing is laundered.



Tips for laundering clothing worn during chemical application

- ▶ Read the chemical label for laundering information
- ▶ Avoid exposing children, pets, and furniture to contaminated PPE
- ▶ Collect and sort contaminated clothing separately from other laundry
- ▶ Use a disposable container such as a plastic bag or cardboard box when sorting clothing
- ▶ Wear pesticide-resistant gloves when sorting and dispose of gloves after use
- ▶ Leave contaminated boots and shoes outside the house
- ▶ Pre-rinse PPE, this could be done outdoors in a disposable container
- ▶ Wash PPE as soon as possible after contamination and separately from the family's laundry
- ▶ Use hot water when washing
- ▶ Rinse washing machine completely before washing other clothing
- ▶ Line dry clothing worn during chemical application

WORKERS USING CHEMICALS

The U.S. Environmental Protection Agency (EPA) has established guidelines called Worker Protection Standards (WPS) and training for the safe use of chemicals to protect workers.

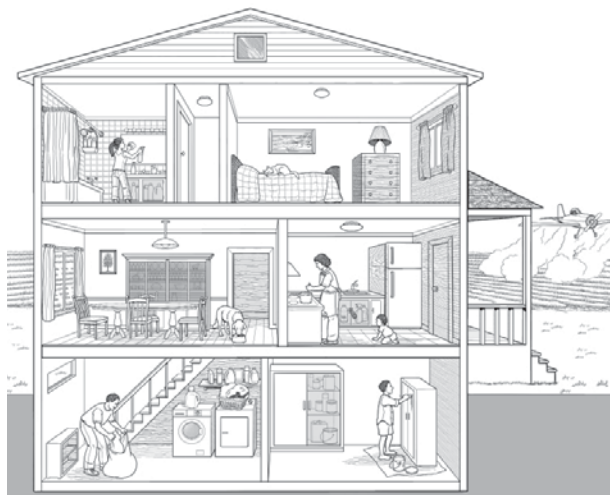
- ▶ Educational materials have been developed so agricultural workers know their rights when required by their employers to work with chemicals.
- ▶ Time periods have been established for safe reentry into exposed areas.
- ▶ Signs must be posted telling workers and others to stay away.
- ▶ Children need to be taught the meanings of these Restricted Entry Internal (REI) signs and warned about the dangers if they enter a posted field.

Responsibility, respect, and reality are essential components for individuals to make wise choices about chemical use. Everyone is responsible for ensuring the wise use of chemicals and proper disposal of chemical by-products and containers.

Respect the rights of others and their decision about individual chemical use. The reality remains that each of us is exposed to chemicals everyday in one way or another. How we choose to deal with chemicals and our exposure to them is based on our knowledge, skills, values, and attitudes about chemicals and the environment.

Suggested References

- ▶ EPA (Environmental Protection Agency)
- ▶ NIOSH (National Institute for Occupational Safety and Health)
- ▶ Extension
- ▶ Poison Control Center



Prevention Tips

- ▶ Handle contaminated PPE cautiously
- ▶ Have emergency phone number by each phone
- ▶ Lock all chemicals away from young children
- ▶ Heed all warnings listed on chemical labels
- ▶ Be familiar with warning signs of chemical exposure
- ▶ Store all chemicals in their original containers
- ▶ If chemical exposure takes place, seek immediate medical attention
- ▶ Keep a clean copy of pesticide labels or label booklet in accessible area

Evaluation

Conducting surveys of your intended program audience can identify knowledge about chemical safety. If the surveys are done before an educational program takes place, it will give the presenter a basis for where his/her audience is in relation to chemical safety. The educational program can then target issues lacking by the audience.

The surveys can be conducted again after the program has taken place in a pre and posttest format. This will identify change in knowledge. The resulting information could make a great newspaper article when reporting the changes made by your audience.

On page 15 are questions related to the information in this packet. Take into consideration what topics you plan to cover in your presentation and program. If you will not be covering organic farming, don't use the questions related to this topic. The questions can be combined or rewritten to be specific to your program.

Surveys can be completed and tabulated several ways. They can be copied, distributed, completed, collected, and tabulated by hand if there are only a few surveys. If many surveys will be completed, an easier way to complete the process is using an electronic software package; some of them are free if you want only basic analysis results. Use their suggestions to ensure a good response rate.

ANSWER KEY: 1:d, 2:c, 3:b, 4:c, 5:d, 6:c, 7:b, 8:d, 9:b, 10:d, 11:b, 12:b, 13:d, 14:a

SELF ASSESSMENT

The self-assessment tool can be used to identify behaviors used by your audience. If used before your presentation, it can be used to identify areas that need special attention. If used after the program, it can be used to see if your audience has changed their behavior when compared to the assessment done prior to the program. This information is self-reported so there is a chance the information may be slanted.

Student Self-Assessment of Safe Behavior When Around Chemicals

	Always	Sometimes	Never
I dispose of unused chemicals properly			
I wash raw fruits and vegetables before eating			
I remove outer leaves of leafy vegetables before eating			
I do not consume substances that are unmarked			
I supervise children when chemical application is taking place			
I do not enter a field posted as restricted-entry			
I leave an area that has a strong ammonia smell			
I store unused chemicals in their original containers			
I can recognize a person with symptoms of unsafe chemical consumption			
I use proper protective clothing when applying lawn chemicals			

1. Where are chemicals found?
 - a. In clothing
 - b. On the farm
 - c. In the environment
 - d. All of the above contain chemicals
2. Farmers use chemicals to...
 - a. Reduce yields
 - b. Increase production costs
 - c. Prevent illness in livestock
 - d. All of the above
3. Which of the following statements is true of organic (food grown without chemicals) farming?
 - a. It is usually less expensive to produce farm crops
 - b. Labor time is usually greater
 - c. Yield of food produced is higher
 - d. Bacteria count on organically produced food is usually less
4. How can chemicals on food we eat be removed?
 - a. Do not peel raw fruits and vegetables
 - b. Eat the outer leaves of leafy vegetables
 - c. Wash fruits and vegetables before eating
 - d. None of the above will reduce chemicals
5. What are ways to prevent children from chemical exposure in the house?
 - a. Lock cabinets where chemicals are stored
 - b. Use child-proof lids
 - c. Keep all chemicals in their original containers
 - d. All of the above
6. What chemicals would a farmer use to eliminate mice or rats in the barn?
 - a. Fungicide
 - b. Insecticide
 - c. Rodenticide
 - d. Herbicide
7. What would a farmer use if he/she wanted to promote plant growth?
 - a. Pesticide
 - b. Fertilizer
 - c. Carbon
 - d. Salt
8. How can chemicals enter the body?
 - a. Through the nose or mouth
 - b. Injection via a cut in the skin or hypodermic needle
 - c. Absorption through the skin
 - d. All of these are possible
9. Which of the following would be a good way to dispose of a hazardous waste product?
 - a. Down the drain
 - b. Take it to a solid waste agency collection program
 - c. Put it in the trash
 - d. Poured on the ground
10. Which of the following might indicate someone had consumed a dangerous chemical?
 - a. Vomiting, nausea, and rapid breathing
 - b. Drowsiness or sluggishness
 - c. Burns around the lips of mouth
 - d. All of the above could indicate chemical ingestion
11. Which of the following words on a chemical label is the most deadly?
 - a. Caution
 - b. Danger
 - c. Warning
 - d. Potent
12. How should clothing be handled after it was worn to apply chemicals?
 - a. Washed with the other family member's clothing
 - b. Use hot water when washing clothing
 - c. Use a reusable container when sorting clothing before washing
 - d. All of the above are good ideas
13. Which of the following is NOT a safe way to store chemicals?
 - a. In their original containers
 - b. In a well ventilated building
 - c. In a locked facility
 - d. In a glass soda container
14. Why might young children be at greater risk for chemical exposure?
 - a. Children are less aware of the potential risks around them
 - b. Children breathe slower than adults
 - c. Children usually don't put things in their mouths without permission
 - d. Their brain and organs are more developed than adults

Lesson Plans

Where are chemicals in rural areas found?	
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A Word of Caution: Safety is the Key

It is tempting to gain youths' attention through the use of spectacular demonstrations of chemicals that produce dramatic effects. Caution should be taken so safety is of prime concern when demonstrating a point.

Don't lose them in the magic of the moment and forget the main message. Discuss the principles as well as how the demonstration applies to the topic. Teachers and leaders need to have a better understanding of the science behind the demonstration or activity than their students, so unexpected student questions can be dealt with, and potential threats to safety can be anticipated. You are trying to teach safe behavior around chemicals, not the misuse to gain attention.

Where are chemicals in rural areas found?

CHEMICALS AROUND

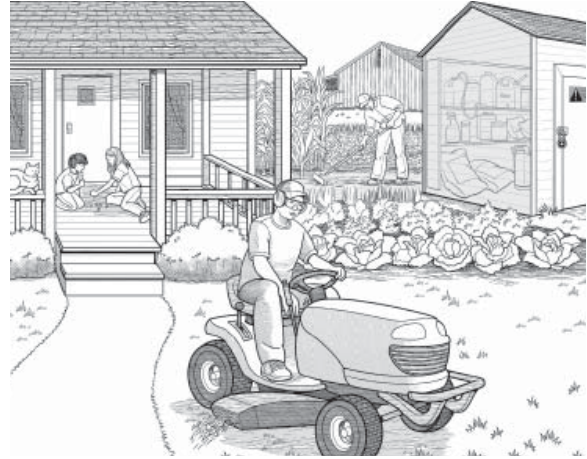
Objective: Identify locations where chemicals are found, used, and stored.

Concept: Chemicals can be transferred from one body part to another and other objects. Proper washing of hands is important after being exposed to chemicals. Chemicals are sometimes difficult to remove from the body. Even after washing the area or clothing, chemical residue can be present even if not visible by the naked eye.

Targeted Age: School Age and Adolescence

Materials:

- ▶ Glo-Germ lotion or oil (Call 1-888-912-7474)
- ▶ Gloves
- ▶ Ultraviolet light



Glo-Germ is a product used to demonstrate the importance of proper hand washing to prevent the spread of bacteria. It can also show how easy it is to transfer chemicals from one location to another.

Before the lesson sprinkle Glo-Germ powder in and onto the gloves, but not enough to see the powder. Ask a volunteer to wear the gloves while listening to a discussion about chemicals. When finished with the session have the volunteer come to the front of the room and turn out the lights. Run the ultraviolet light around the person and note all the places that the person touched during the session. Talk about the amount of transfer that takes place from one part of the body to another.

This is normal. It also means that parts of the body can be exposed that are not protected by PPE. Personal hygiene is important in reducing residue that may exist after exposure to any form of chemical. Even though you may think you have cleaned thoroughly there is probably invisible residue left. Further illustrate this principle by washing the volunteer's hands and show that residue is still present under the light. Explain how this can happen when washing clothing contaminated with chemicals.

Liquid Woolite is another product that is invisible in daylight, but appears under ultraviolet light. This is an alternative if you suspect that a student may be allergic to chemical substances such as Glo Germ. The Woolite will wash off well with water so the demonstration will not point out the importance of cleanliness, but can be used to show the transfer from one person to another person or object.

CHEMICALS CAN BE ANYWHERE AND EVERYWHERE

Objective: Identify locations where chemicals are found, used, and stored.

Concept: Chemicals are not always visible to the naked eye and may leave residue on unintended objects.

ACTIVITY 1

Targeted Age: Elementary School Age

Materials:

- ▶ Talc Powder
- ▶ Electric Fan
- ▶ Respirator Masks

Ask a volunteer wearing dark clothing to sprinkle talc powder onto their clothing. Explain that we can see the powder when used in concentration. Turn a fan to high setting and have the volunteer stand in front of the fan. Allow the powder to blow in all directions. Have the students see if they can find any of the powder on them or in the room. Explain that the particles are so small that they “disappear” in the air. They are still there but invisible. This is what happens when chemicals are sprayed on an open field of crops. The invisible chemicals can be on shoes, clothing, and skin without anyone knowing about their presence. Chemicals can be carried into the car and house, exposing other family members and pets along the way.

Discuss how personal protective equipment (PPE) works to protect workers from the chemicals. Obtain several types of masks from chemical representatives or safety supply stores. Relate the concept of invisibility of chemicals and how the PPE prevents exposure and filters the applicator’s air.

The importance of personal hygiene might help children understand this concept. The analogy of contracting a cold virus in the winter from surfaces they have touched helps students understand the dangers of unseen items. You can get sick from either the cold virus or the chemical.

ACTIVITY 2

Targeted Age: Elementary School Age

Materials:

- ▶ Large poster paper
- ▶ Markers
- ▶ Spray bottle filled with water colored with food coloring

This activity may be messy so you may want to conduct it outside. Before the session draw a picture of a farmstead on a large (3 feet) piece of paper. Include an apple tree with apples, a couple kids, a dog, and an adult in the yard. Prepare a mixture of water and food coloring. Fill a non-aerosol spray bottle with the solution.

Ask a volunteer to spray the apples on the tree with the solution from a couple inches away. This represents chemicals that may be sprayed on a crop in the field. The colored liquid will cover more than the tree. Have students point out where the spray landed on other objects besides the tree. Remind children they would probably not be able to see the spray, but for demonstration purposes we’ve added color to see where the spray settled.

Repeat the procedure from a distance of one foot. Talk about how the greater distance spreads the liquid farther than when the bottle was closer. Explain that is what can happen when chemicals are sprayed incorrectly. The wind can blow the chemicals and they can drift on items that are not intended to be sprayed. Discuss the importance of staying away from areas that might have been sprayed and also marked as restricted-entry interval zones.

RISK MAPPING

Objective: Identify locations where chemicals are found, used, and stored.

Concept: Chemicals can be found in many locations within the rural environment. By identifying their location people can maintain a safe distance from chemicals.

Targeted Age: Early Adolescence

Materials:

- ▶ Large drawing paper
- ▶ Marker or crayons
- ▶ Post-It notes

Divide the group into small groups of 3 to 6 students. Supply each group with a large (3-foot) piece of paper. Instruct the group to draw a bird's eye view of a farm. Instruct them to include all building (barn, house, storage, large machinery, livestock, etc.) Pretend the roofs are missing. Encourage them to draw items without the use of words and include details of the buildings' interiors.

Have the group identify each location on the farm where a chemical is present by coloring it red. (Medicine in the house, gasoline in the tractor, weed killer in the garage, fertilizer in the shed, etc.) Draw locks on the Post-it notes. With the Post-it notes have them cover any items which should be locked up. Discuss the factors that may influence this decision (age of family members, toxicity of chemical, storage capability for chemical, etc.)

CHEMICAL ADVERTISING

Objective: Identify locations where chemicals are found, used, and stored.

Concept: The use of chemicals is all around us. Children can learn to appreciate the wide use of chemicals in today's society.

Targeted Age: Elementary School Age

Materials:

- ▶ Colorful magazines, store advertisements, newspapers
- ▶ Drawing paper
- ▶ Scissors
- ▶ Markers
- ▶ Glue

Have students find pictures of items from magazines, grocery store ads, and newspapers depicting items probably produced with the aid of chemicals. Have them include obvious items such as grain, vegetables also less obvious items such as ice cream, plastics, or colored paper. Arrange the cutout pictures into a collage, overlapping the pictures to make a pleasing picture.

Have the children label their picture with an appropriate title such as:

- ▶ Chemicals All Around Us
- ▶ Chemicals – Friend or Foe?
- ▶ Appealing to the Senses – Alluring to the Eye

Discussion

Facilitate a group discussion about the pictures and colleges. Ask each student to tell what chemicals may have been used in the production of the products.

Highlight the benefits and negative effects of chemicals to the consumer:

Positives

- ▶ Appearance of product
- ▶ Color
- ▶ Lack of blemishes
- ▶ Cost of production
- ▶ Stability of the product
- ▶ Disease prevention

Negatives

- ▶ Skin irritation or burning
- ▶ Chemical build up within ecosystem
- ▶ Expense
- ▶ Killing of beneficial organisms
- ▶ Disruption of soil balance
- ▶ Build up of resistance to chemical

Remind students that chemicals are used for specific purposes that can benefit as well as harm people. It is important to help students weigh the benefits and the disadvantages of chemicals in the production of products. Proper use of chemical products is one key in the prevention of negative effects.

How do rural chemicals work and affect us?

ATTITUDES TOWARD CHEMICAL USE

Objective: Use chemicals safely to reduce the negative impact on people.

Concept: The impact of chemicals on the environment can be a controversial topic. Many experts with very different viewpoints have valid evidence about their position. This would be a great time for speakers to give factual information about environmental factors. Speakers might include: a chemical sales representative, a local organic farmer, a chemistry instructor at a local school or university, and a farmer using chemicals. Many divergent attitudes towards chemical use exist due to individual backgrounds and knowledge of the issues. Understanding these attitudes will help students develop their own ideas and values.

Targeted Age: Adolescence

Materials: Character descriptions copied from below.

Adolescents often enjoy acting out or role playing scenes that depict characters. If given the opportunity they can expand on situation role-playing and make the activity fun for all to participate and watch. Listed below are people with different attitudes about chemical use. Their titles are intended to be comical as well as descriptive.

Copy the following character descriptions and distribute to each selected participant.

- ▶ Mrs. R. U. Helpful – Consumer advocate supporting a ban on all chemical use in foods sold at the grocery store
- ▶ Mr. Industrial Magnate – Large industry president supporting the reduction of production costs
- ▶ Ms. Penny Pincher – Consumer advocate seeking changes in food production to make grocery store prices cheaper
- ▶ Mrs. Jane Q Public – Public official concerned about the healthy future of our next generation
- ▶ Dr. Randy Rainbow – Ecologist with a local group working to eliminate all chemical use
- ▶ Miss Daisy Sprayfreak – Model interested in supporting chemical research that could make her look younger
- ▶ Mr. Joe Farmer – Farmer who has taken a pesticide applicator class and practices safe use of pesticides on his farm

After the students are assigned their characters, ask them to write an expanded description of the person they are to become. These may be comical as long as they stay in character and depict issues related to chemical use or misuse. Answering the following questions may help them think about their character.

- ▶ Why might this person have this specific attitude toward chemical use?
- ▶ How will this attitude to chemical use influence future generations?
- ▶ What might be the economical impact of this attitude if all people felt this way?
- ▶ What might be the impact on wildlife in the area if all people felt this way?
- ▶ What might be the personal impact of this implied chemical use?

Introduce each panel member to the group. Ask each participant to give their viewpoints on the use of chemicals in two minutes or less.

(this activity is continued on the next page)

ATTITUDES TOWARD CHEMICAL USE (CONTINUED)

Ask the panel a few leading questions such as:

- ▶ If we use chemicals in the same manner that we are currently, where will our civilization be in 10 years? 100 years?
- ▶ What is the biggest economic impact of farm chemical use?
- ▶ What role does industry play in the wise use of farm chemicals?
- ▶ How can the average consumer influence the use of farm chemicals?
- ▶ What role does the individual farmer play in the wise use of farm chemicals?

Open the discussion to the audience. As a facilitator, encourage dialogue from all panel members asking them to stay in character.

EMERGENCY PREPAREDNESS

Objective: Use chemicals safely to reduce the negative impact on people.

Concept: In the case where someone is hurt due to exposure to chemicals, everyone, including children, need to follow proper and safe procedures that prevent injuries.

Targeted Age: School Age

Materials:

- ▶ Local phone books
- ▶ Cards with emergency sources listed
- ▶ Contact paper

Identify the emergency numbers of who to call in the case of an emergency. Have local phone books available for children to look up appropriate phone numbers.

Rescue 911 or _____

Poison Control Center 1-800-222-1222 or _____

Sheriff/Police _____

Closest Neighbor _____

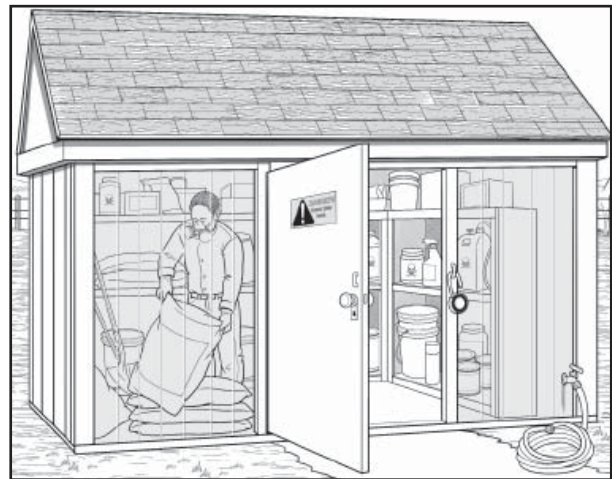
Parent at Work _____

Directions To Farm

Laminate the cards or cover with clear contact paper to protect the card. Punch holes in the top so students can post the cards by each phone, or attach a strip of magnetic tape onto the back.

Targeted Age: Play Age Children

Teach preschool-age children the correct procedure to follow in case of an emergency. Simulate a situation, such as an unconscious adult. Talk about where the child would get help. Stress that 911 calls are for emergency purposes only.



RECYCLING CHEMICAL CONTAINERS

Objective: Use chemicals safely to reduce the negative impact on people.

Concept: Chemicals come in a variety of containers, many of which can be recycled if done properly.

Targeted Age: Middle school age

Materials: Internet / Phone / Library

Each community is different in their activities related to recycling hazardous material and containers. City/county officials, extension, and private companies collaborate to encourage farmers and the public to safely recycle pesticide containers and get rid of excess chemicals. Divide the group into two groups. One group will be finding ways to dispose of empty chemicals containers. Make a list of ten chemicals found on a farm (bagged lawn fertilizer, can of bug spray, crop insecticide, bagged seed corn, garden manure, etc.). Use the internet, phone, or library to find what empty containers can be placed in the recycling bins, trash, burnt, or must be taken to a special hazardous waste receptacle station. Use the following recycle list to identify each container category.



PETE

Poly(ethylene terephthalate): The easiest of plastics to recycle. Soda bottles, water bottles, vinegar bottles, and medicine containers. Is recycled into bottles and polyester fiber.



HDPE

High-density Polyethylene: Readily recyclable. Containers for: laundry/dish detergent, fabric softeners, bleach, milk, shampoo, conditioner, motor oil. Newer bullet proof vests, various toys.



V

Poly(vinyl chloride): Used extensively. Pipes, shower curtains, meat wraps, cooking oil bottles, baby bottle nipples, shrink wrap, clear medical tubing, vinyl dashboards and seat covers, coffee containers.



LDPE

Low-density Polyethylene: Wrapping films, grocery bags, sandwich bags. Can be recycled into more of the same.



PP

Polypropylene: Tupperware®, syrup bottles, yogurt tubs, diapers, outdoor carpet.



PS

Polystyrene: Coffee cups, disposable cutlery and cups (clear and colored), bakery shells, meat trays, "cheap" hubcaps, packing peanuts, styrofoam insulation. It's difficult to recycle since it is bulky and very lightweight. That makes transportation difficult.



OTHER

Can be a mixture of any of the other recycling types which make it difficult to recycle. Avoid this product if possible.

(this activity is continued on the next page)

RECYCLING CHEMICAL CONTAINERS (CONTINUED)

The other group is assigned to identify how to dispose of unused chemicals. Identify ten chemicals that might be found on a farm (a half gallon of paint, a half sack of lawn fertilizer, half dozen heart worm pills, etc.). Use the internet, phone, or library to find where, how, and when these chemicals can be deposited. Ask about any special preparation that must be done before the chemicals will be accepted.

Each group will present their finding to the total group, comparing, and contrasting the information found.

Additional ideas:

- ▶ Create a community brochure or video about recycling chemical containers. Ask the local extension office for assistance in content accuracy and distribution.
- ▶ Take a field trip to the local landfill or recycling center to see first-hand how recyclables are transformed.
- ▶ Start a school project where students assist landscape and sport field maintenance staff in participating in pesticide container recycling. Or start a recycling program for your agricultural community, if you don't have one.

How can chemicals be used safely?

CHEMICAL LOOK-A-LIKES

Objective: Decrease the likelihood of negative effect from chemical exposure.

Concept: It is often difficult to differentiate between safe products and chemicals which could be dangerous if touched, inhaled, or consumed.

Targeted Age: School age and Adolescence

Materials:

- ▶ Household items that have similar appearance to chemicals or chemical containers
- ▶ Unbreakable and tightly closable containers
- ▶ Labels with names of items printed

We use chemicals in farming for varied reasons such as cleaning equipment or curing animal ailments. Others stop the growth of weeds, while others may make agricultural crops thrive. Many chemicals are difficult to identify by appearance even by experienced individuals. Many of the chemicals used are potentially dangerous even in small dosages. Do not expose curious children to the very items we are trying to prevent them from being around.

This activity follows a television game show format. Set up your demonstration like a “The Price Is Right” stage. “Contestants” will try to guess which items are safe and which can be dangerous. (The trick is that all of the items are safe.) Choose some of the safe household items listed below or others you may have on hand. Place each in a plastic, transparent container. Seal securely. Mark each with a number.

Give each participant a set of prepared numbered labels with the correct product name (example: orange Kool-Aid) and a similar look-alike chemical (example: gasoline). Have them place the corresponding label that they think is correct for the item. Several participants can have their turn. A competition can take place to see which “contestant” gets the most correct answers.

Don’t give away the answer until the very end of the discussion. Your point will be made that we all have difficulty in identifying substances.

After everyone has tried the test, identify each item with the correct (safe) product. Talk about the chemical that each product resembles. A container (without the contents) will help the children visualize the chemical. Pictures of the item are preferable for very powerful substances such as a pipeline cleaner. Remember, preventing exposure is the objective.



ACCURACY WHEN WORKING WITH CHEMICALS

Objective: Decrease the likelihood of negative effect from chemical exposure.

Concept: Applying chemicals on the farm can come at inconvenient times when the job of application needs to be done in a hurry. This activity can be fun while still letting the students experience the problems that can exist if people don't pay attention to a task. The use of chemicals can be potentially dangerous if done carelessly. Students will experience a lack of control when working in a rushed situation.

Targeted Age: Adolescence

Materials:

- ▶ Large transparent containers such as clean like sized plastic gallon milk cartons
- ▶ Funnels
- ▶ Adhesive tape
- ▶ Water colored with food dye

This activity can be messy so this makes a good outdoor activity. Divide the groups into two (or more if the group is large) teams. Give each team a gallon container of colored water, an empty bottle, and a funnel. Mark the water level of the original bottle.

The objective is to pour the contents of one bottle into the empty bottle without spilling. The first time the pouring procedure is done indicate time is of no concern, but accuracy is important. Mark the liquid level with a piece of tape. Is it the level after pouring from one bottle to the next? It should be if the bottles are the same size.

Repeat the same procedure again, this time giving the students a 20-second time limit. Measure the liquid's volume by comparing to the taped line. The students should be able to pour the contents without spilling with the time period.

Repeat again, this time giving them only 2 seconds. Compare the liquid volume with the marked line. Another way to measure the contents is with a set of scales.

Explanation:

Hurrying and carelessness have no place when working with potentially dangerous items. Have the students discuss how much of the liquid got on their hands and other surfaces. If this was a real chemical what precautions should they have taken to prevent injury?

- ▶ Protective equipment-listed on the label
- ▶ Gloves
- ▶ Eye protection
- ▶ Coveralls
- ▶ Ignore the kidding, silliness, and horseplay of others around them
- ▶ Pay attention to the task

WASHING CONTAMINATED CLOTHING

Objective: Decrease the likelihood of negative effect from chemical exposure.

Concept: Even when personal protective equipment (PPE) is used properly there is a possibility that clothes underneath could be exposed to chemicals. It is important to not transfer this residue to other family member through the wash. By washing it with other family clothing you may be transferring the chemical residue. Chemicals are not visible by sight and difficult to be removed from clothing.

Targeted Age: Adolescence

Materials:

- ▶ 1 pair of dark colored jeans
- ▶ 1 pair of dark colored socks
- ▶ Talc powder
- ▶ A large bowl of clear water

Liberal dust the jeans with talc powder and rub it into the fabric. Ask him/her to “wash” out the jeans in the bowl of water. Show the participants the resulting water – it will appear cloudy. Give the volunteer the socks and ask him/her to “wash” it in the same water. Explain that the water transferred the pesticide residue in the water to the socks. This is what can happen when family members’ clothes are washed after PPE clothing is washed. Adults are responsible for laundering chemically contaminated clothing.

DIFFICULT DECISIONS ABOUT CHEMICAL USE – A FOUR CORNER DEBATE

Objective: Decrease the likelihood of negative effect from chemical exposure.

Concept: The use of chemicals in today's society is often controversial. Each person must develop his/her own philosophy and tolerance level about the use of chemicals. Controversial topics can be a favorite of adolescents. When controversial topics such as chemical use in today's society are put into a structured format it allows adolescents to think through their own thoughts and develop reasoning skills to defend their position. Along with increased knowledge come these skills:

- ▶ Increase in social skills
- ▶ Ability to listen respectfully to different opinions
- ▶ Ability to debate effectively
- ▶ Ability to look at a theme from different perspectives which improves tolerance and ability to make responsible decisions
- ▶ Shy students will be able to take an active role in a discussion by using prepared arguments

Targeted Age: Adolescence

Materials:

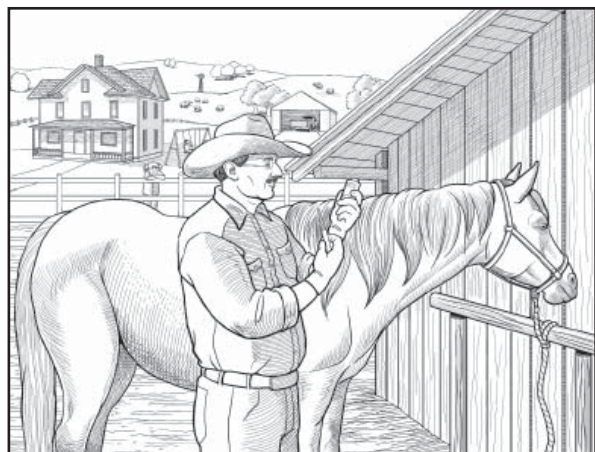
- ▶ 4 posters, each labeled with one of the following: strongly agree, agree, disagree, and strongly disagree
- ▶ Paper and writing utensils

Tape each of the four posters in a different corner of the room. Select a statement from those listed below or make up another one that is appropriate to your audience and lesson. The opinion statements are purposely biased and some may be negatively stated.

- ▶ Parents can prevent poisoning among their children by locking up all hazardous material away from small children.
- ▶ Wearing personal protective clothing while applying chemicals can be more dangerous than not wearing them because of its discomfort and inconvenience.
- ▶ Regulations should be less restrictive in regard to application of farm chemicals.
- ▶ Regulations involving chemical use on the farm should be increased to ensure the safety of the total population.
- ▶ Farmers should be encouraged to only use organic methods.

Debate:

Read the statement to the group. Give the group a couple minutes to determine how they feel about the statement. Direct each person to go to the statement corner that is closest to their opinion. As a subgroup, take five minutes to discuss the reasons for their choice of answer. Instruct them to use facts to defend their choice. Each group will appoint a spokesperson for the group and share the reasons for their choice. At this point some participants may have changed their mind. Have them switch to another corner if they chose to do so. Provide another three minutes for discussion with the new group. As a group, compile a list of the four top reasons for supporting the statement as they did.



PROPER CONTAINERS/EMERGENCY DECISION MAKING

Objective: Decrease the likelihood of negative effect from chemical exposure.

Concept: Chemicals should be stored in their original containers. This will help to decrease the risk of accidental pesticide exposure. The labels on the original containers have vital information for emergency situations.

Targeted Age: Adolescence

Ask students to role-play the following scenario. If students are reluctant to participate, simply read the story and ask them to answer the questions.

Tom is four years old and “helping” his 15 year old brother, Ben, milk the cows one evening. Ben sets his half finished ice tea on the counter and tells Tom to play with his toy truck in the pump room while Ben finishes milking the last five cows so they can go in for supper. Ben has a little trouble with one of the cows that doesn’t want to cooperate. Tom wanders off and starts looking in the cupboard where the bottles of cleansers, bleach, and ammonia are kept. One of the bottles catches his eye. It is a green bottle and looks like a bottle of pop he drank last week at a birthday party. Tom decides he is thirsty so he pulls out the bottle and takes a drink. It tastes nasty so he puts down the bottle and goes to find Ben to see if he is finished with the cows so they can go to the house.

Ben finishes with the milking and lets the last obstinate cow “Molly” out to the pasture. As the two boys walk through the pump house heading for supper Ben notices the bottle of liquid out of the cupboard and on the shelf. He asks Tom if he got the bottle out. Tom looks at him sheepishly and answers “NO”. Ben doesn’t believe Tom. He begins to panic, knowing that if Tom got into some of the chemicals he could be in real trouble. Ben yells at Tom, “What did you do?” Tom proceeds to cry loudly.

Stop the role-play. Lead a discussion asking the following questions:

- ▶ What could have been in the bottle?
Ice tea, soda pop, household cleanser, dairy pipeline cleanser, ammonia. etc.
- ▶ How could Ben have been more effective than yelling at Tom?
Calmly ask Tom which bottle he drank from.
- ▶ What should Ben do now?
Lower his voice and ask Tom to point to the bottle he drank from. Ben should then read the label.

(this activity is continued on the next page)

PROPER CONTAINERS/EMERGENCY DECISION MAKING (CONTINUED)

Begin the role-play again by asking them to act out what they will do next. Add the following information: One bottle in the cupboard is marked dairy pipeline cleaner. It is milky white in appearance. Another bottle in the cupboard looks like the same color as the liquid Tom drank, only darker in color. After Tom calmed down a little he said his stomach hurt but his throat was okay. He says it tasted “very bad”, not at all like pop. The boys’ mother is in the house preparing supper. It is about 50 yards away from the dairy barn. The boys’ father has gone to town for a meeting. There is a phone in the barn.

Complete the activity with the following questions:

- ▶ What additional information should Ben try to obtain before proceeding?
Read the label off the containers
- ▶ Would it be wiser to take Tom to his mom or get mom to come to the barn?
Call the Poison Control Center and answer their questions
- ▶ Should Tom leave Ben alone while goes to get help?
Stay with him so he can observe any symptoms
- ▶ What could have been done differently to prevent this incident?
Always keep small children in sight. Have all chemicals in locked cabinets

Help the students work through the decision making process.

- ▶ Identify the problem (a child has consumed an unidentifiable substance)
- ▶ Identify alternatives that could solve the problem (identify the substance and ways to seek help)
- ▶ Identify the pros and cons of each solution (effects of each substance and consequences of obtaining help)
- ▶ Choose the most appropriate solution
- ▶ Accept the decision
- ▶ Evaluate the choice for future reference (find alternative child care, lock up chemicals)

READING CHEMICAL LABELS

Objective: Decrease the likelihood of negative effect from chemical exposure.

Concept: Chemical labels contain useful information, which influence human safety.

Targeted Age: Early Adolescence

Materials:

Chemical Label, copied for each participant (one is provided on the next page)

Distribute a copy of the following chemical label to the participants. It is a product used to kill parasites on cattle. Using the label, ask participants to answer the question after each of the following situations.

Background Scenario:

John, age 17, and Mary, age 12, are brother and sister who live on a ranch in Montana. Both are in 4-H and are preparing their breeding heifers for the county fair. They also have a younger brother, Ted, age 4. Dad usually treats their cattle with Ivermectin for parasites every six months. He was gone to Helena for a big cattle sale and will be gone for the next week. John and Mary realize it is time to treat the cattle. They don't think they should wait until their dad gets home because the fair is on Saturday.

Situation A:

John and Mary proceed to measure the solution according to the directions. Ted is watching carefully. Suddenly a bee flies through the barn and Ted is scared. He bats at the bee with the stick he is holding and runs for the door. In the process, the stick hits the bottle John is holding. It is knocked out of his hand and spills on John's leg. The bee escaped, but John's leg is soaked with the chemical.

- ▶ What information on the label is useful?
Warning section
- ▶ What should John do about his leg?
Remove jeans and wash area immediately with soap and water

Situation B:

John and Mary apply the chemical to the cattle without problems. When finished, their mom calls for them to come in the house for supper. They leave the empty chemical container on the counter and rush to the house.


- ▶ How should they have disposed of the container?
Dispose in an approved landfill or burn
- ▶ What should be done before eating supper?
Wash hands with soap and water

Participants can have fun with this activity by acting out the different situations. Encourage different people to take on various roles. The rest of the group can answer the questions.

Further Discussion Questions:

- ▶ What does the phrase "internal and external parasite control" mean?
- ▶ What is stated on the label to indicate that this product has been tested for safety?
- ▶ Can you safely use this product on animals other than cattle? What is on the label to indicate this?
- ▶ Why should this product not be used on market animal prior to a fair and/or sale?

Sample chemical label

<p>ACME IVERMECTIN Pour-on for Cattle</p>		
<p>Consult your veterinarian for assistance in the diagnosis, treatment, and control of parasitism. This product delivers internal and external parasite control in one convenient application. This product, when applied correctly, is effective for control of these parasites:</p>		
<ul style="list-style-type: none"> ▶ Gastrointestinal Roundworms ▶ Lungworms ▶ Cattle Grubs ▶ Mites ▶ Lice ▶ Horn Flies 		
<p>Dosage: The dose rate is 1 ml for each 22 lb of body weight.</p>	<p>Administration: Use either a squeeze-measure-pour system or collapsible pack and applicator gun to apply the solution. Follow the directions on the applicator. The formulation should be applied along the topline of a narrow strip extending from the withers to the tail.</p>	
<p>Safety: Based on plasma levels, the topically applied formulation is expected to be at least as well tolerated by breeding animals and has no effect on breeding performance.</p>		
<p>WARNING! NOT FOR USE IN HUMANS! This product should not be applied to humans because it may be irritating to the skin and eyes and absorbed through the skin. To minimize accidental skin contact, the user should wear a long-sleeved shirt and rubber gloves. If accidental skin contact occurs, wash immediately with soap and water. If accidental eye exposure occurs, flush eyes immediately with water and seek medical attention. In case of accidental ingestion, contact the local poison control center. Keep this and all drugs out of the reach of children.</p>	<p>WARNING: Cattle must not be treated within 48 days of slaughter for human consumption. Because a withdrawal time in milk has not been established, do not use on female dairy cattle of breeding age.</p>	
	<p>Environmental Safety: When this product comes into contact with the soil, it readily and tightly binds to the soil and becomes inactive over time. It may adversely affect fish or certain waterborne organisms on which they feed. Do not contaminate water by direct application or by the improper disposal of drug containers. Dispose of containers in an approved landfill or by incineration.</p>	
<p>WARNING! FLAMMABLE! Keep away from heat, sparks, open flame, and other sources of ignition.</p>		
<p>Precautions:</p> <ul style="list-style-type: none"> ▶ Store away from excessive heat and protect from light ▶ Use only in well-ventilated areas of outdoors ▶ Close container tightly when not in use ▶ Do not use when rain is expected within six hours of treatment ▶ Apply to skin surfaces only ▶ Do not give orally ▶ Antiparasitic activity will be impaired if the formulation is applied to areas of the skin with mange scabs, lesions, caked mud, or manure 		

**THIS IS NOT AN ACTUAL CHEMICAL LABEL.
THE INFORMATION SHOULD NOT BE USED FOR APPLICATION.**

Puzzles

These puzzles complement the FS4JK chemical safety packet. Select the puzzle based on the age of your participants and the content included within your presentation. Duplicate the sheet and use within the lesson or send them home to be completed with their families.

Preschool

Coloring Page: Chemical Locations Preschool - Lower Elementary School Age Page 33

Coloring Page: Livestock & Chemicals Preschool - Lower Elementary School Age Page 34

Elementary School

What's Different? Elementary School Age Page 35

The Protection Solution Upper Elementary School Age Page 36

Coded Chemical Message Upper Elementary School Age Page 37

Rural Chemical Scramble Upper Elementary School Age Page 38

Middle School / High School

Chemical Dominos Upper Elementary thru High School Age Page 39

Chemical Bingo Upper Elementary thru High School Age Page 41

Rural Chemical Word Find Upper Elementary thru High School Age Page 42

Rural Chemical Crossword Middle to High School Age Page 43

Chemical Safety Windowboxes Middle to High School Age Page 44

Chemical Safety Square Eights Middle to High School Age Page 45

Answer Keys

What's Different? Page 46

The Protection Solution Page 46

Coded Chemical Message Page 46

Rural Chemical Scramble Page 46

Chemical Dominoes Page 46

Rural Chemical Word Find Page 47

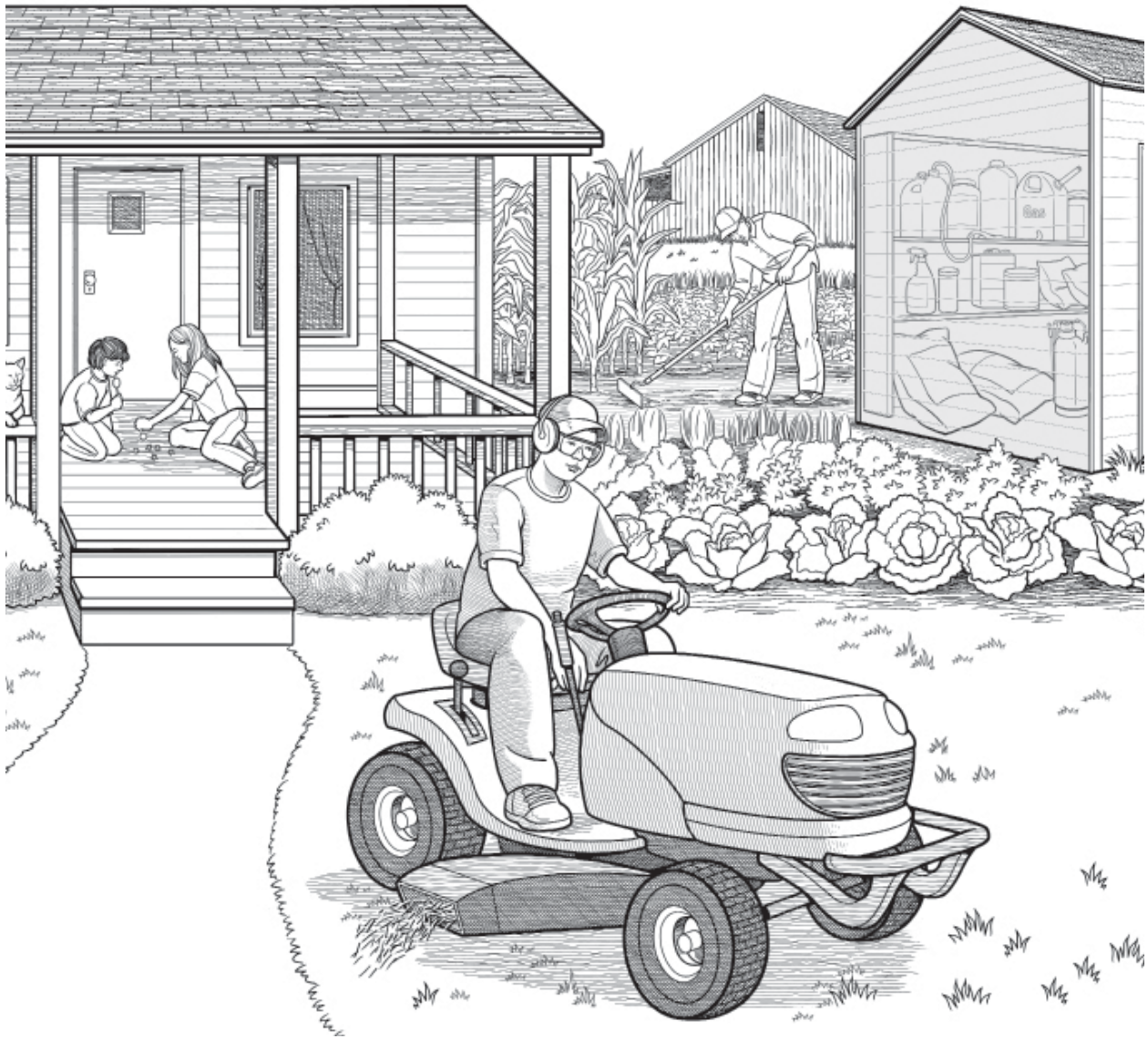
Chemical Safety Windowboxes Page 47

Chemical Safety Square Eights Page 47

Rural Chemical Crossword Page 48

COLORING PAGE: CHEMICAL LOCATIONS

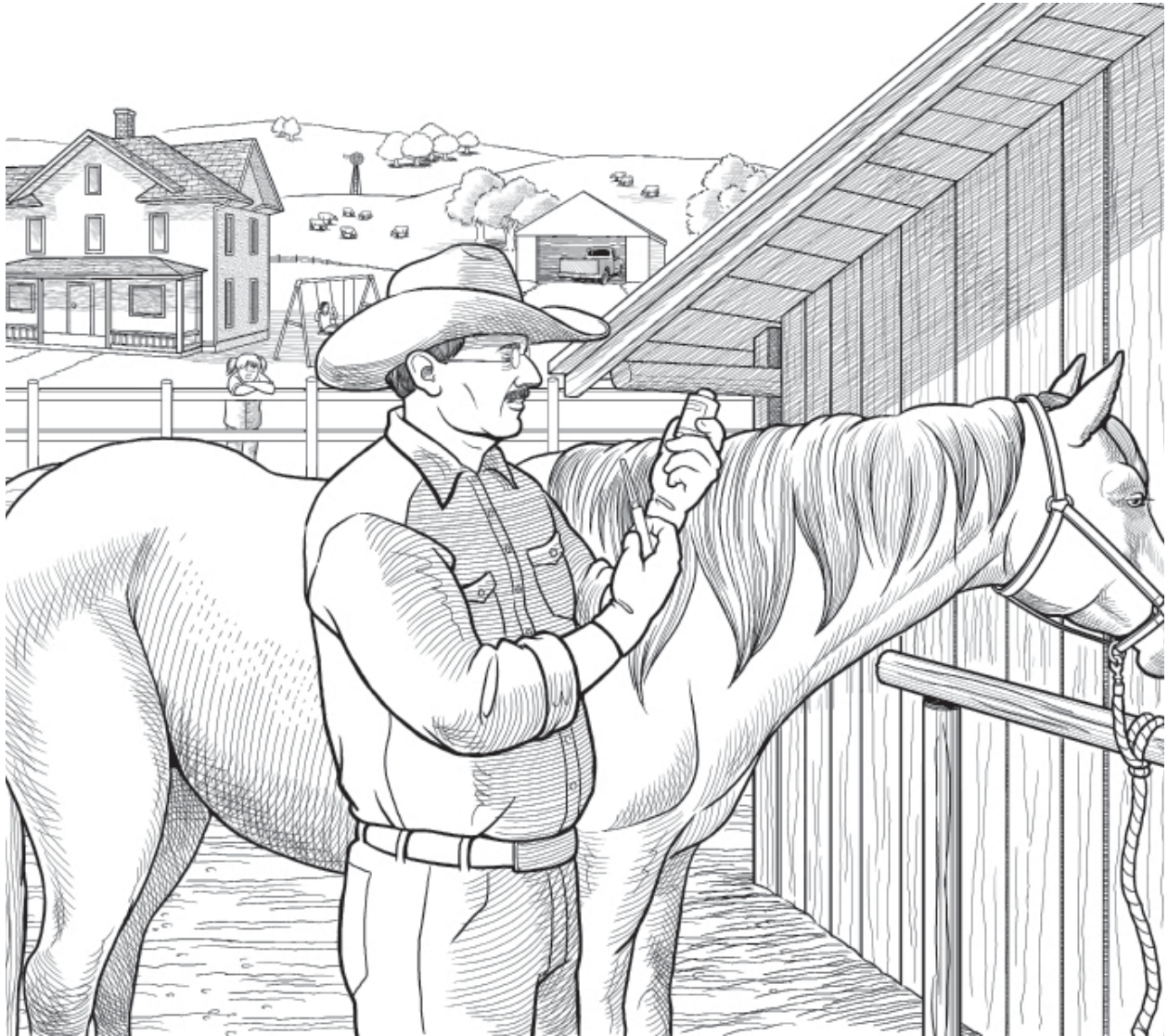
Find the chemicals in this picture. Color the page.



Can you list other places where chemicals can be found?

COLORING PAGE: LIVESTOCK & CHEMICALS

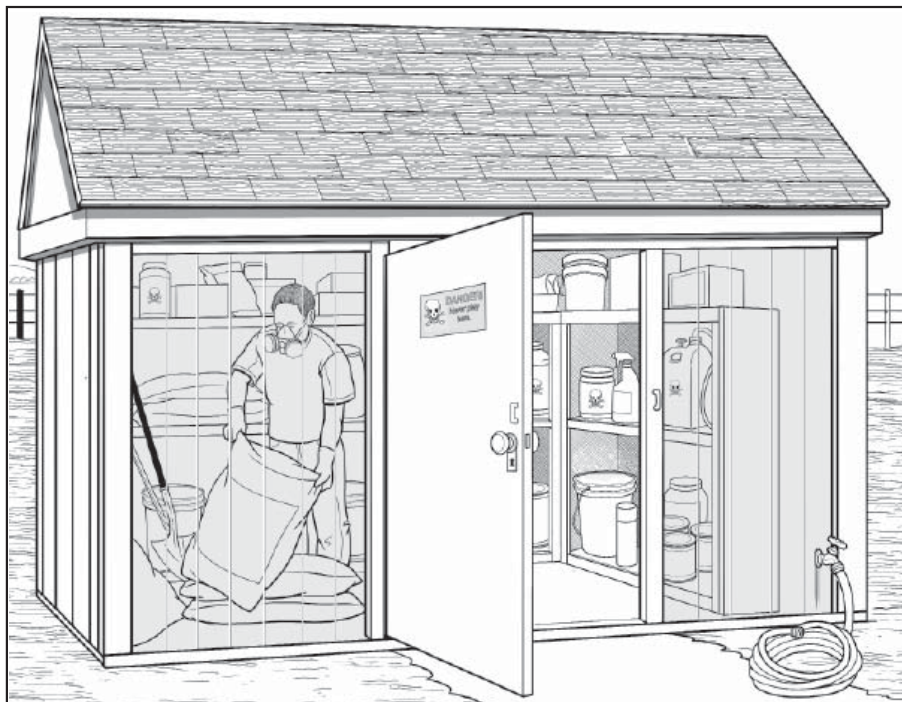
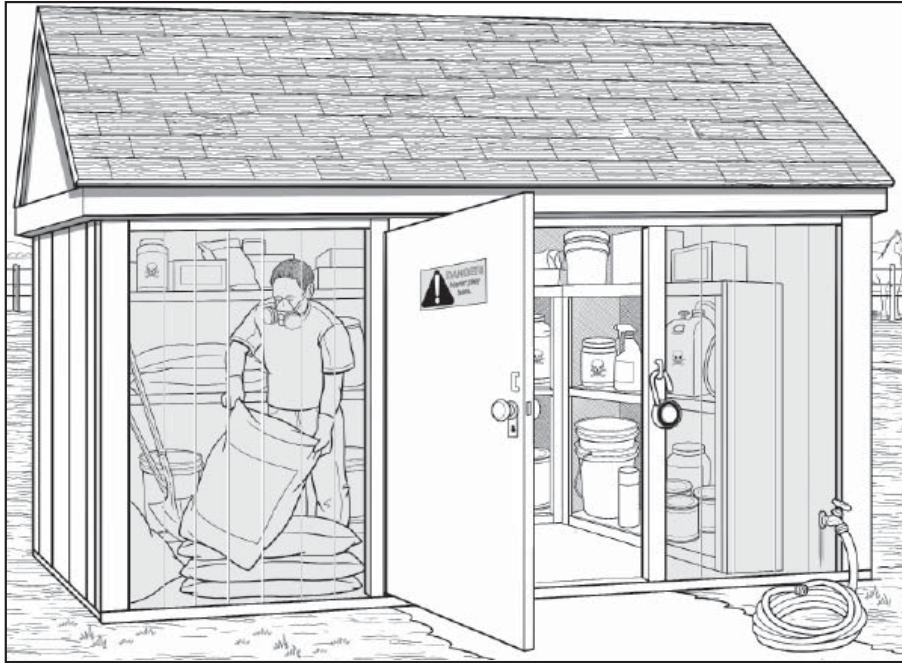
Color this farm scene. Make sure to color the horse your favorite color.



Can you name other animals that need medication on the farm?

WHAT'S DIFFERENT?

List all of the items changed in the second picture.
 Circle the ones that influence safety while around chemicals.



THE PROTECTION SOLUTION

Who wore what? Joe, Mary, and Sam live on an acreage with their parents. Before going to town on Saturday morning they each have a chemical-related chore to perform. Each youth has a different task to perform and different personal protective equipment (PPE) to use. Your job is to determine which youth did each task with what PPE using the clues below. Put an X in the box that matches the person, task, and PPE.

Clue 1: The person who cleaned the toilet used the rubber gloves.

Clue 2: The person who fertilized the yard did not wear the coveralls, gloves, and respirator mask.

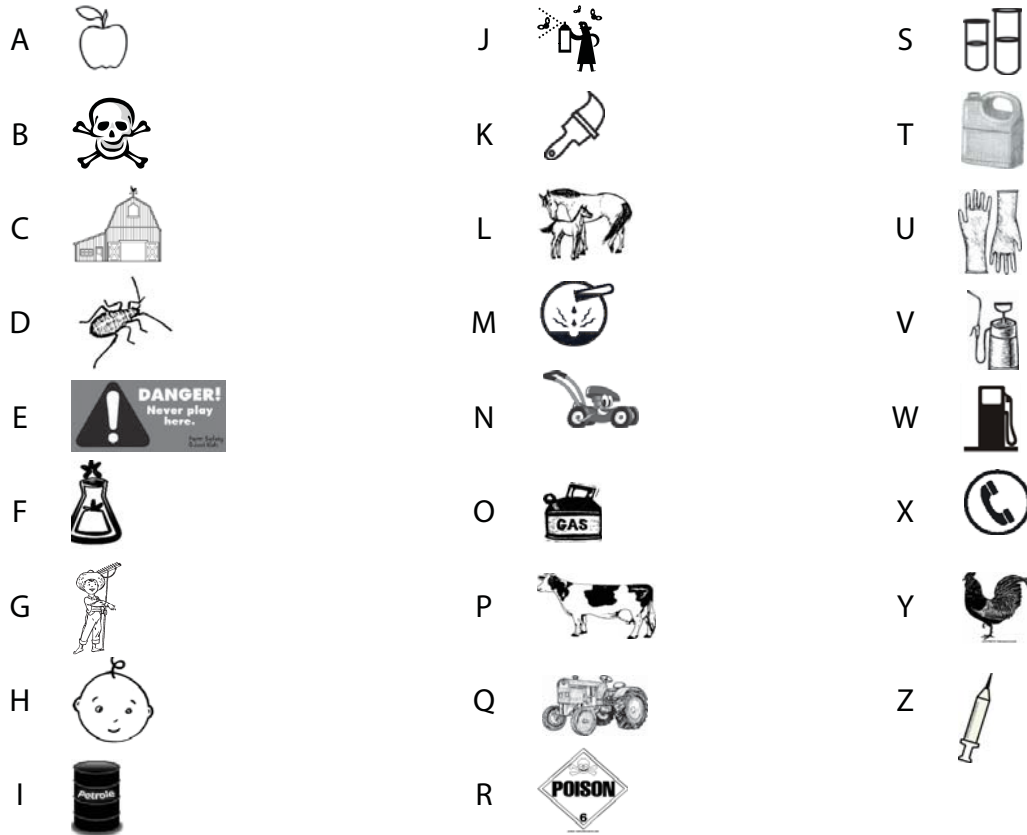
Clue 3: Sam used the rubber gloves.

Clue 4: Joe did not fertilize the yard.

	Chemical related task			Personal Protective Equipment		
	Spray thistles	Fertilize yard	Clean toilet with cleaner	Rubber gloves	Jeans and tennis shoes	Coveralls, gloves, respirator mask
Joe (Age 16)						
Mary (Age 14)						
Sam (Age 13)						



CODED MESSAGE



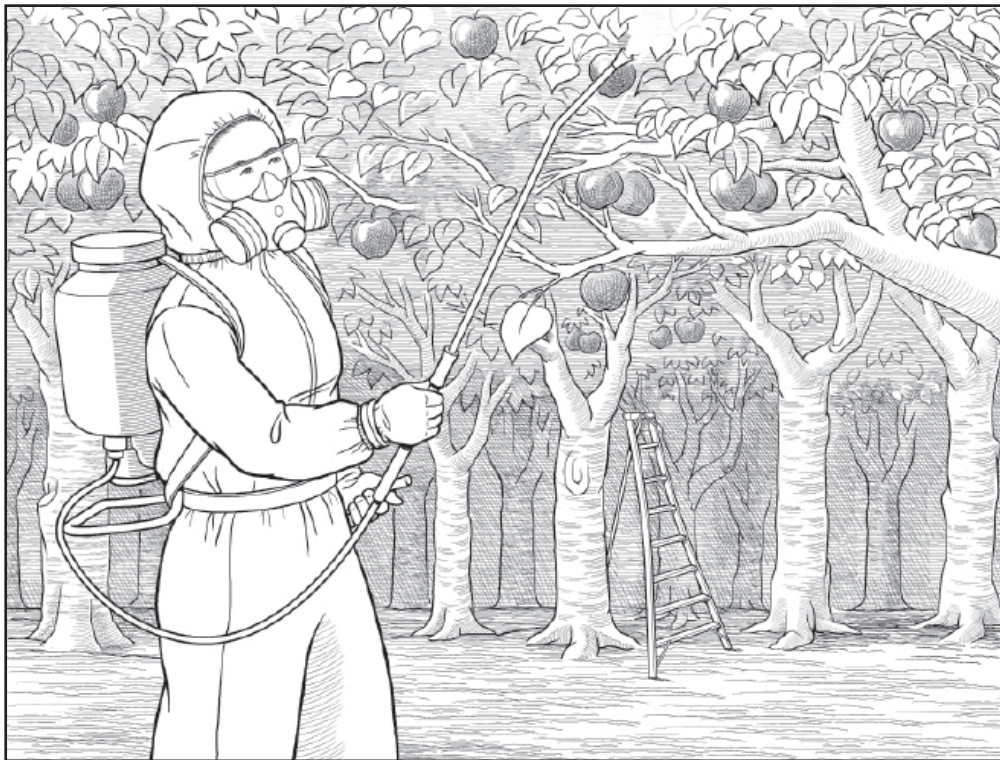
Use the symbols above to decipher what the message says.



RURAL CHEMICAL SCRAMBLE

Unscramble the words to fill in the blanks about rural chemical safety.




























_____ (micsaelch) are used on farms to manage _____ (steps) that interfere with the production of farm _____ (soprc) and _____ (stloevick). Most chemicals are used to kill _____ (swede) or insects. These pests decrease crop _____ (liedy) and reduce quality if they are allowed to grow and _____ (pultmiyl). Farm chemicals can be harmful to _____ (nusham) if they come in contact with their body through eating, _____ (coinught), or inhaling the substance. Stay _____ (wyaa) from areas where chemicals are used.

































Define each word listed and give a correct statement about how to use rural chemicals safely in relation to the word.

CHEMICAL DOMINOES

This game is designed for 2 to 6 players. Copy and cut out the following domino blocks. Laminating them before cutting will increase their durability. Turn them all upside down on a table. Each player draws 7 pieces. The person with a double blank goes first. If no one has a double blank, each player draws until one shows up. Play like normal Dominoes, matching the clue with an answer or like symbols. If a player cannot make a match he/she has to draw another piece until he can play. The first person to use all pieces wins.












		Chemical used on the farm			Pesticide	
Chemical used on the farm	Chemical used on the farm		Chemical used on the farm	Herbicide		Insecticide
Ways chemicals can enter the body	Ways chemicals can enter the body	Ways chemicals can enter the body			Through the eyes	
			Ways chemicals can enter the body	Ways chemicals can enter the body		
Ingestion		Breathing		Hazard signal word	Hazard signal word	
	Absorption		Injection			Hazard signal word
State where many herbicides are used			Virginia			
	State where many herbicides are used	State where many herbicides are used		Nebraska	California	Indiana
	State where many herbicides are used	Place on the farm where fertilizers are used				
Fungicide						

CHEMICAL DOMINOS (CONTINUED)

Yard <hr/> 	 <hr/> Garden	Field <hr/> 	Crops that often use insecticide <hr/>	 <hr/> Crops that often use insecticide	<hr/> Crops that often use insecticide	Cotton <hr/> 
 <hr/> Apples	Peaches <hr/> 	 <hr/> Animal that may have been given medicine	<hr/> Animal that may have been given medicine	 <hr/> Animal that may have been given medicine	 <hr/> Animal that may have been given medicine	Cattle <hr/>
Dogs <hr/>	 <hr/> Sheep	 <hr/>	 <hr/> Chickens	Crops that often use insecticide <hr/> 	 <hr/> 	Place on the farm where fertilizers are used <hr/>
Place on the farm where fertilizers are used <hr/> 	 <hr/> 	<hr/> 	Animal that may have been given medicine <hr/>	 <hr/>	Warning <hr/> 	<hr/> Caution
 <hr/> Wheat	 <hr/> Pigs	 <hr/> 	 <hr/> Danger	<hr/> 	 <hr/>	<hr/> 

CHEMICAL BINGO

Find someone in the group who can say yes to a statement. Write the person's name on the square. Each person can only sign once. The first to fill five squares in a row wins!

<p>Is concerned about our future environment</p>	<p>Has a younger sister</p>	<p>Has a younger brother</p> 	<p>Livestock where they live</p> 	<p>Left an area because it stunk</p>
<p>Lives on a farm</p> 	<p>Called the poison control center</p>	<p>Thrown something out that should have been recycled</p>	<p>Read a label before using a chemical</p>	<p>Locked a cabinet so a child couldn't get to the chemicals inside</p>
<p>Been sick without knowing what caused the illness</p>	<p>Worn rubber gloves</p> 	<p>FREE SPACE</p> 	<p>Drank something that tasted funny</p>	<p>Applied fertilizer to the yard</p> 
<p>Cleaned a stool with toilet bowl cleaner</p> 	<p>Washed your hands before using the toilet</p>	<p>Thrown away expired medications</p> 	<p>Peeled fruit before eating it</p>	<p>Sprayed bug spray</p> 
<p>Opened a child proof bottle of medicine</p>	<p>Washed an apple before eating it</p> 	<p>Placed a Danger Decal on a chemical storage unit</p>	<p>Washed your hands before eating</p> 	<p>Walked through a bean field</p>

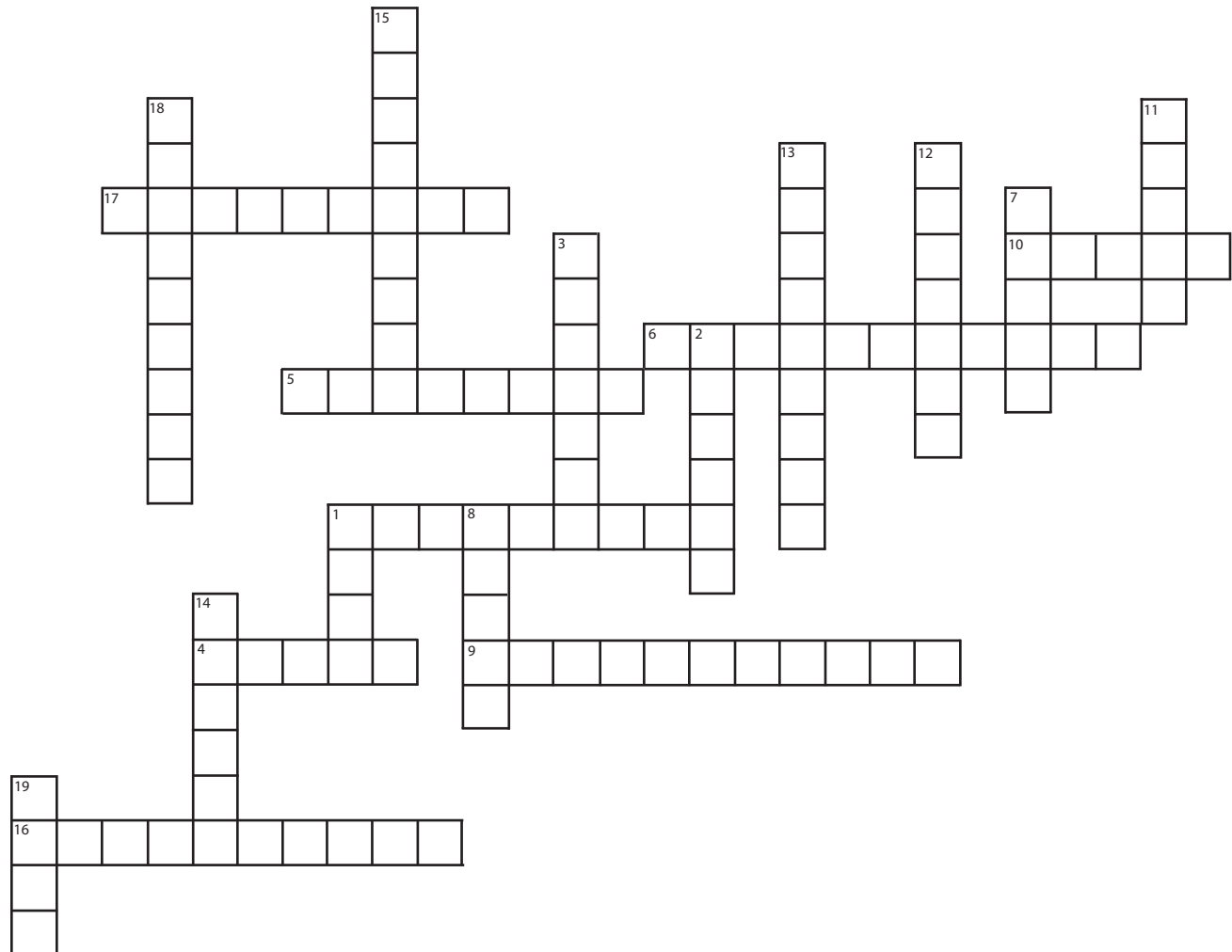
RURAL CHEMICAL WORD FIND

Find words within the word search that answer these statements. Words may be horizontal, vertical, diagonal, or backwards. Check them off as you find each word. The first one is done for you.

- Foods eaten raw that need to be washed before eating (5 total) □ □ □ □ □
- States starting with "I" where you might find herbicides used (4 total) □ □ □ □
- Signal words used on chemicals (3 total) □ □ □
- Crops where insecticides may be used (2 total) □ □
- Another word for "country" (1 total) □

W	N	I	S	I	Y	P	C	T	E	Q
A	O	D	I	T	N	A	E	L	O	S
R	T	A	O	L	U	D	P	A	E	J
N	T	H	N	T	A	P	I	O	C	A
I	O	O	I	N	A	R	T	A	W	H
N	C	O	L	W	E	A	U	O	N	D
G	N	V	L	H	T	Z	I	R	R	A
P	X	V	I	O	R	E	G	N	A	D
F	M	T	P	G	R	A	P	E	E	I
L	E	T	T	U	C	E	B	Q	P	P

RURAL CHEMICAL CROSSWORD



Across

- 1. Substance to destroy pests
- 4. Sudden and severe reaction
- 5. Natural or synthetic substance used to create a reaction
- 6. Surroundings or location
- 9. Substance used to kill insects
- 10. Mature person
- 16. Exposure through the skin
- 17. Exposure by eating a substance

Down

- 1. Nuisance item
- 2. Symptom of excessive pesticide exposure
- 3. Produced without the use of chemicals
- 7. What to have when calling the Poison Control Center
- 8. Deadly or contaminated effect
- 11. Young person
- 12. Cumulative and ongoing reaction
- 13. Substance used to destroy fungi
- 14. Most toxic of the chemical signal words
- 15. Substance used to kill unwanted plants
- 18. Artificially produced item
- 19. Rural location where chemicals are often used

CHEMICAL SAFETY WINDOWBOXES

There are 4-letter, chemical-related words in each strip of letters. Each word has the letters in the correct order, but additional letters are intermixed within the letters. A clue is given for each word.

F	A	R	M	I	N	G	S
---	---	---	---	---	---	---	---

F	A	R	M				
---	---	---	---	--	--	--	--

O	C	D	R	L	O	E	P
---	---	---	---	---	---	---	---

	C		R		O		P
--	---	--	---	--	---	--	---

1. Clue: Wash before eating

F	E	L	L	O	O	X	D
---	---	---	---	---	---	---	---

2. Clue: Bug

I	P	O	R	K	E	S	T
---	---	---	---	---	---	---	---

3. Clue: Where many chemicals are found

B	I	H	O	M	D	E	O
---	---	---	---	---	---	---	---

4. Clue: Not dangerous

O	S	A	T	E	R	F	E
---	---	---	---	---	---	---	---

5. Clue: Security device

I	C	L	Z	F	O	C	K
---	---	---	---	---	---	---	---

6. Clue: Dirt

S	E	T	T	O	I	L	N
---	---	---	---	---	---	---	---

7. Clue: Dermal layer

S	A	M	K	I	D	X	N
---	---	---	---	---	---	---	---

8. Clue: Grassy area

J	A	L	T	A	W	A	N
---	---	---	---	---	---	---	---

Can you make a connection between each of the words within the puzzle?
 Example: Crops are grown on a farm.

CHEMICAL SAFETY SQUARE EIGHTS

Find the chemical related, eight-letter-word in each square. They go forwards or backwards and can start in any box. Match the word with the correct definition.

C	I	M
A		E
L	C	H

1. Word _____
Definition match ____

B	E	N
S		E
T	I	F

2. Word _____
Definition match ____

N	R	E
O		A
I	T	C

3. Word _____
Definition match ____

I	S	M
N		O
A	G	R

4. Word _____
Definition match ____

D	U	E
I		S
S	E	R

5. Word _____
Definition match ____

I	H	C
L		N
D	R	E

6. Word _____
Definition match ____

R	U	S
E		O
E	X	P

7. Word _____
Definition match ____

T	O	X
Y		I
T	I	C

8. Word _____
Definition match ____

- A. Young people
- B. Effect of interacting substances
- C. Positive results
- D. Degree of danger
- E. Left-over matter
- F. Substance that stimulates reactions
- G. Come in contact
- H. Living substance

Answer keys

WHAT'S DIFFERENT?

Removed or changed items: No horse, no lock, label on box, number of buckets, black shovel handle, missing seed bag, fence post, different danger decal, key hole shape, no grass

THE PROTECTION SOLUTION

- ▶ Joe sprayed thistles using the coverall, gloves, and respirator mask
- ▶ Mary fertilized the yard wearing jeans and tennis shoes
- ▶ Sam cleaned the toilet wearing the rubber gloves

Discussion answers - Concentration and toxicity of chemical, type of PPE worn, exposure time

CODED CHEMICAL MESSAGE

Many chemicals can be used safely.

RURAL CHEMICAL SCRAMBLE

Chemicals, pests, crops, livestock, weeds, yield, multiply, humans, touching, away

CHEMICAL DOMINOES

Chemical used on the farm

- ▶ Herbicide
- ▶ Pesticide
- ▶ Insecticide
- ▶ Fungicide

Crops that often use insecticide

- ▶ Apples
- ▶ Wheat
- ▶ Cotton
- ▶ Peaches

State where herbicides are used

- ▶ Virginia
- ▶ Arkansas
- ▶ Indiana
- ▶ Nebraska

Ways chemicals can enter the body

- ▶ Through the eyes
- ▶ Ingestion
- ▶ Absorption
- ▶ Injection
- ▶ Breathing

Place on the farm where fertilizers are used

- ▶ Garden
- ▶ Field
- ▶ Yard

Animals where medicine may be used

- ▶ Dog
- ▶ Sheep
- ▶ Cattle
- ▶ Chickens
- ▶ Pigs

Hazard signal word

- ▶ Danger
- ▶ Warning
- ▶ Caution

RURAL CHEMICAL WORD FIND

Foods eaten raw that need to be washed before eating on chemicals

- ▶ Apple
- ▶ Lettuce
- ▶ Grape
- ▶ Pear
- ▶ Peach

States starting with "I" where you might find herbicides used

- ▶ Iowa
- ▶ Illinois
- ▶ Idaho
- ▶ Indiana

Signal words used on chemicals

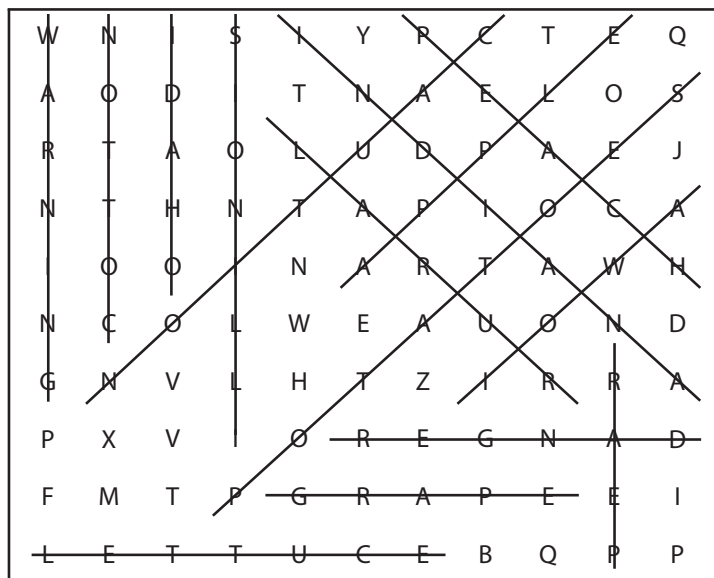
- ▶ Danger
- ▶ Warning
- ▶ Caution

Crops where insecticides may be used

- ▶ Cotton
- ▶ Potatoes

Another word for "country"

- ▶ Rural



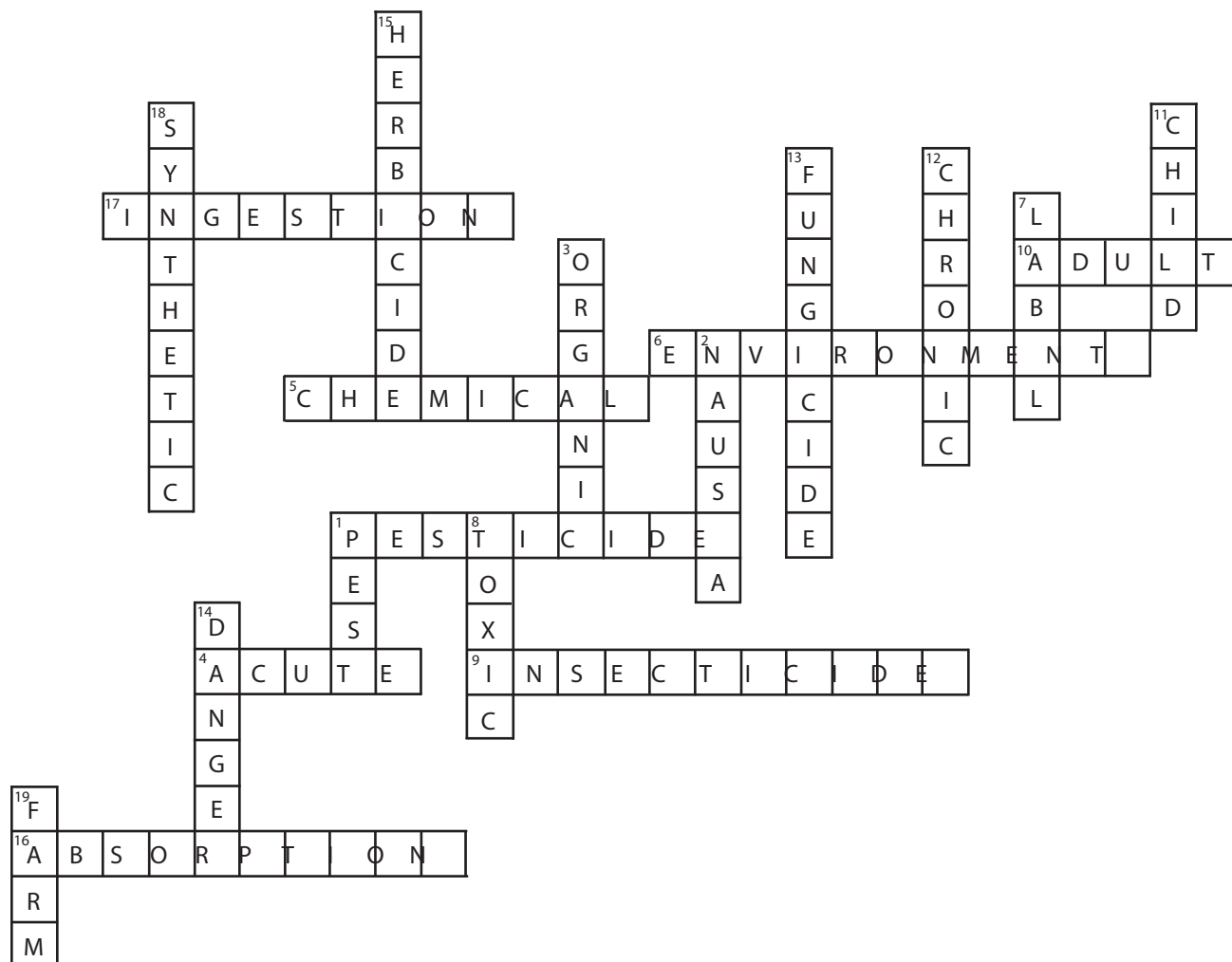
CHEMICAL SAFETY WINDOWBOXES

- | | |
|---------|---------|
| 1. Food | 5. Lock |
| 2. Pest | 6. Soil |
| 3. Home | 7. Skin |
| 4. Safe | 8. Lawn |

CHEMICAL SAFETY SQUARE EIGHTS

- | | | | |
|-------------|---|-------------|---|
| 1. Chemical | F | 5. Residues | E |
| 2. Benefits | C | 6. Children | A |
| 3. Reaction | B | 7. Exposure | G |
| 4. Organism | H | 8. Toxicity | D |

RURAL CHEMICAL CROSSWORD



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