

Mission 3R

A Challenge for Change

Classroom Activities to Complement and Support the
Mission 3R Interactive Software

TEACHER ACTIVITY GUIDE

Solid Waste Education Materials
for Grades 4-6



Arizona Department of Environmental Quality
Recycling Program



Design and development of the Mission 3R interactive software and this accompanying Teacher Activity Guide
was coordinated by:



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was coordinated by:

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Welcome!

Why an electronic Teacher Guide?

In order to conserve natural resources, we are not distributing printed copies of this guide. The File Viewer that you are now using allows you to review the entire Teacher Guide and print any or as many pages as you choose. The first (disk) version of Mission 3R was distributed to over 1000 schools across Arizona, and we anticipate this CD-ROM version being distributed to many more. Sharing this guide electronically allows a savings of over 100,000 sheets of paper!

Why "waste" education?

Did you know that every day the average American throws away over four pounds of trash? Our use, misuse, and waste of natural resources are linked to a broad array of environmental problems. Waste education makes the perfect topic for a classroom environmental studies unit because it is so tangible to young students and because it relates to environmental problems that students can help solve through decisions they make in their daily lives. Learning to reduce, reuse, and recycle, and understanding why these behaviors are critical, is important for students, for our environment, and for the benefit of society as a whole.

Program goals

These activities offer students an opportunity to learn about and practice the 3R's — reduce, reuse, and recycle — and to have FUN in the process. Mission 3R gives today's children and tomorrow's leaders practical knowledge and skills that will help them make intelligent decisions now and in the future.

Making the most of Mission 3R

Although students may use the CD-ROM independently, they will benefit most if activities from this Teacher Guide are also completed. Two preparatory activities introduce key concepts and ensure that students receive maximum benefit from the computer simulations. Four extension activities reinforce and expand student understanding.

While working with the computer program, students learn by receiving spontaneous tips from the program, by clicking to trigger clues, by making independent choices in the various scenarios, and by receiving feedback on their choices. On the computer, students may work alone or with a partner. In contrast, the activities in this guide are designed to be conducted with the class as a whole or (for one activity) as homework. Practicing 3R concepts through interactive group processes helps students achieve a fully integrated understanding.

Although the activities in this Teacher Guide are presented in a logical progression, they need not be conducted in this sequence. Please make adaptations to suit your needs. For information that will be useful to you and that will enrich your students' understanding, review the background section of this guide, called "Just the Facts" (pages __-__). If you wish to expand your teaching unit further, the Resources section (pages __-__) will be useful. If you have any questions about what is recyclable in your area, check the "Contacts List" for your community or county recycling coordinator. Finally, as you utilize the Mission 3R materials, enjoy your "mission" and remember that the concepts you are teaching are relevant to your students' lives and to the future of our economy and environment.

What a Waste!

INTRODUCTORY ACTIVITY 1

Activity Overview

“What a Waste!” provides students with an opportunity to explore the idea that everything we have or use is made of natural resources and that it is important to use resources wisely. Students discuss everyday items, the natural resources that these are made of, and the environmental impacts that occur as we make, use, or dispose of products made of natural resources.

Learning Objectives

Students will be able to:

- 1) state that everything we have or use comes from our environment;
- 2) define natural resources as raw materials and energy that we get from our environment;
- 3) state that many natural resources are available in limited supply;
- 4) recognize that our “trash” is also made of natural resources, including resources that are valuable and in limited supply;
- 5) understand that it benefits humans and the environment to conserve natural resources and use them wisely; and
- 6) state that reducing, reusing, recycling, buying recycled, and composting are important ways to conserve natural resources.



Preparation & Materials

- (none)

Classroom Procedures

1) Introduce the idea of “Earth origins,” that we are completely dependent on our environment, that all we have or use comes from natural resources, and the way we use natural resources affects our environment and all future generations. Include a broad discussion of these ideas, as addressed in the “Just the Facts” teacher background section of this

guide.

2) Invite students to name examples of things they absolutely need for survival (food, water, shelter, air) and examples of non-essentials that students enjoy having or that they have used in the last few days (toys, televisions, clothing of a certain style, etc.). To help make the point of how much we get from the Earth, let the list get very long and inclusive (chairs, plates, cars, bikes, backpacks, paper and pencils, and so on).

3) Select one or more items to highlight as examples. Use inquiry to guide the students in tracing these items, step-by-step, from the students’ lives back to the origin of the item as raw natural resource(s). For example, the chain for a PETE plastic water bottle might be: student, local store, distributor for local store, company that purified water and filled the bottle, company that made the bottle, company that extracted oil and refined it so that it could be made into plastic. Or, for a pair of blue jeans, the chain might be: student, student’s big brother, local store, distributor for local store, company that sewed the jeans, company that wove the denim, mill that cleaned and processed the raw cotton, farm where cotton was grown. As the class pieces together a chain, list each step on the board. Make as many lists as you wish, but be sure to make at least one list for a packaging item and one list for some type of durable goods.

4) Next, beside each step listed on the board, ask the class to name various environmental impacts of that step. For example, wearing the jeans will have impacts related to the water, energy, and soap needed to wash them; the store would have impacts related to discarding the boxes they received the jeans in; the distributor would have impacts related to transporting the jeans; sewing the jeans requires equipment and energy and there will be some waste of fabric scraps; and so on, back to the land, water, fertilizer, pesticides, equipment, and energy used to grow cotton.

5) Bring the introductory discussion together with the impacts charted on the board in a discussion of why it is important to be

careful about what we buy, how we use it, and how we discard it. Discuss the three R's: reduce, reuse, recycle. Be sure to mention that all three of these are very important, but as noted in the teacher background section, reducing and reusing are even more basic than recycling. Conclude by emphasizing that just as we use natural resources every day, so too we make choices every day that affect our impacts on the environment. And that's what Mission 3R is all about!

Ready, Set, Recycle!

INTRODUCTORY ACTIVITY 2

Teacher Note

During the CD-ROM, the character Spike explains the ideas addressed in this activity. Please review the CD-ROM before deciding whether to use this Introductory Activity with your class. Depending on your students' grade level, you may decide this activity is unnecessary; or you may choose to only briefly introduce these concepts; or for younger students, you may wish fully complete this activity before students use the CD-ROM.

Activity Overview

This activity is intended to prepare students for successful independent use of the Mission 3R software program. The goal is to introduce the idea that every day we make choices that determine our impact on the environment. This manifests while shopping for groceries, when we clean our homes, and at other times that we make decisions about how to reduce, reuse, recycle, or compost.

Learning Objectives

Students will be able to:

- 1) list at least some of the items that are recyclable in their community, and apply this knowledge to specific items;
- 2) describe criteria that are important in selecting products and packaging with the least environmental impact, and apply these criteria to specific products;
- 3) describe what composting is, and know examples of items that are compostable; and
- 4) apply critical thinking skills in their everyday lives.



Preparation & Materials

- Review the Mission 3R CD-ROM keeping your students grade level and prior knowledge in

mind. Decide the level of depth at which you would like to conduct this activity (see above).

- The teacher should know in advance what is recyclable in your community. See the Contacts List in the back of this Teacher Guide to learn who your city or county waste reduction coordinator is and how to contact them.
- Either collect yourself or recruit students to collect a clean set of items representing typical household trash. Have at least as many items as there are students in your class:

- glass jars
- steel/tin cans
- aluminum cans
- PETE #1 plastic bottles
- HDPE #2 plastic jugs
- aseptic cartons or "juice boxes"
- orange or banana peels or other kitchen scraps (in a plastic baggie)
- notebook paper
- newspapers
- magazines
- corrugated cardboard box
- paperboard box
- books
- clothing
- toys and games

- * five large, brown-paper grocery bags
- * photocopy of page with "Trash Sorter Cards" with cards cut apart
- * magnet
- * heavy felt marker
- * rubber gloves
- * Recycling Symbols (provided)

Classroom Procedures

- 1) Begin by discussing the students' images of garbage. Ask students what they think of when they hear the word "trash" or "garbage" — what images, feelings, scents, etc., come to mind. Make a list on the board. Are most of the images positive or negative? Why? Explain to the class that they will now have a chance to take a closer look at some gar-

bage! If possible, push the desks to the side of the room and have the students sit in a circle. Using the dish gloves, display the clean garbage samples in the center of the room.

2) Select a few of the sample garbage items. Ask your students to think about what happens to trash after it is used and thrown away. Ask students to guess how much waste one person produces in one day. Explain that each person in our country generates approximately four pounds of garbage each day and this total includes each student in the room. Explain that in Arizona people produce over 16 million pounds of garbage each year! What a waste! Discuss with the class what they think will happen to this waste? Ask if any of the students know about landfills. Explain that landfills are large, outdoor areas for waste disposal and in "sanitary" landfills, waste is layered and covered with soil. Most of the waste placed in landfills will remain virtually unchanged for thousands of years. This means that we will need a lot of space for our garbage if we continue to produce so much of it. Ask if anyone knows of ways to reduce waste.

3) Discuss recycling: Ask students what can be recycled in your area. Share examples with them as they discuss this question. Be sure to mention that different communities are able to recycle different items, some may recycle more than we do, and that hopefully more and more types of materials will be recycled over time. Discuss this in more detail, as per the "Just the Facts" teacher background section of this guide, if you feel this is appropriate for your students' grade level. Ask students to demonstrate how a magnet can be used to distinguish steel/tin cans from aluminum cans. Make sure that students understand that recycling involves separating materials from other materials that are to be thrown away and then making them into new products. If you use again an item that was going to be thrown away, this is called reusing, not recycling.

4) Discuss reuse: This is another way to minimize the amount of waste we produce. Discuss some common ways or items that can be reused. Be sure to include examples of disposable or "throw-away" items (paper towels,

plates, cups, napkins, razors, pens, diapers, etc.) being replaced by comparable items that can be used over and over. Also include how many types of packaging (cans, jars, plastic tubs, etc.) that we normally throw away or recycle can be reused. We can even look for products that come in reusable packaging (such as laundry detergent in a plastic bucket rather than a cardboard box). Finally, also be sure to include examples of how durable goods can be reused (clothing, furniture, CDs, books, toys and games, etc.) either within a single family or by others.

5) Clarify the distinction between "recycled" and "recyclable." Display the photocopy or enlargement of the Recycling Symbols and ask if anyone can explain what they mean. Tell students that the "Made from Recycled" symbol is marked on something already made with recycled content, such as corrugated cardboard (heavy cardboard, usually brown, with smooth outer layers and a wavy inner layer), paperboard (cereal boxes, shoeboxes, etc.), writing paper, and tissue paper. The "Recyclable" symbol does not mean that something already has been recycled. Instead, it means that something is able to be recycled, at least theoretically or in some communities.

6) Discuss the need to reduce: Sometimes, instead of just reusing or recycling something, we can actually reduce our need for it. Compare the use of cloth shopping bags, with reuse of disposable paper or plastic shopping bags, with recycling of disposable shopping bags, as per "Just the Facts." Be sure to emphasize that the "three Rs" are cited in the order "reduce - reuse - recycle" because this lists the strongest choices first. Also discuss the idea that many common products are overpackaged and we can reduce our waste by trying to buy products in large packages (rather than many small packages) or products that have the least amount of packaging.

7) Next, ask for a volunteer to define composting. Ask if any of the students' families compost. List examples of what can be composted. Discuss composting in as much detail as you would like, as per the information

included in “Just the Facts.”

8) Divide the class into five groups with the clean garbage samples still in the center of the room. Give each group one of the five brown paper bags and one Trash Sorter Card. Explain that the trash in the middle of the room is clean and each group will have a chance to sort through the trash to determine which items correspond to their Trash Sorter Card. Ask one volunteer from each group to read the title of their card and the definition aloud to the class. Ask each group to label their bag.

9) One by one, taking turns, let a representative of each group take one item from the pile to place in their bag. Rotate among groups and let every student have a turn. After everyone has had at least one turn and all the items are claimed, ask the groups to display the contents of their bags within their own groups and confirm that all items correctly fit their Card / assignment. Then ask the students to take a look at what each of the other groups have selected. The students should discover that some of the items correspond to more than one Trash Sorter Card and therefore belong in more than one group.

10) Next, remind the groups that even though recycling is very important, reducing and reusing are even more basic, and are a stronger way to protect the environment. Ask everyone to look at the “recyclable,” “recycled,” and “trash” collections and decide what items included in these can also be reused. Ask volunteers to take turns explaining how they might be able to reuse items and then give those items to the group with the “Reusable” Trash Sorter Card.

11) Look at what is left in the “trash” bag and discuss how we might avoid ending up with items like these. For example, might we have been able to purchase certain product in a package that is recyclable instead of one that had to be thrown away (such as buying juice in cans or jars rather than in juice boxes)?

12) Congratulate the students on their success at reducing waste and minimizing what was “thrown away” into the “trash” bag. Ask a

volunteer to explain why reducing waste is beneficial. Wrap up by commenting that the Mission 3R program is a fun way to practice waste reduction and that all students are invited to “take the challenge!” Explain to the students when and where they will be able to play with the Mission 3R computer program.

Trash Sorter Cards

Instructions: Copy this page onto cardstock and cut along the dashed lines.

<p>Reuse Reusable</p>	<p>“<u>Reusable</u>” means <u>able to be reused</u>. Can we extend the life of an item by using it again for the same purpose, repairing or modifying it, or creating a new use for it?</p>
<p>Recycle Recyclable</p>	<p>“<u>Recyclable</u>” means <u>able to be recycled</u>. Can this item be processed in some way so that a new product can be made from it? It might be made into a similar product or something different.</p>
<p>Recycled <small>(Made from recycled materials)</small></p>	<p>“<u>Recycled</u>” means <u>made with recycled content</u>. Was this item made with materials that were once something else, and that have already been recycled to make this?</p>
<p>Compost Compostable</p>	<p>“<u>Compostable</u>” means <u>able to be composted</u>. Is this natural plant material, like fruit peels, vegetable scraps, and yard trimmings, that will decompose? Compost is a rich soil conditioner that keeps plants healthy.</p>
<p>Trash or Garbage</p>	<p>“<u>Trash</u>” and “<u>garbage</u>” refer to anything that is discarded, useless, or unwanted. Is this really trash? Some items that we think of as trash might be useful to or wanted by someone else.</p>

Recyclable



Made from Recycled



Spread the Word!

EXTENSION ACTIVITY 1

Activity Overview

Now that students understand the basics of reducing, reusing, and recycling, they need to practice explaining these concepts to others. In this role-playing activity, students use their new knowledge to educate others – such as friends or family members – about how to reduce, reuse and recycle, as well as why it is important for us to make everyday choices that conserve natural resources and protect the environment.

Learning Objectives

Students will be able to:

- 1) identify opportunities to reduce, reuse, recycle, compost, or buy recycled;
- 2) explain (in a role-play) that these choices reduce waste, conserve natural resources, and protect the environment; and
- 3) teach others about reducing, reusing, and recycling.

Preparation & Materials

- photocopy Role Play Cards (provided) – one set only
- collect paper grocery bags and cardboard boxes – 15 or more may be needed (Consider asking students to bring these in.)
- gather materials to make props, such as used paper, construction paper, newspaper, magazines, bold felt markers, colored pencils, scissors, tape, glue, stapler, clean garbage items from “What a Waste!”, etc.

Classroom Procedures

1) Divide the class into five groups. Explain to students that they will be using their acting skills to role play one of five different scenarios. Explain that role-playing involves skits in which the actors may be performing as themselves or as someone else. Also in a role-play, the sce-

narios are make-believe but could well be real.

2) There are five role-play cards with three or four roles in each story. You may wish to allow some students to prepare props while others act, or get all students involved in both. Consider asking each group to have a director. In any case, all students in a group should be involved in helping the student who is playing the lead role decide what to say and how to be effective at convincing others in the skit to reduce, reuse, and recycle.

3) Distribute one Role Play Card to each group. Make heavy felt markers and paper bags or boxes available; these can be used to represent trash cans, recycling bins, compost bins, a reuse/give-away box, etc. Tell the groups that they must determine what props they need for their role play. You may ask them to bring real items from home, or they can make props with the paper, cardboard, and markers provided.

4) Ask the groups to discuss their role-play and list the points that should be made by the lead character to convince other players to be environmentally responsible. We suggest that groups do this *before* deciding who will play each part. Consider having students draw straws to determine their part.

5) When the groups perform their skits, ask the rest of the class to be sure to listen and watch carefully to the decisions and dialogs. Let the class know they will be expected to give feedback.

6) After each of the skits, ask the rest of the class to first tell the actors what they did well. Then ask the class to offer other feedback, perhaps related to any “recycling” mistakes or related to how the actors might have been more effective at explaining the need to reduce, reuse, recycle, compost, buy recycled, or otherwise conserve natural resources and reduce our effects on the environment.

ROLE PLAY CARDS

ROLE PLAY #1

Narrator: "After returning home from grocery shopping with your mom/dad, you help unload the car and bring groceries to the kitchen. While you are putting the groceries away, you notice a lot of stuff scattered around the kitchen: an empty glass peanut butter jar, an empty tuna fish can, an empty cereal box, several plastic grocery bags, and a stack of newspapers. Your mom/dad had a tough week at work and seems stressed, so you want to help by cleaning up the kitchen. What will you do with these items? Your mom/dad is usually too tired to remember all the different ways to reduce, reuse, and recycle. S/he comes into the kitchen with the last bag of groceries and says...."

Parent: "Boy, am I tired. There's so much to be done around here and I just don't know how I'm going to be able to deal with it all. Hey, thanks for helping with the shopping and putting the groceries away. I see you're tidying up the kitchen. Hey, it's faster to just put all that garbage in the trash."

Narrator: "You have a conversation with your parent about what to do with the different items; what natural resources are; and why it's important to reduce waste and conserve natural resources."

ROLE PLAY #2

Narrator: "It is the Saturday after your Aunt Matilda visited for a whole week and it is house cleaning day. Your mom asked you to clean the bathroom. As you scrub the sink and so on, you notice that your aunt left an empty HDPE plastic shampoo bottle, empty toothpaste tube, an empty toilet paper roll, plus a couple of magazines and a full container of dental floss. What will you do with these items? Your big brother has just come in and says..."

Brother: "Aren't you through yet? My friend and I still wanted to go see that movie. You can invite one of your friends too. Don't take time to separate that trash. Just toss it all and then we can go."

Narrator: "You have a conversation with your brother about what to do with the different items; that recycling doesn't really take very much time; and how a home recycling system can be set up to be easy and fast to use."

ROLE PLAY #3

Narrator: "You're at the grocery store with your grandmother and grandfather. You've been playing with the Mission 3R program at school, so you understand the importance of buying products with the least packaging, products or packaging with recycled content, and products in packaging that can be recycled again. Your grandparents want to buy potato chips in lots of little bags; Snackables crackers and cheese instead of a big box of crackers and a big block of cheese; paper towels that are not made of recycled paper; and grape juice in little juice boxes instead of in aluminum cans.

Grandmother: "Let's see.... I like this kind of potato chips."

Narrator: "For each item listed above, you have a conversation with your grandparents about how our everyday decisions affect the environment; why it's important to buy products with the least packaging; why it's important to buy products and packaging with recycled content; and why it's important to buy products in packages that can be recycled again."

ROLE PLAY #4

Narrator: "A friend from school comes over to see what you are doing. Your mom/dad just asked you to clean up the driveway and carport area. Your friend asks if they can help. You are glad to have help because you have to decide what to do with the pile of grass clippings and leaves, a dead house plant in a clay pot of soil, and a cardboard box filled with dirty wood chips and newspapers that were in the bottom of your gerbils' cage. What will you do with these items? Your friend says..."

Friend: "Hurry up and throw that stuff away so we can go do something fun."

Narrator: "You need to explain to your friend what can be done with these items, that composting keeps plant waste out of the landfill, and what finished compost can be used for."

ROLE PLAY #5

Narrator: "Your dad is busy cooking a special dinner for your mom's birthday and he asks you to clean up the living room so that she can relax when she gets home from working out at the gym. You go into the living room and see that your little brother and his friends and your older sister and her friends left a mess. You see an empty cracker box, empty potato chip bag, several magazines, a toy truck with a broken wheel, some plastic blocks, and somebody has left an old sweatshirt with holes in it. What will you do with these items? Your dad sticks his head in the living room and says..."

Dad: "You are terrific! Thanks for cleaning up that mess. I don't think I could have gotten this place ready without you. Here's the trash bag to put all that garbage in. It's all just trash, right?"

Narrator: "You have a conversation with the dad about what to do with the different items; and how reducing, reusing, and recycling can decrease our impacts on the environment."

Extension Ideas

- 1) Write and perform a recycling skit for a school assembly or other event. Include concepts related to reducing, reusing, recycling, buying recycled, and composting, as well as what natural resources are, and that our everyday choices can conserve natural resources and reduce our impact on the environment.
- 2) Write and perform a recycling radio skit incorporating the sounds of various packaging and materials, also including the concepts listed above.
- 3) Design an educational display or bulletin board about these concepts for the classroom or school.

Get Real!

EXTENSION ACTIVITY 2

Activity Overview

The activity provides students an opportunity to practice applying what they learned through the Mission 3R computer simulations in their own lives. Students complete a worksheet, working at home and at the supermarket, with a parent or adult family member. Students are then asked to make a pledge to help their family reduce waste and conserve natural resources.

Learning Objectives

Students will be able to:

- 1) analyze their family's usual consumer decisions in relation to environmental shopping criteria;
- 2) analyze their family's usual habits related to reuse and recycling;
- 3) propose more environmentally-smart choices in relation to (1) and (2) above; and
- 4) clearly describe the rationale for their proposed product selections.

Preparation & Materials

- overhead transparency copy of "Survey of Ways to Conserve Natural Resources" (provided)
- photocopies of "Survey of Ways to Conserve Natural Resources" (provided) - one per student
- photocopy "My Commitment" (provided) - enough to have one card per student

Classroom Procedures

1) Ask students whether the Mission 3R program helped them think of changes they might make in their own everyday lives to conserve natural resources and protect the environment. Project the overhead transparency of the Survey of Ways to Conserve Natural Resources.

2) Discuss the Survey. Explain to the class that they will need to work with an adult family member to complete the worksheet. They may want to search the kitchen or pantry cabinets at home as well as study alternative options on supermarket shelves. They may want to compare what is in their family's recycling bin with a list of what is recyclable in their community. Ask them to suggest examples of what kinds of items could be listed under each question.

3) Discuss the idea that some changes may work well for some families or at some times but not always. For example, it will have less impact to buy soda in a two-liter bottle than as a six-pack of cans. But this is only workable if several people are having a soda together or in the same day. In contrast, buying chips in a large bag instead of a small bag will almost always work. It may mean using a plastic bag or plastic tub to take chips in your lunch, but this bag or tub can be used many times. Similarly, it will almost always be workable to buy juice in aluminum cans (which have recycled content and can be recycled again) rather than in juice boxes (which are not recyclable). Or it may be workable to buy juice in a large jug and take it to school in a reusable plastic container. Emphasize that students may need to "get involved" and help their parent(s) in these areas. This is intended to stimulate families to work together (not for students to start telling their parents what to do!). For example, if packing their lunch takes more time, the student can help. Or if the student or parent is setting the table for dinner, the student can get out cloth napkins instead of paper napkins.

4) Distribute the Surveys and give students a few days, with occasional reminders, to complete the survey with an adult family member.

5) After students complete the assignment, discuss as a class. Have students share ideas and examples. Next, distribute the "My Commitment" cards and ask students to look at them. Explain that each student will need to prioritize items from their survey and put those they really think they can and will do on the commitment cards. Ask the students to complete the cards and write their signatures in the

space provided.

6) Ask students to take the “My Commitment” cards home, discuss with a parent, and ask the parent to sign it.

7) Follow-up after a few weeks with a discussion of changes actually made. Be sure to clarify that this was intended as a first step and there are many other changes that students can make in time. Each step is important and worthwhile in itself. Do any of the students feel that they would like to make more changes in their household? Do they think their parents would support these changes? End by pointing out that we can always be looking for more ways to conserve natural resources and reduce our impact on the environment.

My Commitment to Conserve Natural Resources and Protect the Environment

I, _____, make a commitment to be conscious about the waste I produce. I pledge to make wise choices related to what I buy and use, and what I do with it when I'm finished. I will try to get involved in family decisions and support my parent(s) in making choices that reduce our use of natural resources and our impacts on the environment.

I will try to remember that I can produce less waste in these ways:

- * look for products with less packaging,
- * look for products in large containers,
- * look for products in packaging that has already been recycled,
- * look for products in packaging that is able to be recycled, and
- * look for ways to reduce, reuse, and recycle whenever I can.

Student's Signature

Parent's Signature

Survey of Ways to Conserve Natural Resources

Instructions:

Now that you have experienced Mission 3R, you need to practice applying what you learned in real life! With the help of a parent or adult family member, complete this survey. You can begin the survey at home, but you will need to visit the supermarket to finish it. Have fun analyzing how you can make changes in your life to protect our environment!

1-a List four products that you now buy in small containers or that have a lot of packaging.

1-b List two alternative products that you could buy in large containers or with less packaging.

2-a List four products that you now buy in packaging that does not have recycled content and/or is not recyclable.

2-b List two alternative products that you could buy in containers that would have recycled and/or recyclable packaging.

3-a List four products that you now use that are disposable. (This question refers to products, not packaging.)

3-b List two alternatives that you could use instead of disposables. (This question refers to products, not packaging.)

4 List two types of packaging that your family sometimes forgets to reuse or recycle, and that you could reuse or recycle more often.

5 List two types of durable goods that your family uses, which you could buy used or give to others for reuse.

What a Load of Garbage!

EXTENSION ACTIVITY 3

Activity Overview

The level of per capita waste generated in the United States is the highest in the world. In this activity, students focus on waste generated in the classroom and use mathematical calculations to estimate the amount produced by their school and by all schools in Arizona.

Learning Objectives

Students will be able to:

- 1) realize the total amount of trash generated by their class;
- 2) know how math skills can be applied to estimate totals for their school and beyond;
- 3) identify the major components of municipal waste;
- 4) explain the concept of percentages; and
- 5) identify ways to reduce waste in the classroom and elsewhere.

Preparation & Materials

- save the trash generated by the class for one typical school day
- plastic bag(s) large enough to hold the trash
- scale (hanging scale or simple bathroom scale)
- photocopy “Trash Pile” master as an overhead transparency, or copy it on the board
- know the number of student attendance days in your school calendar

Classroom Procedures

- 1) Collect and save all trash that your class generates in a typical school day. Be sure to include trash produced in the classroom, art room, lunch room and so on. (Store food waste in a separate container, if possible in a refrigerator overnight or until you are ready to

conduct the activity.)

- 2) Define trash and municipal waste for your students. (See the Glossary of this Teacher Guide.) Be sure to point out that municipal waste includes trash we produce at home, school, or work. Make a list on the board or overhead of the major categories of municipal waste — without showing percentages at this time:

• paper	39%
• glass	6%
• metals	8%
• plastics	9%
• wood	7%
• food wastes	7%
• yard wastes	15%
• other (textiles, rubber, leather, and other materials)	9%

- 3) Ask students to guess what percentage of our municipal waste falls into each of these categories. You might want to draw several circle graphs, or hold a meter stick, or use other means to help make the amounts they are suggesting more tangible. Have the students re-estimate as needed to get the total amount to add up to 100 percent. Ask leading questions to whatever degree you would like.

- 4) Write the actual percentages in another column, beside the estimated percentages. Invite students to discuss any “surprises” as they compare these figures to their own guesses. This may stimulate them to think of waste sources in that category which they had not thought of earlier.

- 5) As discussed in “Just the Facts,” the background section of this Teacher Guide, point out the U.S. produces more than half of the world’s solid waste. Because the U.S. accounts for only

a small percentage of the world's population, this means we produce several times as much waste per person as do people in other countries. Even compared to other wealthy, developed nations, we typically produce twice as much municipal waste per person. The average U.S. citizen produces over four pounds of waste every day! Expand these points as you wish, according to "Just the Facts" or other resources.

6) Remind students that their municipal waste includes trash they generate at school. Weigh the bag(s) of trash collected on the previous day. If using a bathroom scale, show students how a person's weight can be subtracted from the weight of that person holding the trash to arrive at the weight of trash. Write the total pounds of trash on the board.

7) Ask students to find out how much trash the average student produces by dividing their total by the number of students in the class.

8) Use the "Trash Pile" chart to guide students in projecting the amount of trash produced by their classroom, their school, and all schools in Arizona in the course of one school year. Students should discover that there may be more than one way to arrive at certain answers. Note that a Teacher Version of the "Trash Pile" chart is also provided.

9) Discuss: Do you think our class generates a lot of trash? What might we do to reduce the amount of trash generated? As students brainstorm, write their ideas on the board. After a list of several items has been created, lead the class into agreement on which strategies would make the most difference and prioritize the list. Then take concrete steps to set these strategies in motion. For example, if "use back of old homework for scratch paper" is listed, set up a basket or box for the class to collect and access homework that is clean on one side. If "recycle white paper at community drop-off location" is listed, set up an appropriate container and schedule.

Extension Ideas

1) Extend your classroom waste reduction efforts to the school. Students may wish to write letters or make presentations to enlist the support of the school administration and parent-teacher organization.

2) Have students analyze their family's household trash and develop strategies for reducing waste in the home as well.

The Classroom	The School	Schools in Arizona
A Amount of trash per day = _____ lbs. (This answer is the weight measured by the class. Use it in calculating other answers.)	E Amount of trash per day = _____ lbs.	J Amount of trash per day = _____ lbs.
B Amount of trash per week (5 days) = _____ lbs.	F Amount of trash per week (5 days) = _____ lbs.	K Amount of trash per week (5 days) = _____ lbs.
C Amount of trash per month = _____ lbs.	G Amount of trash per month = _____ lbs.	L Amount of trash per month = _____ lbs.
D Amount of trash per school year = _____ lbs.	H Amount of trash per school year = _____ lbs.	M Amount of trash per school year = _____ lbs.

The Classroom	The School	Schools in Arizona
<p>A Amount of trash per day = _____ lbs.</p> <p>This answer is the weight measured by the class.</p>	<p>E Amount of trash per day = _____ lbs.</p> <p>A x (number of classes in your school)</p>	<p>J Amount of trash per day = _____ lbs.</p> <p>E x (1100 schools in Arizona)</p>
<p>B Amount of trash per week (5 days) = _____ lbs.</p> <p>A x 5</p>	<p>F Amount of trash per week (5 days) = _____ lbs.</p> <p>E x 5</p>	<p>K Amount of trash per week (5 days) = _____ lbs.</p> <p>J x 5</p>
<p>C Amount of trash per month = _____ lbs.</p> <p>B x 4</p>	<p>G Amount of trash per month = _____ lbs.</p> <p>F x 4</p>	<p>L Amount of trash per month = _____ lbs.</p> <p>K x 4</p>
<p>D Amount of trash per school year = _____ lbs.</p> <p>A x (number of days in school year)</p>	<p>H Amount of trash per school year = _____ lbs.</p> <p>E x (number of days in school year)</p>	<p>M Amount of trash per school year = _____ lbs.</p> <p>J x (number of days in school year)</p>

A Way with Worms!

EXTENSION ACTIVITY 4

Activity Overview

The word “recycling” literally refers to recycling glass bottles, aluminum cans, and newspapers, but the word can also be used in a broader sense to include composting of biodegradable organic wastes. “A Way With Worms!” teaches students how to compost organic materials using red earthworms to speed up the decomposition process. This compost pile becomes a classroom display that students can maintain and observe for several months.

Learning Objectives

Students will be able to:

- 1) define the terms decomposition, compost, and composting;
- 2) list examples of materials that are suitable or not suitable for composting; and
- 3) identify valuable uses for composted organic waste.

Preparation & Materials

- 10 gallon aquarium, square plastic box, or large plastic bucket (Note, when deciding what kind of container to use remember that the surface area is more important than depth. Generally, every pound of food waste to be composted per week will require one square foot of surface. If using a square plastic box or bucket instead of an aquarium, punch or drill holes the size of a pencil near the top or the lid for letting in oxygen.)
- food and yard wastes, such as leaves, grass clippings, sawdust, kitchen scraps, etc. (Do not include meat scraps, dairy products, fats, and oils which can inhibit decomposition, cause odors, and attract pests.)
- rich soil from outdoors (enough to fill half of the container) (Do not use potting soil, because it is sterile and would not contain the necessary bacteria.)

- bucket
- old scissors
- trowel or large spoon
- thermometer
- one to two dozen red earthworms (These can be purchased from Carron's Organic Farm located in Cochise, Arizona (520) 826-3422 or ordered by mail from Flowerfield Enterprises, 10332 Shaver Road, Kalamazoo, MI 49002, (616) 327-0108; red worms are sometimes sold as fishing bait.)

Classroom Procedures

- 1) Collect materials for composting. Ask one or two students to bring in yard waste, such as leaves, grass, twigs, hedge clippings, and weeds. Ask the student bringing in grass clippings to dry them out in the sun before bringing them in. Save some food waste from the day prior and/or the current day in a sealed plastic container.
- 2) Display the materials in a prominent area in the class, preferably where you expect the compost to be left on a long-term basis. Make sure that it is placed where it will be at room temperature but not in direct sun. Note that once you have prepared the compost pile in the container, it may be too heavy to lift.
- 3) Introduce the topic of composting and such vocabulary terms as organic, biodegradable, decomposition, and natural recycling. Refer to the composting section of the “Just the Facts” background section in this Teacher Guide. Remind the class that a lot of the waste we produce is organic and that it can be recycled through the process of composting. Recall from previous activities how much food and yard waste contribute to the total amount of solid waste Americans generate annually.
- 4) Conduct a discussion by asking the students: What is composting? What are the

necessary ingredients for a good compost pile? In order for decomposition to occur in a compost pile, several components must be present: soil, organic matter, water, air, time, heat, mass, and decomposer organisms. Ask the students to give examples of organic wastes. How is composting related to the concept of recycling? How can composting reduce waste?

5) You are now ready to make the compost pile. Explain to the students that worms can turn food wastes into high-quality soil conditioner for houseplants and gardens. In order to add the earthworms later, you need to prepare a "bed" for them within your container. Ask two students to shred either newspaper or corrugated cardboard into 1 inch strips to make bedding. Place the bedding material in a bucket and add enough water to thoroughly wet the material. Any excess moisture will drain off when it is placed into the container. Ask a few volunteers to cut up the yard and food wastes into one inch or smaller pieces with the scissors. The smaller the pieces, the faster they will break down into compost.

6) While the students are cutting up the organic wastes and preparing the bedding material, ask one student to place an inch of soil on the bottom of the container using the ruler. Add an inch layer of food waste and a sprinkle of yard waste. Place an inch layer of moistened bedding on the layers of soil and organic material of the aquarium. Then cover the bedding with a small amount of garden soil. Add the red earthworms. The bin should be left uncovered for the first day until the worms work down into the bedding, away from the light. Then keep the box closed. Worms work most efficiently in dark, moist environments, at temperatures between 50 and 70 degrees.

7) On the second day, alternate layers of the materials as follows: one inch of soil, two inches of organic waste, a sprinkle of green grass clippings or leaves, and a sprinkle of water. Repeat until the container is almost two-thirds full. Make sure that you are able to cover the last layer with an inch of soil. Note, these amounts are approximate. With each

layer, water the pile enough to make it moist but not soggy. It should feel like a damp sponge. Inorganic materials, such as chemicals, glass, metal, or plastic, should not be added.

8) Vegetable and fruit scraps can be incorporated into the bin by digging a small hole in the soil, placing the wastes in the hole and then covering it. Burial spots should be rotated so that wastes are distributed throughout the bin. The worm bin can be overtaxed if a large amount of food waste is added at one time. Consider leaving a few large pieces of the materials (such as a whole banana peel) to compare rates of decomposition between large and small items. Why might there be a difference?

9) Gently mix the compost once a week to aerate it. Water it if it becomes too dry. Keep the material as moist as a squeezed-out sponge. Use a thermometer to test the temperature of the pile. You may want to graph the results. Every month, check the progress of decomposition by turning and aerating the bin. When the bin is full, let it sit and decompose for several months, then use it for indoor and outdoor gardening. When the compost is ready to use, it should be dark and crumbly with most of the original identity of the materials lost. You may wish to screen finished compost to remove coarse or incompletely decomposed materials such as woody plant matter that break down slowly. Anything too coarse to pass through a 3/8 or 1/2 inch screen can be added to a new compost pile to decompose further.

10) Discuss: A sanitary landfill is not a gigantic compost pile. A variety of organic materials can be composted. Different types of composting may be suitable for people in different types of homes. Because so much of our waste is food and yard waste, composting is an important way to reduce the amount of waste that is sent to landfills.

Extensions

1) To observe the benefits of compost, con-

duct an experiment comparing plant growth with and without compost. Use the compost made by the class.

2) Make a second compost pile with inorganic or non-biodegradable materials in it (such as a soda can, glass bottle, comb, can opener, etc.). Every week compare and contrast the rates of decay of the two compost containers.

3) Observe decomposition in a natural setting, such as a park or vacant lot.

Adapted from the "Mini-Compost" activity in the Nature's Recyclers Activity Guide created by the Wisconsin Department of Natural Resources, Publication IE-043 90.

Trouble-Shooting: Potential Problems with Composting

Problem

What to do

Pests

Fruit flies and soil gnats are decomposer organisms that actually help make compost. You can reduce them, however, by digging in food waste or covering it with soil.

Smells like ammonia

The compost has too much nitrogen. Adding dry leaves will help absorb excess moisture and mix to aerate it. Adding a thin layer of soil on top can help trap odors.

Smells like rotten eggs

There isn't enough air. Aerate the pile. Mix it daily until the smell is gone. Adding a thin layer of soil on top can help trap odors.

The center is dry

Spray or sprinkle the compost with water while mixing it.

Just the Facts

TEACHER BACKGROUND INFORMATION

About Natural Resources

A resource is anything that an organism uses from its environment. All material goods – essentially, everything we have and use – is derived from natural resources, or raw materials and energy we get from the environment. The clothes we're wearing, the chairs we're sitting on, our homes and TVs and school and books, the school bus, city streets, whatever you ate for breakfast, and the package your breakfast came in are made of natural resources. Natural resources sustain human life. We're completely dependent on our environment to provide what we need for our basic survival, including air, water, food, and shelter, as well as for all of the "extras" that are not essential to survival but that may still seem important at times, such as our computers, skateboards, balls, backpacks, and so on.

Nonrenewable natural resources are not replenished through natural cycles or are replenished very slowly through geologic time. Nonrenewable resources, like soil and water, oil and gas, and minerals like iron and aluminum, are available only in finite quantities, although for some resources the amount available may be quite large. Renewable natural resources, like trees, are regularly replenished through natural cycles on a human time scale. However, even renewable resources are limited in availability; for example, the harvest of wood products may be limited by tree growth rates. Perpetual natural resources like sunlight and wind are derived from essentially inexhaustible sources, in limitless amounts.

Some scientists think that the depletion of some natural resources may be an important problem for society in the future. For most natural resources, the amount utilized by present and future generations relates to two major factors: human population, and the consumption level or amount consumed by each person. The environmental impacts of harvesting and processing resources are tied to population and consumption levels, plus the

technologies employed as we harvest and use natural resources. Historically, access to or development of natural resources has played a great role in determining the political strength and international influence of nations. Scarcity of renewable resources has contributed to a number of violent conflicts in recent years and some experts project will contribute to even more violent conflicts in the future.

Our use of natural resources has impacts that go far beyond simply using materials that may be limited in supply. The environment is affected at every stage of the chain of extraction – processing – manufacturing – marketing – consumption – disposal. The harvesting of raw natural resources directly impacts the environment through mining, timber cutting, construction of dams, and the like. Then the raw materials must be made into a usable form, such as metallic ores into more pure metals. This is an energy-intensive process that typically results in air and water pollution as well as unwanted or even toxic by-products. Next, to produce specific consumer products like clothes, camcorders, or skateboards, further manufacturing processes are needed. These manufacturing processes also use energy and often generate pollution. Then the final consumer products need to be transported and stored, which again involves additional inputs of energy and materials and has further environmental impacts.

Finally, the products must be packaged and marketed to us, the public. This involves still more natural resource use and more environmental impacts related to packaging materials, billboards, print ads, and so on. Packaging and advertising contribute significantly to the cost of a product and to its overall environmental impact as well.

When we purchase an end product, is the chain of impact finally complete? Not yet! If using the product we have bought requires gasoline, batteries, or electricity, the production and use of these generates more pollution.

Anyway, at some point, whatever the item – be it a few ounces of packaging that hold a fast-food meal for two minutes, or a two-ton

automobile that lasts for years – we throw it away. But really, there is no “away.” Something must be done with the stuff we no longer want. The sheer volume of trash we generate in the U.S. is a significant problem. Discarded packaging materials alone account for about 35 percent of our household trash. And this figure does not include all of the other waste tied to the entire life cycle of the product, the chain that begins with extraction of raw natural resources and continues with processing, manufacturing, marketing, use, and disposal.

A World of Waste

What is solid waste? “Solid waste” is also referred to as trash, rubbish, refuse, or garbage; basically it means waste material that is not liquid or gas. Solid waste includes not only municipal and industrial wastes, but also wastes from mining, agriculture, and silviculture, demolition debris, and a variety of sludges. The term “waste” has interesting connotations. It can refer to something leftover or something not used wisely. This makes it a very appropriate term for trash, because much that is considered waste actually could be very useful.

Municipal solid waste is produced by residential, commercial, and institutional generators within a community. Though the terms solid waste and municipal solid waste can be confusing, solid waste is comprised of a much greater variety and amount than municipal waste. Municipal solid waste generally is categorized as follows: paper and paperboard, glass, aluminum, metals, plastics, rubber and leather, textiles, wood, food and yard wastes, and miscellaneous inorganic wastes.

Solid waste is a real problem in the United States. The average U.S. resident generates several times as much waste as a typical person in most other countries. The U.S. produces more than 50% of the world’s solid waste! Even compared to other wealthy industrialized nations such as Japan or countries in Western Europe, we generate twice as much solid waste per capita. The average American produces about 4.4 pounds of garbage each day! This is expected to in-

crease to 4.8 pounds per person per day by the year 2010.

Recycling has been growing steadily for over 20 years. From 1980 to 1990, the U.S. almost doubled its recycling rate from 9 percent to 17 percent. In 1995, our country’s average recycling rate was over 25 percent, and by 2000, it was 30 percent. Arizona’s recycling and composting rate is currently around 18 percent of municipal solid waste. This is a definite improvement over 10 years ago, but well below the national average. Several states have recycling and composting rates over twice Arizona’s current rate (that is, 36 percent or more of their waste is recycled or composted). Washington state’s rate is almost 50 percent. In several of the leading states, hundreds of individual communities are recycling or composting 50 percent or more of their waste. Arizona still has a long way to go! Some researchers estimate that as much as 60 to 80 percent of our waste stream is potentially able to be recycled, composted, or otherwise recovered.

A few nay-sayers have claimed that recycling is not cost effective and that it does not always pay for itself. However, no one expects landfills or incinerators to pay for themselves. Why should we expect this of recycling? Plus, recycling is much more than an alternate means of waste disposal. Recycling is about conserving natural resources, reducing our use of energy and materials, minimizing pollution, and more. Studies that incorporate the complete life cycle of products, from cradle to grave, show that recycling is a viable, economically intelligent choice.

What are the “Three R’s”?

In a waste reduction context, the “three R’s” are to reduce, reuse, and recycle. These are the three most basic, important ways to reduce waste, conserve natural resources, and decrease our impacts on the natural world. Reducing, reusing, and recycling often saves money too.

It is important to recognize that the order cited – reduce, reuse, recycle – is not arbitrary.

Some people tend to think of recycling as a central focus and of reducing and reusing as less important, but this is not a correct understanding. Reducing is actually the most efficient way to conserve resources. Reusing is second in efficiency. Recycling is still important, but is not as efficient as reducing and reusing.

An example that should help students understand this clearly is the simple question of what kind of bag to use when shopping. If we were to extract oil and make new plastic bags for every trip to the store, or cut down trees and make new paper bags for every trip to the store, this would be a sad waste of natural resources. Recycling those plastic or paper bags would clearly be an improvement, and our impact would be less because we would be extracting and processing less oil, cutting and milling less trees, and manufacturing less bags. Products made with recycled content, including plastic or paper bags, clearly reduce our impact on the environment.

Recycling is more efficient than using virgin natural resources, but reuse is a further improvement. If you reuse a plastic or paper bag several times, it still has the environmental impact of only one bag. Contrast this to the effects of shredding, pulping, melting, or otherwise processing that bag after a single use so that you can make a new bag with the same materials. Recycling is good, and better than using virgin materials, but reusing something as much as possible is clearly even better.

What about reducing? To continue the example of a shopping bag, we could reduce our ongoing need for bags by getting a set of several durable canvas bags. These bags are able to be used hundreds and hundreds of times. Although the initial impact of producing one cotton bag might be greater than the impact of producing a single plastic or paper bag, the cotton bag is obviously going to have far less impact over time than the cumulative effects of using plastic or paper bags. The old dilemma “paper or plastic?” is really a mute point; the correct answer is “neither – I brought my canvas bags!”

Source reduction, or eliminating waste at its source, is more effective than trying to recycle waste after it already exists. Besides reducing our need for items like bags, we can reduce our need for other types of packaging or even whole products. Another way to reduce packaging is to buy products in large containers. For a given product, available in two containers of similar type but differing size, the larger size will always have less packaging in relation to the amount of product. This is something your students could learn more about in math classes, it relates to the relationship between surface area and volume.

This type of comparison made here for bags applies to many other products that we might need to choose from disposables or durables. For example, rather than wonder about whether you should purchase paper, plastic, or plastic-foam cups for a school event, consider using durable, washable cups on loan from the school cafeteria. And this comparison of reducing versus reusing versus recycling applies to certain kinds of durable goods as well. Purchasing a used bicycle or car or book or musical instrument or piece of furniture is going to have less impact than the same item purchased new. Even if some degree of effort and resources must go into repair and refurbishing, reducing and reusing are always a good idea and a very effective way to reduce our impact on the environment.

In various contexts, you may see other “R’s” mentioned besides the basic three of reduce, reuse, and recycle. Repair and refurbishing are sometimes listed. “Precycling” may be noted, referring to the idea of not just recycling what you can, but pre-planning your purchases to prioritize items that can be recycled. Another occasional “R” is the idea of “re-buy” or buying recycled. This means trying to purchase products or packaging that are already made with recycled content. Recycling of course involves a cycle. For recycling to be successful, we need to do complete the cycle or “close the loop” by buying recycled goods. This is why it’s important for students to learn to distinguish between the “made from recycled” symbol, which is a trio of light chasing arrows on a dark circle background, from

the “recyclable” symbol, which is a simple trio of chasing arrows. A “made from recycled” product or container is actually made from materials that have been used before. Advertisers know that consumers are interested in green products and often promote their products and/or packaging as “recyclable.” Consumers should realize that this is not the same as “recycled,” a word it closely resembles. Many materials are technically recyclable, and may be labeled as recyclable, but are seldom actually recycled. What really matters is whether you can recycle an item in the programs that exist in the area where you live.

Finally, on the subject of what's it means to recycle, it is worth noting that not all kinds of materials are recyclable in the same sense of the word. In particular, plastic recycling is very different than glass or metal recycling. Glass, aluminum, tin and steel containers can be recycled many, many times into more containers of the same type. Almost all glass, aluminum, tin and steel containers that we purchase today have at least some recycled content. Many have 30 percent or more recycled content. In contrast, it is highly unusual for plastic bottles and containers to be recycled into new plastic bottles and containers. Plastics are typically recycled into very different new products. The list of products that can be made from recycled plastic is quite impressive. However, most of these products can not be recycled again. Thus, after serving a second use, the plastic still ends up in a landfill. Much of the plastic bottle recycling that began in the early 1990s was funded by the plastics industry. Much of this support has been withdrawn and many communities now absorb the cost. Recycling plastic bottles is preferable to sending them to a landfill or incinerator. However, for reasons involving both environmental concerns and community economics, when comparable products are available in plastic bottles and in glass or metal containers, many environmentally-minded consumers consider it preferable to purchase product in glass or metal containers.

REDUCE

- Prevent waste; but only what you really need.
- Purchase products in large packages, for things you use regularly.
- Purchase products in less packaging.
- Purchase concentrates and bulk items.
- Buy products in refillable packaging.
- Avoid buying products you don't really need.
- Borrow, loan, rent, lease, or share when possible (books, tools, etc.)
- Use both sides of paper.
- Take action to get your name deleted from mailing lists.
- Repair instead of replace something broken or worn.
- Buy good quality, durable products that fabricated so that they can be repaired.
- Take good care of your things, so that they last.

REUSE

- Choose reusable rather than disposable goods (napkins, mugs, razors, sponges, etc.).
- Purchase used goods (furniture, books, music, toys, clothes, etc.).
- Sell or give away goods you no longer want or need.
- Use the back of old paper as scratch paper.

- Use glass jars, plastic tubs, water bottles, lunch bags, etc. again and again.
- Reuse leftover materials to make something different (scrap lumber to build a bat house or doll house).

RECYCLE

- Recycle as much as possible through community collection programs, either curbside or at drop-off locations.
- Adjust your purchasing habits to buy items in packages that are recyclable in your area.
- Keep an eye out for other special recycling programs, such as opportunities to recycle copier or computer printer cartridges through an office supply, special seasonal brush or Christmas tree collection programs, and so on.
- Remember to buy recycled. Look for products and packaging with recycled content.
- Try to help “nature’s recycling” by composting kitchen and yard waste.

What Can We Recycle?

What kinds of materials are collected for recycling varies from one location to another. Each community is unique. Your city, town, or county has an individual or office responsible for coordinating programs in your area. The contact point for your community should have up-to-date knowledge of what is currently being recycled in your area. The Arizona Department of Environmental Quality’s Recycling Office maintains a list of recycling coordinators in local government. The ADEQ Contacts List is included in this Teacher Guide. Please be aware that ADEQ updates this list regularly. You may wish to contact the ADEQ or check their website to look for the latest version of the list.

The kinds of materials collected for recy-

cling may change in your community over time. In general, the number of types of materials collected is most likely to increase. However, changes in recycling materials markets may occasionally result in one or more types of materials being dropped from your local “what’s recyclable” list. The reason for this relates to basic economics in a free market society. Just as supply and demand affect the price of beans and blue jeans, so too do they affect the price that recycling companies pay for your old recyclables. For example, if used glass is in demand, your community will collect it. But if the market is saturated, it may end up costing your community more to collect and ship the glass than they can earn from selling it, and the local government may be pressed to stop collecting glass.

The distance that materials must be transported also affects how feasible it is to collect them for recycling. If there is a paper mill near your community, any paper collected may bring a good price. The cost to ship it will be minimal. So how far materials need to be transported for processing, as well as how heavy, bulky, or expensive that type of material is to transport, also affect what can be recycled in your area. As new processing or remanufacturing facilities are built, or old mills re-tooled, the distance that materials need to be transported may change, affecting how feasible it is to recycle those materials in your area.

Sometimes people who live in large municipal areas, with several different local jurisdictions, may be confused by the differences between the various recycling programs around them. Many factors affect what each individual community chooses to recycle. One factor is the technology and facilities that community has available to process materials – or to landfill them. In some cases, perhaps your community could easily market a certain material, but they are not able to collect and process it. For example, if the trucks used for curbside collection are set up for only certain categories of materials, and it would require a large capital outlay for a new fleet of trucks, your community may choose to simply limit the

types of materials collected. And whether your community has plenty of landfill space or their landfill is rapidly approaching its capacity may also affect the situation.

Finally, the attitudes and management style of your community or county waste management department and your elected officials will also affect what is recycled in your area. This is partly a matter of politics and the environmental attitudes of the decision-makers, but that's only part of it. Community education efforts and community relations come into play as well. If a market for a new material develops, for example for paperboard, some community decision-makers may feel ready to start recycling paperboard right away. In other communities, the decision-makers might take a more conservative approach, choosing to watch the market for as much as a few years to confirm that it is stable and dependable and consistently able to offer a good price for paperboard. The decision-makers may also be concerned that if the market isn't stable, it could confuse or anger citizens if a new material is added to the community "what's recyclable" list and then later dropped from the list.

Solid Waste Disposal

In Arizona, the large majority of our waste ends up in landfills. This is in contrast to other parts of the U.S., where a significant portion of municipal waste may be incinerated. Arizona is not a leader in recycling. Some states recycle a much greater portion of their waste than we currently do.

What is a landfill? The term usually refers to a modern sanitary landfill, in contrast to older "dumps" which had no safeguards in place to prevent pollution of the nearby land or pollution of surface waters and groundwater. In April 1994, the EPA instituted new sanitary landfill requirements designed to prevent groundwater pollution and polluted runoff; restricted placing landfills on flood plains, earthquake faults, and other unstable areas; mandated that future landfills be designed to protect groundwater; mandated that monitoring wells

be installed to detect pollution of groundwater, and required landfill owners and operators to clean up contaminated waters. Each state was required to adopt a landfill regulatory program that matched or exceeded the new federal standards. Arizona adopted its new standards in April 1994.

Arizona has about 60 municipal solid waste landfills (ten of which are state-of-the-art sanitary landfill sites) and eight refuse (for construction debris only) landfills. State-of-the-art sanitary landfills are those that were newly created according to the updated EPA standards. The Arizona Department of Environmental Quality reviews and approves plans for new landfills, inspects existing ones, closes landfills, and monitors closed facilities to ensure that groundwater is not being contaminated.

A sanitary landfill can be described as a large pit, usually 25 to 50 feet or more deep, lined with two feet of dense clay, a layer of thick plastic liners, and covered with several feet of gravel or sand. Perforated pipes are laid to collect leachate, the liquids that seep downward out of the trash. Garbage brought in each day is compacted and covered with six or more inches of soil, crushed glass, or plastic foam. Most of the materials in a landfill will not decompose over time. As leachate is collected, the water in it is separated, then treated and released. The remaining sludge is landfilled, burned, or used as fertilizer. To deal with methane gas, a byproduct of decomposition, many newer landfills contain pipes that draw off the gas. The methane may be burned on site, or it may be cleaned and sold as fuel to a power-generating facility. Some of the gas is allowed to escape into the atmosphere. After they reach their capacity, landfills are sometimes reclaimed for use as parks and, occasionally, as building sites. Siting of new landfills is often a contentious issue for a community.

In many towns and cities, citizens are unaware of reasons to reduce waste. And often, trash disposal is considered a "free" public service. Very few communities directly bill residents for garbage collection, even though they usually do bill for water or sewer

use. This lack of immediate financial consequences contributes to low public awareness and little incentive for residents to reduce the amount of garbage they generate. Cities that offer trash collection fee systems that charge for different size trash cans, or the number of cans set out, usually report reductions in the amount of trash put out for collection. Only when trash becomes a financial issue, as with the water and phone bill, does it become a priority for many people.

Arizona, in 1990, enacted the Arizona Solid Waste Recycling Act. The primary focus of the Act for every city, town, or county to provide its citizens and businesses with an opportunity to participate in recycling and waste reduction programs. It requires all state government units to establish programs to recycle waste paper and corrugated cardboard. It also required that at least 25 percent of all newsprint be made from recycled content. This percentage increased to 50 percent in the year 2000.

Compost Facts

Although the word "recycling" literally refers to recycling glass bottles, aluminum cans, newspapers, and similar materials, "recycling" can also be used in a broader sense to include composting of biodegradable organic wastes. Composting has been called "nature's recycling." Composting can be a very important form of waste reduction, as over 25% of household waste is food and yard waste. Composting, or the process of making compost, is a controlled waste management alternative in which organic wastes are partially decomposed by aerobic bacteria, fungi, and other organisms. Although decomposition happens naturally, in composting we try to set up optimal conditions for it to occur. Decomposition is a basic ecosystem process, an important part of many nutrient cycles, and is essential for the continuation of life on Earth. We are only able to compost materials that are biodegradable or able to be broken down into simpler compounds or basic elements by microorganisms and other decomposers. Only organic materials or wastes are biodegrad-

able or able to decompose. Anything made up of living organisms, like plants and animals and their wastes, is organic. Something that is biodegradable is capable of being broken down naturally by microorganisms into simple, stable compounds, like carbon dioxide and water.

Most organic materials, including food scraps, yard trimmings, and paper, are readily biodegradable. Leaves, evergreen needles, grass clippings, sawdust, manure, fruit peels, vegetable trimmings, and other plant material can be composted. Dog, cat, and human feces are not recommended for composting due to potential problems with disease organisms. Meat scraps, dairy products, fats, and oils are also not recommended, as these can inhibit decomposition, cause odors, and attract pests.

The composting process requires organic material (nitrogen and carbon), moisture, air, and soil organisms. Frequently aerating the compost pile, by turning or mixing, will speed up decomposition. It's also important for the materials to be moist but not soggy. Coarse materials will compost more readily if they are chopped or broken into small pieces. For optimum decomposition rates, a balance of "green" and "brown" materials, with more of the latter, is needed. So-called green materials are high in nitrogen and include grass clippings, other fresh green plant trimmings, food scraps, and manures. So-called brown materials are high in carbon and include dry leaves, straw, nutshells, sawdust, and wood chips. But it's not necessary to be overly concerned about the balance of greens and browns. As the saying goes, "compost happens." How we tend a compost pile may accelerate or slow the process, but decomposition will take place at some rate regardless of our attention or inattention.

Paper, paperboard, and cardboard can be composted as well. However, these materials must be shredded thoroughly before they are placed in the pile. It should be noted that these brown materials are very low in nitrogen and too much of them can imbalance the pile and slow the rate of decomposition. Paper

towels, tissues, and newspapers are easier to compost than other paper products. However, some experts suggest that if paper is composted, it should not be more than 10 percent of the total weight of the material in your pile. Another concern about paper products is that because they are often bleached with toxic chemicals, the organisms in your compost pile will not be able to break down bleached paper products as the same rate as unbleached paper products. Also, those planning to use their finished compost in a vegetable or herb garden may wish to avoid the chemical bleaches and inks on many types of paper. In sum, although all paper products are theoretically able to be composted, there are many caveats regarding their use, and to compost them effectively requires giving extra time and attention to the compost process. Even the most avid composters often compromise by using unbleached paper towels and tissues in their home and then putting these in their compost, and perhaps also including shredded unbleached tubes from rolls of paper towels or toilet tissue. Others may use a limited amount of newspapers, but send other paper products to regular recycling facilities.

Egg shells and wood ashes can be composted, but for many Arizona residents are not necessarily recommended. This is because desert soils tend to be alkaline and high in calcium, and egg shells and wood ashes would further exaggerate this soil chemistry. Leaving these materials out of the compost pile will result in a compost that better balances our soils toward a neutral pH.

Finished compost can be a valuable soil additive. This holds for any type of soil. Composted organic matter provides many plant nutrients and can balance the soil pH. It can also improve soil textures, helping to break apart heavy clay soils and make them lighter, and improving the water-holding capacity of sandy soils. Compost can be used in vegetable gardens, flower gardens, under citrus trees, shade trees, and for general landscaping purposes. Note, native desert plants are adapted to live in soils with limited organic matter and should not be planted with or fed

large amounts of compost. Compost can be used as a potting soil. It can also be covered with water, and the water used as liquid fertilizer.

Composting can be done on almost any scale: For those living in an apartment, a worm box can be used to compost food scraps and house plant trimmings. Worm composting is also an excellent method for composting in the classroom. For those in a house with a yard, an outdoor compost bin can be set up. Home compost bins can be quite varied in appearance and in the materials they are made of. Some businesses and municipalities compost on a much larger scale, and citizens may be able to participate in these programs as well. Some communities offer ongoing composting programs, while others offer seasonal programs, such as special Christmas tree pick-up and composting efforts.

Explanation of the Activities and Scoring for the Shopping Simulation

What happens in the shopping simulation?

Each time a user enters the shopping segment of the program, a shopping list with 10 items is generated and appears in the corner of the main shopping screen. These items are randomly selected from a set of 20 possible items, so that even if a student plays the program several times, the “mission” will always be different to some degree.

The main shopping screen offers a set of three help buttons, which may be clicked to trigger clues about shopping to support the “3R” mission to reduce, reuse, and recycle. The central image of the screen is a view down a supermarket aisle. To proceed, students must click an over-aisle sign that matches an item on their shopping list. With this click, an expanded shopping screen specific to that item appears.

Students now see an array of four alternative products from which to choose. For example, if apple sauce is on the shopping list, and a student clicks the aisle sign for apple sauce, four alternative apple sauce products appear. Students can click on any of these alternatives (types of applesauce) as many times as they wish to display information about a specific product, one product at a time. This information includes the size of the package (such as “46 oz.” or “6-pack of 4 oz. cups”), packaging materials (such as “glass jar”), whether the packaging materials include recycled content, and whether the packaging materials are recyclable.

Students are also able to click on a button to see a list of materials that are recyclable in the local community. The items on this “what’s recyclable” list are determined by the teacher before users access the program. This is a simple process of checking boxes in one of the set-up screens. To confirm what is locally recyclable in your area, please see the “Community Recycling Contacts List,” the next section of this Teacher Guide, for information

on who to contact in your community and county for more information

After a student reviews the available information as much as s/he would like, s/he then drags a product into a shopping cart at the bottom of the expanded shopping screen. This triggers a return to the main shopping screen and a response on the score meter. If a student is not satisfied with that score, s/he is able to click a “change selection” button to return to the expanded screen and try again. Note, students can change their selection only once, not repeatedly, for each item on their shopping list. Then they continue with their list, clicking a set of buttons as needed to move between four grocery store aisles and find all of the items on the list.

What scoring criteria are used in the shopping segment?

The scoring criteria are summarized in the “quick tip” that Spike offers before the user enters the Main Shopping Screen. The quick tip is:

1. Buy products in large-size packages. Big packages tend to have less packaging. Think big!
2. Buy products with the least amount of packaging. Less is best!
3. Buy products or packaging that are already made with recycled content, and that you can recycle again. Choose recycled!”

From the main shopping screen, users can also access more information about each of these areas by selecting any of three help buttons that expand on the quick tip items. These tips are not placed in arbitrary order, but ranked in order of importance. The points that students receive for the choices they make in the shopping segment reflect the quick tip and help statements as well as whether a particular type of packaging is recyclable in the local

community. Although the choices are based on packaging for most products in the shopping simulation, in some cases the product itself has recycled content. This then becomes the deciding factor (for example, although the recycled paper towels have slightly more packaging, this is considered less significant than the fact that the paper towels themselves have 100 percent recycled fiber content). The user receives a maximum of four points and a minimum of one point for each item for which s/he shops. Selecting the best option warrants four points (for example, a large quantity of apple sauce in a recycled-content, reusable, recyclable glass jar); other choices are worth less points, with the lowest-ranked option receiving only one point (for example, small amounts of apple sauce in non-recycled, non-recyclable plastic cups).

Both the quick tip and help-button priorities reflect the usual hierarchy of the three R's - reduce, reuse, and recycle. During the shopping segment, reducing and recycling are the most applicable concepts. However, reuse is brought out at the end of the shopping segment, when Spike comments on the importance of bringing your own grocery bags.

SHOPPING SIMULATION DATA AND SCORING TABLE

Item	Brand	Size	Packaging	Recycled?	Recyclable?	Score
Applesauce	Musselman's	46 oz.	Glass jar	Yes	In some areas	4
	Seneca	24 oz.	Glass jar	Yes	In some areas	3
	Janet Lee	16 oz.	Steel/tin can	Yes	In some areas	2
	Motts	6-pack of 4 oz. cups	Six #7 plastic cups Six aluminum foil lids Paperboard wrap	No	Cups – no Foil – in some areas Paperboard – in some areas	1
Butter	Janet Lee	48 oz.	HDPE #2 plastic tub Plastic lid	No	Usually not	4
	Land O' Lakes	16 oz.	Paperboard box Four paper-foil wrappers	No	Paperboard – in some areas Wrappers – no	3
	Country Crock	16 oz.	HDPE #2 plastic tub Plastic lid	No	Usually not	2
	Land O' Lakes	8 oz.	Paperboard tub Plastic lid	No	Paperboard – in some areas Lid – no	1
Cereal	Malt-o-Meal Toasty O's	40 oz.	Plastic bag	No	No	4
	Kellogg's Frosted Flakes	48 oz.	Paperboard box Plastic bag	Paperboard partly recycled	Paperboard – in some areas Bag – no	3
	Post Fruit and Fiber	15 oz.	Paperboard box Plastic bag	Paperboard partly recycled	Paperboard – in some areas Bag – no	2
	Kellogg's "Fun Pak"	6-pack of 9 oz. packages	Six paperboard boxes Six inner bags Outer plastic wrap	Paperboard 100% recycled	Paperboard – in some areas Plastic – no	1
Cheese	Albertson's	3 ½ lbs.	Plastic wrap	No	No	4
	Albertson's	1 lb.	Plastic wrap	No	No	3
	Kraft	½ lb.	Plastic bag	No	No	2
	Albertson's	1 lb. 24-pack of singles	24 plastic wrappers Outer plastic wrap	No	No	1
Coffee Filters	Janet Lee	200 count	Plastic bag	No	No	4
	Janet Lee	100 count	Plastic bag	No	No	3
	Melita	100 count	Paperboard box	Yes	In some areas	2
	Mr. Coffee	100 count	Paperboard box	No	In some areas	1

SHOPPING SIMULATION DATA AND SCORING TABLE

Item	Brand	Size	Packaging	Recycled	Recyclable	Score
Cola	Coke	3 liters	PETE #1 plastic bottle	No	In some areas	4
	RC	2 liters	PETE #1 plastic bottle	No	In some areas	3
	Shasta	6-pack of 12 fl. oz. cans	6 aluminum cans Plastic rings	Yes for cans	Cans – yes Plastic rings – no	2
	Albertson's	12-pack of 12 fl. oz. cans	12 aluminum cans Box of special wet-strength paperboard	Yes for cans No for paperboard	Cans – yes Soda-carrier paperboard – usually not	1
Cooking Oil	Canola Harvest	48 fl. oz.	PETE #1 plastic bottle	No	In some areas	4
	Janet Lee	32 fl. oz.	PETE #1 plastic bottle	No	In some areas	3
	Wesson	24 fl. oz.	#3 plastic jug	No	Usually not	2
	Wesson	16 fl. oz.	PETE #1 plastic bottle	No	In some areas	1
Corn	Janet Lee	16 oz.	Steel/tin can	Yes	In some areas	4
	Green Giant	7 oz.	Steel/tin can	Yes	In some areas	3
	Green Giant	16 oz.	Plastic bag – must be kept frozen	No	No	2
	Janet Lee	10 oz.	Paperboard box – must be kept frozen	No	In some areas	1
Detergent	Good Day	30 lbs.	HDPE #2 plastic bucket with lid	No	Usually not	4
	Tide	10 lbs.	Plastic bag	25% recycled	No	3
	Purex	1 gallon	HDPE #2 plastic jug	No	In some areas	2
	Cheer	2 lbs.	Paperboard box	Yes	Yes	1
Dog Food	Purina	40 lbs.	Bag with paper and plastic layers	No	No	4
	Ken-L Ration	4 lbs.	Bag with paper and plastic layers	No	No	3
	Butcher's Blend	3 ½ lbs.	#3 plastic jug	No	Usually not	2
	Gaines Burgers	3 ¾ lbs.	12 plastic wrappers Paperboard box	No	Plastic – no Paperboard – in some areas	1

SHOPPING SIMULATION DATA AND SCORING TABLE

Item	Brand	Size	Packaging	Recycled	Recyclable	Score
Grape Juice	Welch's	48 fl. oz.	Glass bottle	Yes	In some areas	4
	Welch's	48 fl. oz.	Steel/tin can	Yes	In some areas	3
	Welch's	4-pack of 5.5 fl. oz. cans	Four aluminum cans Plastic rings	Yes for cans	Cans – yes Plastic – no	2
	Welch's	3-pack of 8.45 fl. oz. juice-boxes	Boxes made of aluminum, paper and plastic in layers Plastic straws and wrappers Outer plastic wrap	No	No – none of it!	1
Mayonnaise	Best Foods	48 oz.	Glass jar	Yes	In some areas	4
	Kraft	48 oz.	PETE #1 plastic jar	No	In some areas	3
	Kraft	8 oz.	Glass jar	Yes	In some areas	2
	Best Foods	12 oz.	PETE #1 plastic squeeze bottle	No	In some areas	1
Paper Towels	Green Forest	1 roll	Plastic wrap	No for packaging Yes, paper towels 100% recycled	No	4
	Viva	6 rolls	Plastic wrap	No	No	3
	Bounty	3 rolls	Plastic wrap	No	No	2
	Bounty	8 rolls	8 plastic wrappers Outer plastic wrap	No	No	1
Popcorn	Jolly Time	32 oz.	Plastic bag	No	No	4
	Orville Redenbacher	32 oz.	PETE #1 plastic jar	No	In some areas	3
	Orville Redenbacher	6-pack of 3 oz. bags	Six paper pop-in bags Six plastic wrappers Paperboard box	No for paper and plastic Yes for box	Paperboard – in some areas	1
	Jiffy Pop	4.5 oz.	Aluminum foil pan Aluminum foil top Wire handle Paperboard cover	No	Aluminum foil and paperboard – in some areas	1
Raisins	Janet Lee	24 oz.	Plastic bag	No	No	4
	Sunmaid	24 oz.	Paperboard can Plastic top	No	Paperboard – in some areas Plastic – no	3
	Sunmaid	15 oz.	Paperboard box	Paperboard is 100% recycled	In some areas	2
	Sunmaid	14-pack of .5 oz. boxes	14 paperboard boxes Plastic wrap	No	Paperboard – in some areas Plastic – no	1

SHOPPING SIMULATION DATA AND SCORING TABLE

Item	Brand	Size	Packaging	Recycled	Recyclable	Score
Refried Beans	Rosarita	40 oz.	Steel/tin can	Yes	In some areas	4
	Rosarita	30 oz.	Steel/tin can	Yes	In some areas	3
	Rosarita	16 oz.	Steel/tin can	Yes	In some areas	2
	Rosarita	8 oz.	Steel/tin can	Yes	In some areas	1
Rice	Good Day	10 lbs.	Plastic bag	No	No	4
	Minute	10 lbs.	Paperboard box	85% recycled	In some areas	3
	Mahatma	1 lb.	Plastic bag	No	No	2
	Uncle Ben's	1 lb.	Paperboard box	No	In some areas	1
Sugar	C & H	10 lbs.	Paper bag	No	In some areas	4
	Domino	5 lbs.	Paper bag	No	In some areas	3
	Albertson's	2 lbs.	Paper bag	No	In some areas	2
	C & H	1 lb.	Paperboard box	No	In some areas	1
Tuna Fish	Bumble Bee	12 oz.	Steel/tin can	Yes	In some areas	4
	StarKist	6 oz.	Steel/tin can	Yes	In some areas	3
	StarKist	3 oz.	Steel/tin can	Yes	In some areas	2
	StarKist	3-pack of 3 oz. packages	Three steel/tin cans Paperboard wrapper	Yes for cans No for paperboard	In some areas for both cans and paperboard	1
	Water	Arrowhead	2.5 gallon	HDPE #2 plastic container	No	In some areas
	Arrowhead	1 gallon	HDPE #2 plastic jug	No	In some areas	3
	Naya	½ liter	PETE #1 plastic bottle	No	In some areas	2
	Arrowhead	6-pack of ½ liter bottles	Six PETE #1 plastic bottles Plastic wrap	No	Bottles – in some areas Plastic wrap – no	1

Explanation of the Activities and Scoring for the Home Clean-Up Simulation

What happens in the clean-up simulation?

Each time a user enters the clean-up segment of the program, the computer generates a set of 15 items that need to be picked up from various rooms of the house. These 15 items are randomly selected from a set of 25 possible items, so that even if a student uses the program repeatedly, the “mission” will always be somewhat different.

There are five main clean-up screens, each featuring a view of a particular room in a house. At the side of these screens is a set of three help buttons that may be clicked for clues about what clean-up decisions best support the mission to reduce, reuse, and recycle.

The items to be cleaned up appear scattered around various rooms of the house. Items to be cleaned up flicker when users pass the cursor over them. If the user clicks on such an item, an expanded screen appears for that item. In the expanded screen, students see the name of the item and a brief description (such as “corrugated cardboard box”). Students are able to click on a button to see the list of materials that are recyclable in the local community. (This “what’s recyclable” list was determined by teacher choice in a simple set-up screen and remains consistent through the entire program.)

The user drags the item into one of four bins — recycle, reuse, compost, or trash. This triggers a return to a main clean-up screen, or view of a room, and a response on the score meter. If a student is not satisfied with the score, s/he is able to click a “change selection” button to return to the expanded screen for a second attempt. To find all of the items that need to be picked up, the student moves from room to room in the house by clicking a set of buttons arranged like a schematic of the house.

What scoring criteria are used in the clean-up segment?

Clean-up scoring criteria are summarized in the “quick tip” that Spike offers before the user begins the actual clean-up simulation:

1. Try to reuse anything possible. Reuse it yourself, or give it to someone else.
2. If it can’t be reused, then recycle it, if possible.
3. If it can’t be recycled, then compost it, if possible.
4. Only put it in the trash if there’s no other choice.

The three help buttons expand on the first three quick tip items. Both the quick tip and help-button priorities reflect the usual hierarchy of the three R’s - reduce, reuse, and recycle. During this clean-up segment, reusing and recycling are the most pertinent concepts.

The points associated with each item and bin choice reflect the quick tip and help statements as well as whether a particular type of packaging is recyclable in the local community. The user may receive up to four points for the best possible choice, three or two points for less-ideal choices, one point for an undesirable choice (such as trashing an aluminum can), or zero points for an impossible choice (such as trying to compost an aluminum can). Because the scoring possibilities for this segment are more complex and subject to interpretation than the shopping and field trip segments, the information below is offered to help educators discuss and interpret this with students.

What are the rationales for how clean-up points are scored?

- In theory, reuse is preferable to recycling

because reuse is the most efficient. Whenever it's feasible to reuse an item, reuse is ranked higher (4 points) than recycling (3 points).

- In general, any option that is possible but not desirable always receives at least one point. An option that is not possible receives zero points. Thus, it is possible to discard a glass jar (1 point) that is best reused (4 points) or recycled (3 points), but it is not possible to compost it (0 points).
- Even when an item is not locally recyclable, recycling receives one point. This reflects the fact that recycling is always possible (such as when residents of one area save recyclables and transport them to another community).
- The concept of reuse is emphasized but not to an extreme. When a garbage art collage seems the only likely way to reuse an item (such as toothpaste tubes or aerosol cans), the choice to reuse receives no points.
- Composting is also emphasized. For food and yard waste, composting is always the top score (4 points). For paper products, reuse generally scores highest (4 points) with recycling and composting tied as fairly desirable alternatives (3 points). Anything that was once a plant can be composted, if prepared properly (such as by shredding paper).
- Generally, scoring for durable goods (such as books) is based on the idea that reuse is a best choice (4 points), discarding is a possible choice (1 point), but composting or recycling is not possible or not applicable (0 points). Reuse includes using an item again within the home, selling it, or giving it away.

HOME CLEAN-UP SIMULATION DATA AND SCORING TABLE

ROOM	ITEM	YES, RECYCLABLE IN LOCAL COMMUNITY OR THIS ITEM NOT ON CHECK-OFF LIST*				NO, NOT LOCALLY RECYCLABLE			
		TRASH	RECYCLE	REUSE	COMPOST	TRASH	RECYCLE	REUSE	COMPOST
Bathroom	aerosol can	1	4	0	0	4	1	0	0
Garage	amber glass bottles	1	3	4	0	3	1	4	0
Bedroom	apple core	1	0	0	4				
Kitchen	banana peel	1	0	0	4				
Garage	corrugated cardboard box	1	3	4	2	2	1	4	3
Kitchen	glass mayonnaise jar	1	3	4	0	3	1	4	0
Living Room	Jiffy Pop popcorn pan	1	3	4	0	3	1	4	0
Living Room	magazines	1	3	4	2	2	1	4	3
Kitchen	milk jug	1	3	4	0	3	1	4	0
Living Room	newspapers	1	3	4	2	2	1	4	3
Garage	old auto tire	1	3	4	0	3	1	4	0
Living Room	opened third-class mail	1	4	0	2	4	1	0	3
Kitchen	paperboard cereal box	1	3	4	2	2	1	4	3
Kitchen	paper towel	3	0	1	4				
Garage	laundry detergent bottle	1	3	4	0	3	1	4	0
Bedroom	raisins container	1	3	4	2	2	1	4	3
Bathroom	shampoo bottle	1	3	4	0	3	1	4	0
Living Room	soda can	1	4	0	0	4	1	0	0
Bathroom	toilet paper tube	1	3	4	2	2	1	4	3
Bathroom	toothpaste tube	4	0	0	0				
Kitchen	tuna fish can	1	3	4	0	3	1	4	0
Bedroom	used books	1	0	4	0				
Living Room	water bottle	1	3	4	0	3	1	4	0
Bedroom	white envelopes	1	3	4	2	2	1	4	3
Garage	yard trimmings	1	0	0	4				

* Note on reading this table: The first set of columns applies when the teacher has checked that item as recyclable (in the Teacher Screen for this purpose). The second set of columns applies when the teacher has not checked that item as recyclable (in the same Teacher Screen). Also, for items not listed in the Teacher Screen (such as toothpaste tubes), scoring is shown in the first set of columns.

Explanation of the Activities and Scoring for the Field Trip Simulation

What happens in the field trip simulation?

When a user begins the field trip segment, the main screen presents a map showing a number of potential field trip sites. Also, the program generates a list of items for which the student needs to find and visit an appropriate recycling facility. This list, which appears in the corner of the screen, includes six items randomly generated from a total of nine possible items, so that the selection will be varied for new or repeat users.

The segment always begins with a site of a Materials Recovery Facility or MRF, at which mixed recyclables are separated for shipping to specific recycling plants or mills. After this, the user chooses sites to visit. When the cursor is passed over locations on the map, an identifying label pops up. If the student chooses to click on that site, this triggers a "site tour" or a unique sequence of images with a narrative by Spike about that facility, the type of materials processed there, how the recycling process works, and what products may be made from materials recycled there.

Most of the field trip sites have an associated matching activity, and an expanded field trip screen opens up automatically following the site tour. In each matching activity, users attempt to correctly identify one of three clusters of consumer products that can be made from materials recycled at the site they just toured. One cluster has 100% correct items, resulting in a score of 4 points, and others have lesser numbers of correct items, resulting in lower scores.

After the student selects a cluster, the screen automatically returns to the main field trip or map screen and the score meter responds to the student's selection. If a student is not satisfied with his/her score, s/he is able to click the "change selection" button. There are no help buttons; instead, the "help" information is contained within the field trip site tours.

There are three sites on the map (in addition to the opening MRF tour) that are

never linked to any items on the student list. These sites are included to provide a broader understanding of recycling and cover industrial waste, large-scale composting, and the idea of recycling a variety of other goods, such as used appliances, building materials, and so on. If students click on and tour these sites, there is no matching activity and no points can be scored.

Finally, it should be noted that all sites featured in the virtual field trips are intended as examples only. At the time that the Mission 3R program was under development, the featured sites were involved in processing a significant portion of that type of materials from Arizona. But recycling is a rapidly growing business field, and change is the norm. Old facilities are being retooled and new facilities are being developed all the time.

FIELD TRIP SIMULATION CLUSTERS AND SCORES

The point value of each cluster is indicated. Also, for each item shown in the clusters, we indicate in parentheses whether the item typically contains that material as recycled content.

STEEL / TIN CANS

4 points:
Rosarita steel/tin can (yes)
motorcycle (yes)
ice skate (yes)

1 point:
Rosarita steel/tin can (yes)
aluminum soda can (no)
aluminum foil (no)

2 points:
Rosarita steel/tin can (yes)
motorcycle (yes)
aluminum soda can (no)

PETE (#1) PLASTIC

1 point:
carpet (yes)
park bench or picnic table (no)

motor oil bottle (no)

2 points:

Patagonia jacket (yes)

t-shirt (yes)

park bench or picnic table (no)

4 points:

carpet (yes)

Patagonia jacket (yes)

Patagonia hat (yes)

CONTAINER GLASS

0 points:

PETE plastic bottle (no)

eyeglasses (no)

frame with glass mirror (no)

4 points:

clear glass Welch's grape juice bottle (yes)

cluster of several shaped glass bottle and jars (yes)

1 point:

clear glass Welch's grape juice bottle (yes)

eyeglasses (no)

frame with glass mirror (no)

ALUMINUM CANS

2 points:

aluminum tomato juice cans (yes)

aluminum foil (yes)

tuna fish can (no)

1 point:

aluminum foil (yes)

tuna fish can (no)

fork (no)

4 points

aluminum tomato juice cans (yes)

aluminum foil (yes)

auto (yes)

NEWSPAPER

2 points:

newspapers (yes)

Green Forest paper towels (yes)

notebook paper (no)

4 points:

newspapers (yes)

egg carton (yes)

paperboard box (yes)

1 point:

newspapers (yes)

notebook paper (no)

corrugated cardboard box (no)

CARDBOARD

4 points:

corrugated cardboard boxes (yes)

0 points:

comic books (no)

masking tape (no)

deck of cards (no)

1 point:

corrugated cardboard box (yes)

kids board game (no)

masking tape (no)

#2 HDPE PLASTIC

0 points:

toy gun (no)

polarplus pullover (no)

rubber boots (no)

1 point:

recycled HDPE bench or picnic table (yes)

carpet square (no)

4 points:

recycled HDPE bench or picnic table (yes)

motor oil bottle (yes)

TIRES

4 points:

highway (yes)

soaker / sprinkler hose (yes)

1 point:

soaker hose (yes)

rubber boots (no)

0 points:

mouse pad (no)

rubber boots (no)

Public Recycling Program Coordinators List

This is a list of recycling coordinators for the 102 local public jurisdictions in Arizona. Contact these individuals for current, accurate information on local recycling programs. This list was current in early 2000.

The list is periodically updated at: <http://www.adeq.state.az.us/comm/download/waste.html> under the heading "Solid Waste," look for the *Public Recycling Program Coordinators List*.

Apache County
Leon Slade, Manager
Apache County Regional Landfill/Blue Hills Environmental
Work phone: (520) 337-2357
St. Johns, AZ 85936

Apache Junction
Doug Dobson, Director of Public Works
City of Apache Junction
Work phone: (602) 982-1055
Apache Junction, AZ 85219

Avondale
Esmeralda Avila, Water Resource Technician
Public Works Department
Work phone: (602) 932-1909
Avondale, AZ 85323

Benson
Mark Holt, City Manager
City of Benson
Work phone: (520) 586-2245
Benson, AZ 85602

Bisbee
Ray Sparkman, Public Works Director
City of Bisbee
Work phone: (520) 432-6000
Bisbee, AZ 85603

Buckeye
Delbert Self, Town Manager
Town of Buckeye
Work phone: (602) 386-4691
Buckeye, AZ 85326-9699

Bullhead City
Janice Paul, Planning Official
City of Bullhead City
Work phone: (520) 763-0123
Bullhead City, AZ 86442

Camp Verde
Bruce Billstrand, Zoning Inspector
Town of Camp Verde
Work phone: (520) 567-6631
Camp Verde, AZ 86322
Carefree
Jonathan Pearson, Town Administrator
Town of Carefree
Work phone: (602) 488-3686
Carefree, AZ 85377

Casa Grande
Frank Tapia, Solid Waste Superintendent
City of Casa Grande
Work phone: (520) 421-8725
Casa Grande, AZ 85230-5011

Cave Creek
Phil Hughes
Town of Cave Creek
Work phone: (602) 488-1400
Cave Creek, AZ 85331

Chandler
Sheree Sepulveda, Recycling Specialist
City of Chandler
Work phone: (602) 786-2866
Chandler, AZ 85225-5550

Chino Valley
J. H. Mazy
Town of Chino Valley
Work phone: (520) 636-2646
Chino Valley, AZ 86323

Clarkdale
Karla Davis, Deputy Town Clerk
Town of Clarkdale
Work phone: (520) 634-9591
Clarkdale, AZ 86324

Clifton
Nazario Hernandez, Public Works Director
Town of Clifton
Work phone: (520) 865-4146
Clifton, AZ 85533

Cochise County
Sam Warner, Solid Waste Supervisor
Facilities and Solid Waste Management
Work phone: (520) 432-9482
Bisbee, AZ 85603

Coconino County
Vickie Amabisca, Administrative Assistant
Highway Department
Work phone: (520) 526-2735
Flagstaff, AZ 86004

Colorado City
Dean Cooke, Public Works Director
Town of Colorado City
Work phone: (520) 875-2722
Colorado City, AZ 86021

Coolidge
Donald Peters, Director of Public Works
Public Works Department
Work phone: (520) 723-4882
Coolidge, AZ 85228

Cottonwood
Marilyn Spaeth, Recycling Coordinator
City of Cottonwood
Work phone: (520) 634-8033
Cottonwood, AZ 86326

Douglas
Wendell Lewis, Recycler/
Code Enforcement
Office of Public Works
Work phone: (520) 805-4077
Douglas, AZ 85607

Duncan
Lupe Madrigal, Public Works Director
Town of Duncan
Work phone: (520) 359-2791
Duncan, AZ 85534

Eagar
Kay Dyson, Public Works Director
Town of Eagar
Work phone: (520) 333-4223
Eagar, AZ 85925

El Mirage
Leonard Rivera, Assistant City Manager
City of El Mirage
Work phone: (602) 972-8116
El Mirage, AZ 85335

Eloy
Fred Rustam
City of Eloy
Work phone: (520) 466-3082
Eloy, AZ 85231

Flagstaff
Rebekah Cadigan,
Recycling Coordinator
City of Flagstaff
Work phone: (520) 779-7621
Flagstaff, AZ 86001

Florence
Jerry Allen, Water/
Wastewater Superintendent
Town Florence
Work phone: (520) 868-5134
Florence, AZ 85232-0490

Fountain Hills
Robin Goodwin, Director
Town of Fountain Hills
Work phone: (602) 816-5117
Fountain Hills, AZ 85269-7958

Fredonia
Barbara Kimball, Town Clerk
Town of Fredonia
Work phone: (520) 643-7241
Fredonia, AZ 86022

Gila Bend
Gene Merritt, Public Works Director
Town of Gila Bend
Work phone: (520) 256-6509
Gila Bend, AZ 85337

Gila County
Sharon Radanovich, Fiscal Coordinator
Gila County
Work phone: (520) 425-3231 315
Globe, AZ 85501

Gilbert
Beth Jackson, Refuse Inspector
Town of Gilbert
Work phone: (602) 503-6437
Gilbert, AZ 85234

Glendale
Ernie Ruiz, Solid Waste Management
City of Glendale
Work phone: (602) 930-2681
Glendale, AZ 85301

Globe
Larry Hensen, City Engineer
City of Globe
Work phone: (520) 425-8346
Globe, AZ 85501

Goodyear
Steve Ruppenthal, Utilities Supervisor
City of Goodyear
Work phone: (602) 932-1637
Goodyear, AZ 85338

Graham County
Neil Karnes, Health Department Director
Graham County
Work phone: (520) 428-1962
Safford, AZ 85546

Greenlee County
Phillip A. Romerud, Engineer
Greenlee County
Work phone: (520) 865-4762
Clifton, AZ 85533

Guadalupe
Mark Johnson, Finance Director
Town of Guadalupe
Work phone: (602) 730-3080
Guadalupe, AZ 85283

Hayden
Robert Lorona, General Superintendent
Town of Hayden
Work phone: (520) 356-7801
Hayden, AZ 85235

Holbrook
Joe Rye, Community Development
Director
City of Holbrook
Work phone: (520) 524-1682
Holbrook, AZ 86025

Huachuca City
Vivian Cobb, Floor Supervisor
Town of Huachuca City
Work phone: (520) 456-9889
Huachuca City, AZ 85616

Jerome
Ron Ballatore, Public Works Director
Town of Jerome
Work phone: (520) 634-7943
Jerome, AZ 86331

Kearny
Margaret Gaston, Town Clerk
Town of Kearny
Work phone: (520) 363-5547
Kearny, AZ 85237

Kingman
Robert Verneti, Sanitation Superintendent
Public Works
Work phone: (520) 692-3102
Kingman, AZ 86401

Lake Havasu City
Brian Conway, Market General Manager
River City Waste
Work phone: (520) 855-9441
Lake Havasu City, AZ 86403

La Paz County
Mary Dahl, Director of Community
Development La Paz County
Work phone: (520) 669-6138
Parker, AZ 85344

Litchfield Park
Robert Gaunt, Director of Public Works
City of Litchfield Park
Work phone: (602) 935-5033
Litchfield Park, AZ 85340

Mammoth
Randy Scott
Town of Mammoth
Work Phone: (520) 487-2331
Mammoth, AZ 85618

Marana
Pauline Nunez
Department of Public Works
Work phone: (520) 682-3324
Marana, AZ 85653

Maricopa County
Ash Maddock, Director of Solid Waste
Solid Waste Management
Work phone: (602) 506-8726
Phoenix, AZ 85009

Mesa
Jennifer Means, Recycling Specialist
Department of Solid Waste
Work phone: (602) 644-3673
Mesa, AZ 85211-1466

Miami
John Encizo, Public Works Director
Town of Miami
Work phone: (520) 473-4403
Miami, AZ 85539

Mohave County
Jerry Hill, Coordinator Emergency
Management
Mohave County
Work phone: (520) 757-0910
Kingman, AZ 86402-7000

Navajo County
Dave Ashton, Assistant County Engineer
Public Works Department
Work phone: (520) 524-4100
Holbrook, AZ 86025

Nogales
Michele Kimpel, Environmental Engineer
City of Nogales
Work phone: (520) 287-6571
Nogales, AZ 85621

Oro Valley
Ainsley Ann Reeder
Town of Oro Valley
Work phone: (520) 575-1756
Oro Valley, AZ 85737

Page
Mary Scheel, Coordinator
Page Recycles
Work phone: (520) 645-9378
Page, AZ 86040

Paradise Valley
Glen Cornwell
Town of Paradise Valley
Work phone: (602) 948-7411
Paradise Valley, AZ 85253-4399

Parker
Frank Savino, Jr., Public Works Director
Town of Parker
Work phone: (520) 669-9265
Parker, AZ 85344

Patagonia
Willie Sanchez
Town of Patagonia
Work phone: (520) 394-2229
Patagonia, AZ 85624

Payson
Colin "Buzz" Walker, Public Works
Director
Town of Payson
Work phone: (520) 474-5242 285
Payson, AZ 85541

Peoria
Larry Fudurich, Public Works Superintendent
Public Services Department - Municipal
Operations Center
Work phone: (602) 412-7456
Peoria, AZ 85345

Phoenix
Terry Gellenbeck, Solid Waste Administrative Analyst
Public Works Department - Recycling
Section
Work phone: (602) 256-5607
Phoenix, AZ 85004

Pima
John Bryce, Town Clerk/Manager
Town of Pima
Work phone: (520) 485-2611
Pima, AZ 85543

Pima County
Suzanne Shields, Wastewater
Management
Pima County
Work phone: (520) 744-7649
Tucson, AZ 85701-1317

Pinal County
Barbara Parkin-McBride, Program
Coordinator - Recycling
Department of Solid Waste
Work phone: (520) 868-6685
Florence, AZ 85232

Pinetop-Lakeside
Eldon Skousen, Recycling Coordinator
Town of Pinetop-Lakeside
Work phone: (520) 368-8696
Lakeside, AZ 85929

Prescott
Rob Waskow, Solid Waste Superintendent
City of Prescott
Work phone: (520) 771-5849
Prescott, AZ 86302

Prescott Valley
Larry Tarkowski, Public Works Director
Town of Prescott Valley
Work phone: (520) 775-4022
Prescott Valley, AZ 86312

Quartzite
Glen Hill
Town of Quartzite
Work phone: (520) 927-4333
Quartzite, AZ 85346

Queen Creek
Joseph La Fortune, Management
Assistant
Town of Queen Creek
Work phone: (602) 987-9887
Queen Creek, AZ 85242

Safford
Robert Porter, Public Works Director
City of Safford
Work phone: (520) 348-3192
Safford, AZ 85548-0272

Sahuarita
Greg Saxe, Planning Director
Town of Sahuarita
Work phone: (520) 648-1972
Sahuarita, AZ 85629

San Luis
David M. Ford, Public Works Director
City of San Luis
Work phone: (520) 627-8848
San Luis, AZ 85369

Santa Cruz County
Norma Northcross, Public Works
Technician
Santa Cruz County Public Works
Department
Work phone: (520) 761-7800 3072
Nogales, AZ 85621

Scottsdale
Shawn McCready, Solid Waste Mgmt.
Services Coordinator
City of Scottsdale
Work phone: (602) 391-5600
Scottsdale, AZ 85258

Sedona
Kate Blevins, Director
Sedona Recycles, Inc.
Work phone: (520) 204-1185
Sedona, AZ 86336

Show Low
Rob Emmett, Public Works Director
City of Show Low
Work phone: (520) 537-5724
Show Low, AZ 85901

Sierra Vista
Brian Bauer, Management Analyst
City of Sierra Vista
Work phone: (520) 458-3315
Sierra Vista, AZ 85635

Snowflake
Gary Leach, Solid Waste Supervisor
Town of Snowflake
Work phone: (520) 536-7103 257
Snowflake, AZ 85937

Somerton
Edmundo Mendez, Director of Public
Works
City of Somerton
Work phone: (520) 627-4155
Somerton, AZ 85350

South Tucson
Angel Lopez, Solid Waste Supervisor
City of South Tucson
Work phone: (520) 770-0031
South Tucson, AZ 85713

Springerville
Ernest Anaya, Public Works Director
Town of Springerville
Work phone: (520) 333-5016
Springerville, AZ 85938

St. Johns
Bill Prentice, Public Works Director
City of St. Johns
Work phone: (520) 337-2031
St. Johns, AZ 85936

Superior
Gail Jimenez, Administrative Clerk
Town of Superior
Work phone:(520) 689-5752
Superior, AZ 85273

Surprise
Robert Zobel, Public Works Director
City of Surprise
Work phone:(602) 583-0947
Surprise, AZ 85374

Taylor
Leon Palmer, Town Manager
Town of Taylor
Work phone: (520) 536-7366
Taylor, AZ 85939

Tempe
Gaylan Oliphant, Sanitation Inspector
Field Services Division
Work phone: (602) 350-8146
Tempe, AZ 85280
Thatcher

Bill Harmon, Town Engineer
Town of Thatcher
Work phone: (520) 428-2290
Thatcher, AZ 85552

Tolleson
Ray Dubois, Streets and Sanitation
Supervisor
City of Tolleson
Work Phone: (602) 936-7141
Tolleson, AZ 85353

Tombstone
Kathy Miller, City Clerk
City of Tombstone
Work phone: (520) 457-2202
Tombstone, AZ 85638

Tucson
Donald Gibson, Recycling Coordinator
Solid Waste Management Department
Work phone: (520) 791-4745
Tucson, AZ 85726-7210

Wellton
Gary Rinehart, Deputy Town Clerk
Town of Wellton
Work phone: (520) 785-3348
Wellton, AZ 85356

Wickenburg
Russell Willis, Assistant Public Works
Director
Town of Wickenburg
Work phone: (520) 684-2761
Wickenburg, AZ 85390

Willcox
Jesus Esqueda, Streets/Solid Waste
Foreman
City of Willcox
Work phone: (520) 384-4271
Willcox, AZ 85643

Williams
Douglas Owens, Sanitation Supervisor
City of Williams
Work phone: (520) 635-4451
Williams, AZ 86046

Winkelman
Estanislado Bravo,
Public Works Supervisor
Town of Winkelman
Work phone:(520) 356-7854
Winkelman, AZ 85292

Winslow
Roger K. Kuster, Utility Manager
City of Winslow
Work phone: (520) 289-4011
Winslow, AZ 86047

Yavapai County
Brooke Sines, Account Clerk
Department of Solid Waste
Work phone: (520) 771-3189
Prescott, AZ 86301

Youngtown
Jesse Mendez, Director of Public Works
Town of Youngtown
Work phone: (602) 933-8286
Youngtown, AZ 85363

Yuma
Larry Knight, Solid Waste
City of Yuma
Work phone: (520) 343-8889
Yuma, AZ 85364-4711

Yuma County
William Beck, Solid Waste/Technical
Support Manager
Yuma County Public Works
Work phone: (520) 329-2306
Yuma, AZ 85364

Glossary

biodegradable (adj.) – able to be broken down into simpler compounds or basic elements by microorganisms and other decomposers such as fungi. Most organic materials, including food scraps, yard trimmings, and paper, are readily biodegradable.

cellulose (n.) - a chemical compound that is the chief component of the cell walls of plants, and most often extracted for human use from wood, hemp, or cotton for the manufacture of paper, textiles, and cellulose packaging.

compost (n.) - the product of composting; a material resulting from the natural decomposition of plant materials, rich in nutrients and highly beneficial to living plants. also (v.) to use in compost or the act of making compost.

composting (n. or v.) – the process of making compost; a controlled waste management alternative in which organic wastes are partially decomposed by aerobic bacteria and fungi, producing a useful soil enricher; can be done at home or on a commercial scale.

conservation (n.) – the preservation or wise use of natural resources by avoiding destructive, wasteful, or simply unnecessary use.

corrugated cardboard (n.) - heavy cardboard made of three layers of paperboard bonded together; the outer layers are smooth and the inner layer is corrugated or “wavy.”

cullet (n.) - small pieces of broken glass which are suitable for remelting and making new glass; usually mixed with new material to facilitate melting when making new glass products.

disposable (adj.) - designed to be discarded after a single use, such as disposable napkins, razors, pens, diapers, etc. also, especially in plural form, can be a noun for disposable products.

drop-off centers (n.) - collection sites to which consumers transport various types of recyclable materials; may be staffed or unstaffed; usually an alternative to curbside pick-up service.

dump (n.) an area used to put garbage; refers to locations lacking environmental safeguards such as those used before the development of modern sanitary landfills; dumps are now illegal.

durable (adj.) - designed to last; able to be used many times (compare with disposable). also, especially in plural form, can be a noun for durable goods.

EPA - U.S. Environmental Protection Agency; a federal agency established in 1970 and charged with enforcement of all federal regulations related to protecting the environment and preventing pollution; areas of responsibility include air and water quality, radiation and pesticide hazard, ecological research, solid waste disposal, and others.

fossil fuels (n.) - naturally occurring hydrocarbons (e.g., coal, crude oil, natural gas) formed over extremely long periods of time from fossil remains or organic materials and used to produce energy; all fossil fuels are considered non-renewable resources.

garbage (n.) - often used casually as a synonym for “trash” or solid waste; more formally refers to solid waste that includes wet food material.

humus (n.) – the dark organic matter that is part of soil, resulting from the decay of plant or animal matter.
inorganic (adj.) - composed of matter other than animal or plant; most inorganic compounds do not contain carbon, do not readily biodegrade, and are derived from mineral sources.

ingot (n.) – a block or bar of processed, cast metal, intended to be remelted and shaped into a final product.

landfill (n.) - a large, outdoor area for burying solid waste; in sanitary landfills, waste is layered and covered with soil.

Materials Recovery Facility (MRF) - a facility where recyclables which were collected together (comingled) are sorted into different types of materials. This process is the first step

in preparing materials for remanufacturing. Typically pronounced “merf.”

mixed paper - a “catch all” category for unsorted paper recovered from offices, homes, and other establishments; includes generally light-colored paper, envelopes, magazines, catalogs, manila folders, newspapers, phone books, daily mail, etc. However, different recycling collection programs may have specific guidelines for what may or may not be included in the mixed paper they collect (e.g., newsprint is often a category of its own).

natural resources – raw materials and energy obtained from the environment; includes water, minerals, etc. Natural resources may be renewable, nonrenewable, and perpetual natural resources. Everything that humans have or use comes from natural resources.

nonrenewable resources - natural resources that are found in limited quantities on our planet and that are not replenished by natural processes (except in geological time frames of millions of years); includes oil and gas, soil and water, and minerals like iron or aluminum

organic (adj.) - composed of living or once-living matter; more broadly, composed of chemical compounds principally based on the element carbon, excluding carbon dioxide.

organic waste – usually refers to food waste and yard waste.

paperboard (n.) - a single layer of very heavy paper that is thick, durable and used for a wide variety of packaging (e.g., notebook backings, cereal boxes, shoe boxes, etc.). When coated with wax, paperboard can also be used to make cartons for juices, milk, and other products.

perpetual resources – natural resources that are found in essentially unlimited supply, such as the energy of the sun or wind. This is a relatively new term and is preferred for these energy sources because it distinguishes them from other renewable resources that are in more limited supply.

plastics (n.) - synthetic (human-made) organic material derived from oil and natural gas, made of continuing long chains of polymers (giant molecules made up of repeating units) and used in a wide variety of products including packaging, automobiles, and construction materials.

pulp (n.) - a combination of water and cellulose fiber used to make paper; pulp can be of virgin wood, recycled paper, or other plants high in cellulose.

raw materials - substances still in their natural or original state, before processing or manufacturing; or the starting materials for a manufacturing process.

recycle or recycling (n. or v.) to reprocess materials which otherwise might be thrown away, for use in the manufacture of new products. Many common materials such as aluminum, steel, paper, glass, and plastic can be recycled, as well as other consumer products like tires or batteries; some industrial wastes or byproducts can be recycled as well.

recycling loop – refers to the complete cycle through which used materials are separated from other solid waste and made into new products; includes collection, sorting, transport, processing, remanufacture, and purchase of the new product. Purchase of products made with recycled content is essential to “close the loop” and thus make recycling successful.

refuse (n.) - useless or unwanted materials that are thrown away; another word for solid waste.

renewable resources – natural resources that are replenished by natural environmental processes on a human time scale; includes wood and other plants as well as animals. Even renewable resources are limited in supply (e.g., harvest of wood products is limited by tree growth rates). Also may be used to refer to sun and wind energy; see perpetual resources.

resource (n.) – may refer to natural resources or to almost anything that is natural or man-made and can be used to produce something else

resource recovery - a general term used to describe the taking of usable materials or energy from what were previously considered waste materials.

reuse (v.) - to extend the life of an item by using it again for the same purpose either as is or by repairing it, modifying it, or creating new uses for it; to use again. Also (n.) may refer to an act or incidence of reusing.

sanitary landfill - a land area where solid wastes are disposed of using methods that protect human health and the environment by installing liners, spreading the waste in layers, compacting it to the smallest practical volume, and covering it with soil at the end of each working day. Also see dump.

solid waste - also referred to as trash, garbage, refuse, debris, or rubbish; materials that are considered worn or worthless and thrown away after used in homes, businesses, restaurants, schools, farms, factories and virtually anywhere; includes trash (dry), garbage (wet), yard waste, and commercial and industrial waste.

source reduction - involves reducing the amount of waste created at the source, such as through product design or by minimizing packaging; may refer to products, packaging, manufacturing processes, and lifestyles that minimize the amount of waste created.

source separation - the separating of recyclable materials from waste at the place of use, such as the home or office.

transfer station - an intermediate collection facility which temporarily holds solid waste en route to a landfill and/or other destination; often a location where waste materials are sorted and diverted for recycling or energy recovery.

trash - usually refers to dry waste; in contrast to garbage, trash is a term used for wastes that usually do not include food wastes, but may include other organic materials, such as plant trimmings.

virgin materials - term describing raw materials or resources not yet used (e.g., virgin pulp by definition does not consist of recycled fiber).

waste (n.) - anything that is discarded, useless, or unwanted; also may refer to something that was not used wisely or (v.) to using unwisely.

waste stream - all of the waste generated in the processes of production, utilization, and disposal of goods; the total waste produced by a community or society, as it moves from origin to disposal.

yard waste - plant matter resulting from landscaping maintenance or land clearing operations; includes such materials as tree and shrub trimmings, grass clippings, cactus pads or palm fronds, etc.

Additional Resources

America Recycles Day

www.americarecyclesday.org

Nov. 15 is nationwide America Recycles Day, which focuses on a different theme each year. A number of organizations and sponsors make this annual event possible. Find out more about events that are already planned in Arizona or get ideas for what you can do. Learn how to contact the Arizona coordinator for this year.

American Plastics Council

www.plasticsresource.com

APC is the main trade association representing the U.S. plastics industry on resource conservation issues. The APC mission includes working to help consumers perceive plastics as a preferred material. Their web site is educational to visit, but does not offer specific materials for use in the classroom.

Environmental Defense Fund

www.edf.org/issues/recycling.html

The website for the Environmental Defense Fund, a major environmental organization, offers several pages on various aspects of recycling and waste reduction.

Glass Packaging Institute

www.gpi.org

GPI is a trade association for the glass container industry with members in the U.S., Mexico and Canada. Its web site includes an educator's section with ideas for activities related to glass, its advantages as a container, and glass recycling.

Institute for Local Self-Reliance

www.ilsr.org

ILSR is a nonprofit research and educational organization that provides general information for the public as well as technical assistance to citizen groups and local governments regarding environmentally sound economic development strategies. The recycling section of their web site thus covers many economic facets of recycling.

National Recycling Coalition

www.nrc-recycle.org

The National Recycling Coalition is a non-profit organization dedicated to maximizing recycling

so that we can all benefit from the natural resource conservation, waste reduction, energy conservation, and economic benefits of recycling. NRC works to encourage recycling through public policy, technical education, public outreach and more. Resources available through their on-line library include several fact sheets about diverse aspects of recycling.

Steel Recycling Institute

www.recycle-steel.org

SRI is an industry trade association that supports and promotes recycling of all steel products (including food containers as well as auto and appliance parts) and works to educate government, businesses, and consumers about steel recycling. The education section of the web site offers descriptions and samples of free and reasonably priced materials including video, print, and interactive CD-ROM media.

U.S. EPA Explorers' Club

www.epa.gov/epahome/students.htm

The Environmental Protection Agency's website includes many resources for teachers and students. Start from this address and go from here to the teacher's page or the Explorer's Club. The latter includes a comic-book style story about how kids in one town stopped the "Garbage Gremlin" by reducing, reusing, and recycling. "Recycle City" would be an excellent complement to Mission 3R. It is aimed at upper elementary students and includes an interactive storybook, a game, and other puzzles through which students can explore the many ways a whole community can work together at all levels to reduce, reuse and recycle. Specific teacher suggestions are offered for using Recycle City in the classroom.

U.S. EPA Resource Guide of Solid Waste Materials

www.epa.gov/epaoswer/osw/teacher.htm

This guide (EPA/530-B-97-004) offers an extensive listing of school curricula, teacher and student activity guides, videos, and internet sites touching on a variety of aspects of waste reduction education. All materials listed in the guide are suitable for use by K-12 teachers and students. The Office of Solid Waste plans to update this listing on a regular basis. Also,

some of the EPA's more specific publications may also be of interest. Recycle Today (EPA/530-SW-90-024) is the U.S. Environmental Protection Agency's educational program on recycling. It can be used in conjunction with *Let's Reduce and Recycle: Curriculum for Solid Waste Awareness* (EPA/530-SW-90-005) and *School Recycling Programs: A Handbook for Educators* (EPA/530-SW-90-023) to introduce students to the benefits of recycling. A poster, *Recycle Today! Ride the Wave of the Future* (EPA/530-SW-90-010), is also available to promote recycling and encourage students to get involved in recycling efforts in their schools. All of these materials can be ordered free of charge by writing OSW Publications, Office of Solid Waste (5305W), U.S. Environmental Protection Agency, 401 M Street SW, Washington, DC 20460. They can also be obtained by phone by calling the Resource Conservation and Recovery Act (RCRA) Hotline at 1-800-424-9346 or, for the hearing impaired, TDD 1-800-553-7672.