

Lesson 1

Kids Doing the 4Rs

v. 1.0.0



Topic(s)

The 4Rs—Reduce, Reuse, Recycle, Rot
 Conservation
 Waste Prevention
 Nonrenewable Resources
 Renewable Resources

Duration

Lesson Steps—45-60 minutes
 4Rs Diary—ongoing
 Extension Ideas—varies

21st Century Learning Skills

- Collaboration
- Communication
- Creativity
- Critical Thinking

Grade Level

Fourth and Fifth

Materials

Students

1. *Kids Doing the 4Rs* rubric (one per student) [Page 6](#)
2. *Everyday Items* picture cards (one per pair of students) [Page 7](#)
3. *Doing the 4Rs Video Notes* (one per student) [Pages 8-9](#)
4. *My 4Rs Diary* student recording sheet (one per student) [Page 10](#)
5. *My 4Rs Diary* student data analysis sheet (one per student) [Page 11](#)
6. *My 4Rs Diary* student focus questions sheet (one per student) [Page 12](#)

Teachers

1. *4Rs Pictographs* [Page 13](#)
2. *Natural Resources* visual [Page 14](#)
3. *Everyday Items* picture cards answer key [Page 15](#)

(continued)

SUMMARY

In this lesson, students will learn about renewable, nonrenewable, and perpetual natural resources. They will work in pairs to classify various items as renewable or nonrenewable resources. Additionally, they will be introduced to the concepts of conservation and waste management, including the 4Rs hierarchy, by watching a video of students demonstrating ways to practice the 4Rs. Finally, students will record and analyze their own waste prevention and conservation choices.

CORRELATION WITH STANDARDS

NEXT GENERATION SCIENCE STANDARDS

Fourth Grade

Fifth Grade

Standard and Performance Expectation

4-ESS3-1: Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.

5-ESS3-1: Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

Disciplinary Core Ideas

ESS3.A Natural Resources: Energy and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not. (4-ESS3-1)

ESS3.C Human Impacts on Earth Systems: Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments. (5-ESS3-1)

COMMON CORE STATE STANDARDS

Fourth Grade

Fifth Grade

Lesson Focus Standards

Speaking and Listening

SL.4.2: Paraphrase portions of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.

SL.5.2: Summarize a written text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.

Supporting Standards

Writing
 W.4.4

Writing
 W.5.4

Speaking and Listening
 SL.4.3, SL.4.4, SL.4.5, SL.4.6

Speaking and Listening
 SL.5.3, SL.5.4, SL.5.5, SL.5.6

Math
 3.NF.A.3, 3.NF.A.3.D

Math
 5.NF.B.3

LEARNING OBJECTIVES

Students will...

1. Define renewable, nonrenewable and perpetual resources
2. Classify items as being made from renewable or nonrenewable resources

4. Large chart (teacher created) on which to classify picture cards
5. [Doing the 4Rs video](#), running time 17 min [goo.gl/JtDhHP](https://www.youtube.com/watch?v=JtDhHP)
6. Interactive whiteboard, document camera, or overhead projector (photocopy transparencies of visuals if needed)

Vocabulary

Compost: The process or end result of living organisms digesting and reducing organic material into a dark, rich, soil amendment.

Conserve: To protect something from harm or destruction.

Decomposition: The process of materials being digested and broken down into simpler substances, making nutrients more available to plants. Decomposition happens all the time in nature and in human-managed systems such as compost bins.

Garbage: Things that people throw away.

Hierarchy: A ranking system according to relative importance.

Landfill: An area of land designed to handle the disposal of garbage by burial. The garbage is usually spread out, compacted and covered with dirt or other material in order to control odors and fires, prevent the garbage from blowing around, and discourage animals. Materials in a landfill cannot be used again.

Litter: Waste materials that are carelessly discarded or put in the wrong place.

Natural resources: Living and nonliving materials that come from the Earth such as fossil fuels, minerals, plants, animals, water, air, sunlight, and other forms of energy.

Nonrenewable resources: Minerals or sources of energy that can be mined or col-

3. Identify four ways (the 4Rs) to conserve fossil fuel, minerals, plants and animals
4. Explain the need for each of the 4Rs, as well as the 4Rs hierarchy
5. Record and analyze their own waste prevention and conservation choices

TEACHER BACKGROUND

The 4Rs (Reduce, Reuse, Recycle and Rot/Compost) are organized in a hierarchy, or order of importance, based on natural resource savings. Natural resources are extracted or harvested from the earth, and used in their existing form or changed through the manufacturing process and turned into products. They can be classified as renewable or nonrenewable. Renewable resources—such as water, wood and sunlight—can be replenished in a relatively short time, while nonrenewable resources—such as coal, oil, and metals—are effectively gone forever once used because they take millions of years to regenerate. Some renewable resources are perpetual—naturally occurring forms of energy beyond human management, such as energy from the sun.

Reduce comes first in the 4Rs hierarchy because the best way to limit waste and decrease our use of natural resources is to use less stuff in the first place. Ways to reduce waste include buying products with minimal packaging, using a cloth bag instead of paper or plastic, buying durable products with longer life spans, writing an email instead of a paper note, and not buying things that we don't really need.

The next level in the hierarchy is *reuse*. When something is reused, no new natural resources are required to make a new item (replace it) and there is no manufacturing process. Cleaning, refilling, and/or transporting items to be reused requires less energy than manufacturing new items from new or recycled materials. Ways to reuse items include using both sides of the paper, using refillable water and milk bottles, and purchasing used clothing and other household items from thrift stores instead of buying new ones.

Recycle is the third level in the hierarchy in terms of natural resource savings. Recycling extends the life of existing resources by turning old materials into new products. Paper can be recycled and used to produce new paper. Glass bottles and aluminum cans can be turned into new bottles and cans again and again. Making new products from recycled materials instead of virgin resources uses less energy, water, and other resources because the manufacturing process is less intensive. For example, recycled glass melts at a lower temperature than sand (silica)—the main ingredient in glass—so less energy is needed. Natural resources and the energy used to extract them from the earth are conserved. In these ways recycling reduces air and water pollution, habitat destruction, and greenhouse gas (GHG) emissions that impact climate change.

Finally, organic materials (originally plants or animals) that cannot be reused or recycled can be decomposed (allowed to *rot*) to produce compost—a rich soil amendment that helps plants grow. Composting is a natural process that can be harnessed and accelerated by humans in order to recycle food and yard waste into fertilizer for plants. Composting conserves energy, water, and other resources. It displaces the production and use of chemical fertilizers, and the GHG emissions associated with their production. Composting also keeps organic materials out of landfills, where they decompose anaerobically (without oxygen) and produce methane—a greenhouse gas with more than twenty times the global warming potential of CO₂.

Sending items to a landfill should always be the last resort. Landfilled materials are wasted resources that become permanently unavailable for reuse, recycling or composting.

lected from the Earth, such as coal, petroleum, iron ore, copper, etc. The processes of their formation are so slow that these resources may be considered gone forever once they are used up.

Organic: Materials that were once living or material produced by a living organism such as food, leaves, plant trimmings, hair, clothing fibers, paper, etc. Organic may also be used to describe food grown using sustainable agricultural methods.

Perpetual resources: Forms of naturally recurring energy that are beyond human management, e.g., sun, wind, falling water, tides.

Product: Something produced by human or mechanical effort or by a natural process.

Recycle: A series of activities by which material that has reached the end of its current use is processed into material utilized in the production of new products.¹ Some recycled materials become new versions of the same thing, such as used aluminum cans being made into new aluminum cans. Others are made into entirely new items, such as used car tires being made into rubber mats or a playground surface.

Reduce: Use less “stuff” and produce less waste.

Renewable resources: Naturally occurring raw materials or form of energy that has the capacity to replenish itself within a relatively short amount of time (e.g., a human lifetime) through ecological cycles and sound management practices (e.g., trees, agricultural crops, grasses).

Reuse: To use an item more than once for the same or another purpose.

Rot: To decompose.

LESSON STEPS

Activating Prior Knowledge

1. To motivate and interest students, pass out *Everyday Items* picture cards of items made from natural resources (one card per pair of students).
2. Display the *Natural Resources* visual. Inform students that all of the items on their picture cards are made from natural resources, which are materials that come from the earth. Explain to students that all of these resources can be classified as either nonrenewable or renewable. Explain that nonrenewable resources exist on Earth in limited amounts and cannot be replaced, e.g., fossil fuels (coal, oil, natural gas) and many minerals (e.g., iron, gold, and bauxite, the source of aluminum). Fossil fuels are nonrenewable natural resources because they take millions of years to form. Explain that renewable resources are replaced naturally or through human-assisted actions within a relatively short amount of time, such as a human lifetime. For example, plants, such as trees, can be replanted indefinitely.
3. Briefly explain that natural resources are taken from the earth and made into products. Instruct students to collaborate with a partner to classify the item on their picture card as made from either a nonrenewable or renewable resource. Provide students with a sentence frame to support their discussion (e.g., Partner A: “I think the soda can comes from a nonrenewable resource because I think aluminum cans are made out of minerals.” Partner B: “I also think...” or “I disagree. I think...”)
4. Pairs will share their responses with the class. Students may physically place their picture card under the correct natural resource (*fossil fuels, minerals, plants, animals*) on a large chart, or teacher can choose to let students hold on to their picture card and instead chart student responses. Ask students how they arrived at their answer, and whether they agreed or disagreed with their partner. Correct misconceptions and guide students to categorize the products correctly (see *Everyday Items* picture cards answer key).

Building Background

5. Explain that some resources can also be classified as perpetual resources. These are forms of naturally recurring energy that are beyond human management, e.g., sun, wind, falling water, tides.
6. Define for students the concept of *conservation*, which is the act of saving or protecting the earth and its resources. Ask students why natural resources are worth conserving. Students can discuss responses with a partner or small group (e.g., “I think it’s important to conserve natural resources because _____.”)
7. Share one way that students can conserve natural resources (for example, by riding a bike to school instead of driving in a car, students can conserve fuel, which comes from a nonrenewable resource). Ask students to think of other ways they can conserve natural resources. Students can discuss responses with a partner or small group. (For example, “One way I can conserve natural resources is by _____.”) Solicit student responses using a strategy that encourages active participation such as [Numbered Heads Together](#) (link is <http://goo.gl/JYfb47>) or allowing a student who shares to select the next student to share.
8. Tell students they can remember the different forms of conservation, or different ways to conserve, by remembering the “4Rs.” Ask students whether they can name any of the 4Rs. Display the *4Rs Pictographs*. Have students

Additional Resources

<http://www.newsela.com> A website containing current news articles at upper elementary and middle school reading levels. Sign-up required.

<http://www.rewordify.com> A website for translating difficult text into easier reading levels.

<http://www.cde.ca.gov/be/st/ss/index.asp> California Department of Education, Content Standards Page

<http://science.howstuffworks.com/environmental/green-science/save-earth-top-ten.htm> How Stuff Works Video: Ten Things You Can Do to Help Save The Earth

hold up four fingers and say each word chorally as they point to a finger (i.e., “First—reduce. Second—reuse. Third—recycle. Fourth—rot.”) You may also choose to teach students gestures, hand motions, or key words to match the 4Rs and aid memorization. (*Reduce* = Use Less. *Reuse* = Use it Again. *Recycle* = Turn it into something new. *Rot* = Decompose)

9. Ask the students whether any of the 4Rs is more important to practice than another. Guide the students toward putting the 4Rs in the correct hierarchy (order) and explain what a hierarchy is. (You can have student volunteers post the *4Rs Pictographs* in the correct hierarchy—*Reduce, Reuse, Recycle, Rot.*)

Reduce—The best way to limit waste and decrease our use of natural resources is to use less stuff in the first place.

Reuse—After reduce, the next best option is reuse because additional natural resources aren’t required and there is no manufacturing.

Recycle—When reuse isn’t possible, the next level in the hierarchy is recycling because it extends the life of existing resources and uses less resource-intensive manufacturing processes.

Rot—Finally, organic materials (originally living plants or animals) that cannot be reused or recycled can be decomposed (rot) to produce compost, a rich soil amendment that helps plants grow.

Check for Understanding

10. On an individual white board or [Exit Slip](http://goo.gl/A9t59p) (link is <http://goo.gl/A9t59p>), ask students to write down an example of a nonrenewable and a renewable resource. Students can share their responses with a partner using a sentence frame (e.g., “_____ is a nonrenewable resource because _____. However, _____ is a renewable resource because _____.”) Listen to students’ discussions to determine if additional support is required.
11. Then, ask students to write down one sentence to show why it is important to conserve natural resources (both nonrenewable and renewable), as well as one way they can conserve those resources. (For example, “It is important to conserve natural resources because _____. One way I can conserve natural resources is by _____.”)
12. Check students’ understanding of the 4Rs hierarchy in one of several ways, such as having students rearrange *4Rs Pictographs* on the board; asking students to write down the 4Rs in order; or, calling out one of the 4Rs and asking students to respond by holding up the number of fingers that corresponds to its rank in the hierarchy.

Activities

13. Show the lesson rubric and review the expectations for this lesson.
14. Before showing the video *Doing the 4Rs*, inform the students that they will be looking for examples of students practicing the 4Rs. Distribute a copy of *Doing the 4Rs Video Notes*. Read through the directions as a class. Make sure students understand that during the video, they should write down facts or examples of kids doing the 4Rs, as well as evidence to support the facts when possible. Review the example given on the video notes.
15. Show the video *Doing the 4Rs*. Pause after each section to allow students ample time to update their notes.
16. After the video, pass out the *My 4Rs Diary* student recording sheet. Explain to students that they are going to record and analyze their waste prevention choices over the next few days or weeks. Ask students how they believe

keeping track of their personal choices can help them better practice the 4Rs in the future. Review the example on the first line. Remind students to be as thorough and honest as possible—it is important to get an honest look at our waste prevention choices so that we can set goals and learn to make even better choices!

Wrap-Up

17. Display the *4Rs Pictographs* one at a time. Have groups name and provide a definition for the pictograph and provide examples of how to practice that level in the waste reduction hierarchy (reduce/reuse/recycle/rot).
18. Ask students to address why each of the 4Rs is important.
19. Within several days or weeks, after students have completed some or most of the entries in their *My 4Rs Diary*, pass out the *My 4Rs Diary* data analysis sheet and *My 4Rs Diary* focus questions sheet. Demonstrate how to calculate the fraction and percentage of their waste prevention choices represented by each of the 4Rs and the landfill. Then, assign each student a 4Rs buddy with whom they will collaborate on the last page of the diary. Discuss with students the idea of goal setting and supporting a partner in his or her goals.

Extension Ideas

- Compile data from all students' *My 4Rs Diary* entries to construct a graph (bar graph or circle/pie graph) representing students' collective waste prevention choices. Analyze the result, draw conclusions, and set whole-class goals for practicing the 4Rs.
- Assign 4Rs Buddies the task of tracking progress towards the 4Rs goals they chose when completing their *My 4Rs Diary*. Students will analyze the results and present a report to the class. Presentations should include visual, audio, or multimedia elements that aid in communicating the 4Rs goal progress to the audience.
- Students draw or create their own pictograph showing one way to practice each of the 4Rs at home or school. Students present their pictographs in small groups, while the other group members evaluate which of the 4Rs each pictograph represents.
- Students interview family members about ways they practice the 4Rs at home. Have students record their family's waste prevention behaviors and identify other ways to reduce waste at home.

REFERENCES

Alameda County Waste Management Authority and Recycling Board. *Doing the 4Rs – A Classroom Activity Guide to Teach Reduce, Reuse, Recycle and Rot*. 2010. Web. 18 November 2014. <<http://www.stopwaste.org/recycling/schools/curriculum-and-videos>>.

¹ National Recycling Coalition. Forthcoming. <http://nrcrecycles.org/nrc-updates-definition-of-recycling/>

City of Napa, County of Napa, and Napa Recycling & Waste Services. *Reduce, Reuse, Recycle Guide for Napa County*. 2016. Web. 19 July 2016. <<http://schools.naparecycles.org/wp-content/uploads/2016/09/Napa-Recycle-Guide-2016.pdf>>.

Kids Doing the 4Rs

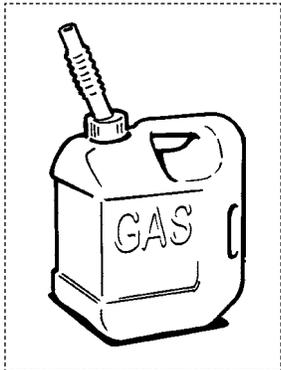
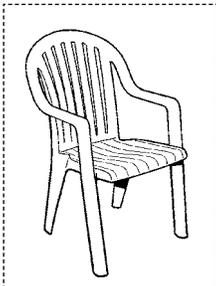
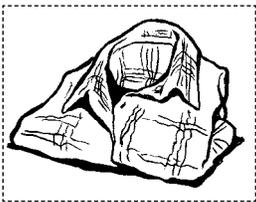
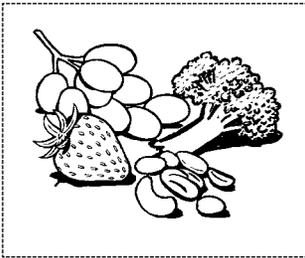
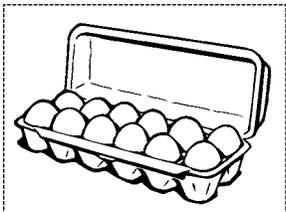
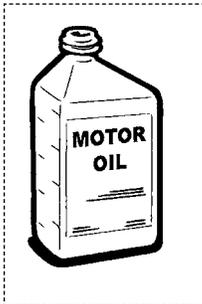
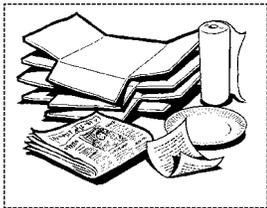
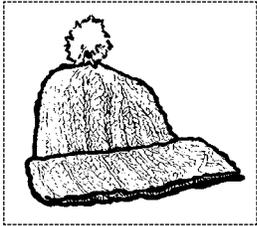
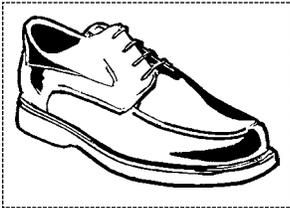
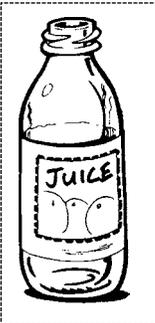
Rubric

A rubric is a scoring tool that helps you understand how your work will be evaluated. This rubric is provided to show you the expectations for your performance and engagement during the lesson based on specific tasks

Name _____ Date _____

Task	4	3	2	1
<i>Doing the 4Rs Video Notes</i> (Individual)	Notes are detailed, complete, and neat. Responses to focus questions are thorough and correct.	Notes are mostly detailed, complete, and neat. Responses to focus questions are correct, though may lack some detail.	Notes lack detail or are difficult to read. Some responses to focus questions are incorrect.	Notes are incomplete.
<i>My 4Rs Diary</i> (Individual)	Diary is complete, detailed, realistic, and reflective. Math is done accurately. Student thoroughly explains his/her 4Rs goal, with clear examples of how to achieve it.	Diary is mostly complete; contains details and honest reflections. Math is mostly accurate. Student explains his/her 4Rs goal and provides some examples of how to achieve it.	Diary is incomplete; parts may appear rushed or unrealistic; reflections are incomplete or superficial. Math is done inaccurately. Student needs more examples of how to achieve 4Rs goal.	Diary is incomplete. Student does not demonstrate a commitment to practicing the 4Rs.

Everyday Items Picture Cards
Renewable or Nonrenewable?



Kids Doing the 4Rs

Doing the 4Rs — Notes During the Video

Videos and other multimedia can be an effective way to learn information on a topic. Before the video begins, read the entire notes page thoroughly. As a result, you'll know what information you should be watching and listening for. Then, pay close attention to the information presented in the video, and take notes on what you see and hear. These notes will be an important resource for you later in the lesson. There's a place at the bottom for questions you have during the video.

Name _____ Date _____

Video Topic _____

Throughout the video, the narrator will state facts and details supported by evidence. Use the boxes below to write down important facts relevant to the topic, as well as the evidence given to support each claim.

<p>1. Example:</p> <p>Fact: Every day we throw things away that end up in the landfill</p> <p>Evidence: I see tons of trash being poured into a landfill</p>	<p>2.</p>	<p>3.</p>
<p>4.</p>	<p>5.</p>	<p>6.</p>
<p>7.</p>	<p>8.</p>	<p>9.</p>

Questions?

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Kids Doing the 4Rs

My 4Rs Diary — Data Analysis Sheet

Name _____ Date _____

Using the data you collected, record your waste prevention choices as fractions and percentages.

Category	Fraction		Percentage %
	(# of items in category)	(total # of items)	
REDUCE	/		
REUSE	/		
RECYCLE	/		
ROT/COMPOST	/		
LANDFILL	/		

Use your data to create a bar graph. Shade in one rectangle to represent each waste prevention choice you made.

10					
9					
8					
7					
6					
5					
4					
3					
2					
1					
	REDUCE	REUSE	RECYCLE	ROT/COMPOST	LANDFILL

Kids Doing the 4Rs

My 4Rs Diary — Focus Questions

Name _____ Date _____

1. Remember—the 4Rs hierarchy is Reduce, Reuse, Recycle, Rot. Rank the percentage of your total waste prevention choices represented by each of the 4Rs (and landfill) from greatest to least

4Rs Hierarchy	My Waste Management Choices
1. REDUCE	1.
2. REUSE	2.
3. RECYCLE	3.
4. ROT/COMPOST	4.
5. LANDFILL	5.

2. Do your choices match the 4Rs hierarchy? Why or why not?

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.....

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3. Which of the 4Rs would you like to practice more often?

.....

.....

4. Write a personal goal to help you practice one of the 4Rs more often. Be sure to include three ways that you will achieve your goal.

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5. Write down the name of your 4Rs buddy.....

What is your buddy's 4Rs area of focus?.....

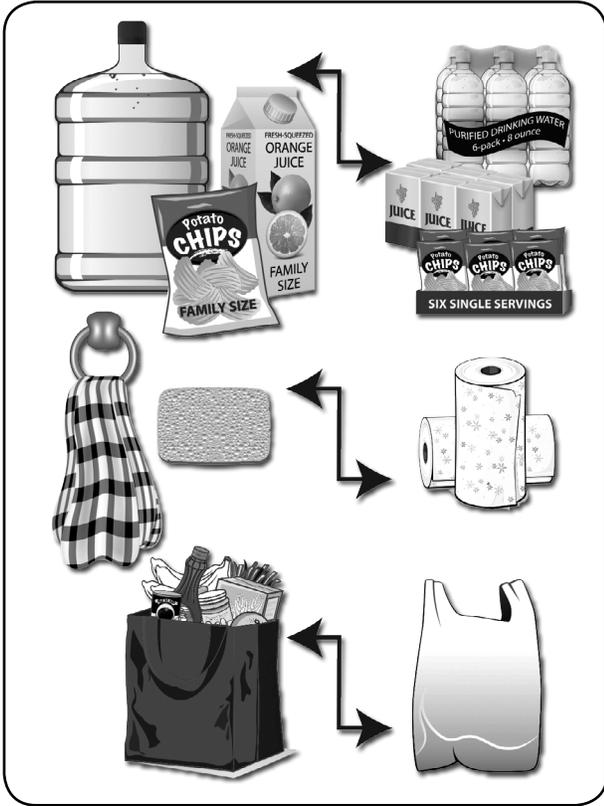
What is one way you are going to support your buddy towards his or her 4Rs goal?

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REDUCE



REUSE



RECYCLE



ROT

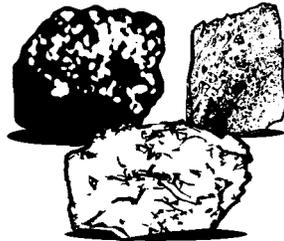


Natural Resources

NONRENEWABLE



Fossil Fuels

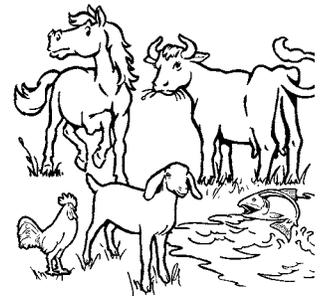


Minerals

RENEWABLE

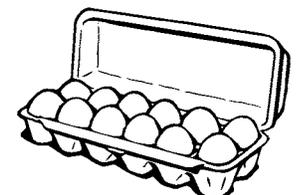


Plants



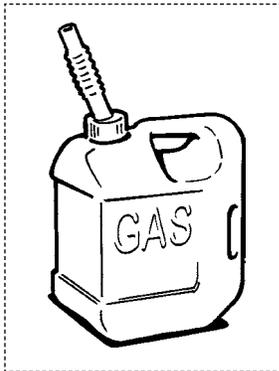
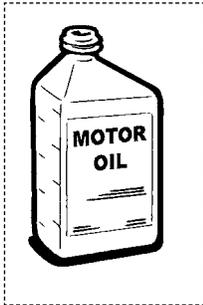
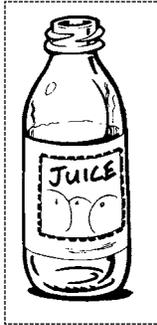
Animals

Everyday Items Made from Natural Resources



Everyday Items Answer Key

NON-RENEWABLE



RENEWABLE

