

Reduce; Critical Thinking

Grades: 4-5

State Standards: Grade 4, Science; Investigation and Experimentation 6.c. Students will formulate and justify predictions based on cause and effect relationships. Grade 5, Science; Investigation and Experimentation; 6.h. Students will draw conclusions based on scientific evidence and indicate whether further information is needed to support a specific conclusion.

Preparation Time: 25 minutes

Activity Time: 60 minutes

Key Words: Evidence, Opinion, Reduce, Value, renewable resources, non-renewable resources, natural resources

OBJECTIVE

Students will:

- Express their values about reducing waste.
- Describe whether their values about reducing waste changed because of discussions with other students.
- Understand and apply the term “evidence.”

MATERIALS

Students:

“Value Statements” & “Fast Facts” (one per student) “Student Reflection” worksheet (one per student)

Teacher:

“Value Statements” & “Fast Facts” overhead

BACKGROUND

People express a wide variety of opinions, values and behaviors related to the environment. Values represent how a person rates the usefulness or importance of a principle or ideal. Values provide the foundation for beliefs that drive decision making and behavior. People can also value material objects for their worth. Producing these objects requires the use of natural resources, which can be classified as renewable or nonrenewable. Consumption of some of these resources may eventually lead to either the loss or the near loss of these resources within the current century.

Students can develop the ability to think critically and carefully about their values, can develop their own opinions, and can learn to convey and justify their thoughts in order to make decisions based on their values. During the decision-making process, students may attempt to locate additional evidence that may support their opinions on topics such as reducing waste. Through this process students can discuss their values with others and be exposed to values and opinions that differ from their own. By looking at both sides of an issue, students can learn the importance of respecting the values and opinions of others.

Vocabulary:

Evidence: facts that indicate whether something is true.

Opinion: a person's thoughts or beliefs about something that may not be based on facts.

Reduce: use less "stuff" and produce less waste.

Value: the quality of an object that makes it desired or wanted; the beliefs of a person or social group; the fundamental beliefs or guiding principles that guide behavior and decision making.

Natural resources occur naturally within environments that exist relatively undisturbed by mankind, in a natural form.

Renewable resources are ones that can be replenished or reproduced easily. Some of them, like sunlight, air, wind, etc., are continuously available and their quantity is not affected by human consumption. Many renewable resources can be depleted by human use, but may also be replenished, thus maintaining a flow. Some of these, like agricultural crops, take a short time for renewal; others, like water, take a comparatively longer time, while still others, like forests, take even longer.

Non-renewable resources are formed over very long geological periods. Minerals and fossil fuels are included in this category. Since their rate of formation is extremely slow, they cannot be replenished once they get depleted. Of these, the metallic minerals can be re-used by recycling them. But coal and petroleum cannot be recycled

PROCEDURE

1. Ask students to think about different ways that people dispose of waste materials; some may help reduce waste, and others may not. For example, some people are very careful—before they throw something away, they consider whether it can be reused, recycled, or composted. They use recycling and compost bins and produce very little waste. Other people do not recycle much and sometimes even contribute to litter by throwing waste on the ground or out of a car window.
2. Ask students to share some examples of things that people might throw away that could be of value to someone else.
3. Define the word "value": "the quality of an object that makes it desired or wanted." If we value something like a material object, we will sometimes pay or do much to get it. A value may also be defined as "the beliefs of an individual or social group that guide how decisions are made." For example, a school may have a recycling club made up of students who believe that recycling is important. The students participating have the common goal of reducing waste at school through recycling.
4. Ask students to name something that they value. Explain that this can be an object, belief or principle. Share some examples as needed to start the discussion.
5. You may want to specifically discuss examples of principles or beliefs that people value so that students understand the difference between valuing material things and beliefs or principles. For example, Dr. Martin Luther King Jr. sought equal protection for citizens of all races during the Civil Rights Movement.
6. Explain that people may base their values on factual information or evidence; e.g., some people choose to bring a reusable bag to the store when shopping instead of using a

paper bag. They may have read research showing in 2009, 63.4% of the paper consumed in the U.S. was recovered for recycling (American Forest and Paper Association). The practice of using a reusable bag shows that they value the resources needed to make a paper bag by reducing the amount of paper they use.

7. It is important for students to be able to justify their values and to answer questions about their values based on factual evidence

Activity

1. Organize the students into five groups.
2. Pass out a “Value Statements” card to each student in the group. There are five versions of the value statement cards so each group will have different statements. For example, all students in group one will have a card titled “Group One.”
3. Post up the overhead for one of the group value statements, and model for the students how to fill it out. For each statement have them circle a number. A “10” signifies that you strongly agree with the statement. A “1” signifies that you strongly disagree with the statement.
4. Next, ask the students to answer the questions below each statement. The questions ask them to cite factual evidence to support their opinions. Factual information is located on the back of their value statement cards.
5. When the students are done filling out the card, ask them to take turns sharing their opinions about the value statements, citing evidence to support their opinions.
6. Ask each group to share one or two value statements they discussed with the entire class, citing examples of how their opinions were similar or different.
7. Have the students return to their seats.
8. Pass out the “Student Reflection” worksheet to each student and have them answer the questions.

Discuss

1. Ask students to raise their hands if any of their values changed after talking with a partner who had a different value. Ask for students to share what evidence persuaded or influenced them to change their values.
2. Ask students whether there were any value statements they had difficulty agreeing or disagreeing with. What additional evidence or factual information would have helped them better understand the waste reduction value statement?
3. Have students write their own value statements about reducing waste. Ask them to cite evidence supporting their beliefs, where they located the information, and whether they

have additional questions they would like to research. Students can use the Tehama County Landfill website as a guide (<http://www.tehamacountylandfill.com>). Other useful websites:

- <http://www.calrecycle.ca.gov/>
- <http://www.epa.gov/>
- <http://earth911.com/>

Extension

Have the students create several value statements about reducing waste. Then assign students to conduct a survey of other student's opinions of the value statements from another class or their family and report their results as a percentage of students or family members that chose or rated the value statement the same as them.

ANALYSIS

During the decision-making process, students may attempt to locate additional evidence that may support their opinions on topics such as reducing waste. Through this process students can discuss their values with others and see how their actions might change the future situation with losing land to landfills and reducing our natural resources.

Value Statements

Group one

Directions: Read each statement and the fast facts about the statement on the back of the card and circle the number that reflects your thoughts or opinion about the statement.

1. It is better to ask for a plastic bag than a paper bag when I'm shopping at the store.

strongly disagree **1 2 3 4 5 6 7 8 9 10** *strongly agree*

Explain why you agree or disagree with the statement by citing evidence to support your opinion.

2. It is my responsibility to put litter in a garbage can.

strongly disagree **1 2 3 4 5 6 7 8 9 10** *strongly agree*

Explain why you agree or disagree with the statement by citing evidence to support your opinion.



GROUP 2

Directions: Read each statement and the fast facts about the statement on the back of the card and circle the number that reflects your thoughts or opinion about the statement.

1. Using less stuff is important because things are made from natural resources. Natural resources include things of value to humans such as, land, water, air, and forests.

strongly disagree **1 2 3 4 5 6 7 8 9 10** *strongly agree*

Explain why you agree or disagree with the statement by citing evidence to support your opinion.

2. Many things we buy come with too much packaging.

strongly disagree **1 2 3 4 5 6 7 8 9 10** *strongly agree*

Explain why you agree or disagree with the statement by citing evidence to support your opinion.

FAST FACTS

GROUP ONE

Directions: Use the fast facts below to cite evidence that supports your opinion about each value statement.

1. Fast Facts

- Plastic bags are mistaken by many marine animals, especially sea turtles, for food.
- Paper bags hold five to six times the amount that plastic bags hold.
- Californians use more than 19 billion plastic bags each year (about 552 bags per person). Discarded plastic bags create 147,000 tons of waste that end up in the state's landfills each year and are enough to circle the Earth more than 250 times (www.ktvu.com).
- Using a reusable canvas bag decreases the amount of bags used, which in turn shrinks the amount of waste going to our landfills.

2. Fast Facts

- Almost 80% of marine debris comes from litter left on the ground. Most of the litter gets to the ocean when it is washed down storm drains, into streams, and empties into the ocean. (www.ktvu.com)
- The state will spend in excess of \$72 million annually to collect and dispose of disposable cups & bags. 520,000 tons of material landfilled (50 tons recycled) multiplied by statewide average collection and disposal cost of \$140 per ton. (<http://www.earthresource.org/>)
- The current projected annual costs to California public agencies for litter prevention, cleanup, and disposal are \$375.2 million. (<http://www.earthresource.org/>)

FAST FACTS

GROUP TWO

Directions: Use the fast facts below to cite evidence that supports your opinion about each value statement.

1. Fast Facts

- It takes over one ton of natural resources to make one ton of glass. This includes 1,300 pounds of sand, 410 pounds of soda ash, 380 pounds of limestone, and 160 pounds of feldspar (www.earth911.com).
- In California alone we use more than 19 billion plastic bags a year. It takes more than one million barrels of oil, or 4,000 barrels a day, to make these bags. (www.ktvu.com).
- Every ton of steel that is recycled prevents 2,500 pounds of iron ore, 1,400 pounds of coal, and 120 pounds of limestone from being used (www.fcgov.com/recycling/).
- For every aluminum can that is recycled instead of being created from bauxite, enough energy is saved to watch three hours of television (<http://www.professorshouse.com/>).

2. Fast Facts

- On average 60% to 80% of total marine debris is plastic garbage. Single-use disposable products, packaging, and bags make up a large part of the plastic marine pollution (<http://www.seaweb.org/resources/briefings/MarineDebris.php>).

- Californians throw away 66 million tons of solid waste and about one third of that comes from packaging (<http://planetgreen.discovery.com>).

GROUP THREE

Directions: Read each statement and the fast facts about the statement on the back of the card and circle the number that reflects your thoughts or opinion about the statement.

1. The commercials I see influence me to buy certain products.

strongly disagree 1 2 3 4 5 6 7 8 9 10 strongly agree

Explain why you agree or disagree with the statement by citing evidence to support your opinion.

2. It is okay to throw things away that could be reused, recycled or composted because they will go to a landfill.

strongly disagree 1 2 3 4 5 6 7 8 9 10 strongly agree

Explain why you agree or disagree with the statement by citing evidence to support your opinion.



GROUP FOUR

Directions: Read each statement and the fast facts about the statement on the back of the card and circle the number that reflects your thoughts or opinion about the statement.

1. It is cool to fix up things like bikes and skateboards instead of always buying new stuff.

strongly disagree 1 2 3 4 5 6 7 8 9 10 strongly agree

Explain why you agree or disagree with the statement by citing evidence to support your opinion.

2. I should use the backside of a piece of paper to do my math calculations instead of a new sheet of paper.

strongly disagree 1 2 3 4 5 6 7 8 9 10 strongly agree

Explain why you agree or disagree with the statement by citing evidence to support your opinion.

Fast Facts

GROUP THREE

Directions: Use the fast facts below to cite evidence that supports your opinion about each value statement.

1. Fast Facts

- The average American receives 41 pounds of junk mail, or advertisements through the mail each year (<http://ecofx.org/wiki>)
- Half of parents believe that the food they buy and the restaurants they go to are strongly influenced by their children’s desires.

2. Fast Facts

- In California, during 2008, food was the number-one thing thrown away by residents, making up 15.5% of waste disposed in landfills (<http://www.scpr.org/news/2010/04/05/hunger-series-food-waste/>).
 - One person uses approximately one 100-ft. Douglas fir tree in paper and wood products per year (American Forest and Paper Association, 1996).
 - Making new aluminum products out of old aluminum cans uses 95% less energy than it takes to make new aluminum out of bauxite (www.earth911.com).
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Fast Facts

GROUP FOUR

Directions: Use the fast facts below to cite evidence that supports your opinion about each value statement.

1. Fast Facts

- Wood is the most common material used to make skateboard decks, the part skaters stand on. Skateboard trucks, which hold the deck to the wheels, are usually made of aluminum or other metals (steel, brass, or another alloy). Skateboard wheels are made of polyurethane (a synthetic rubber polymer). All of the parts come from natural resources. If the skateboard deck were to break, the trucks and wheels can be reused or recycled. (www.skateboardingmagazine.com)

2. Fast Facts

- California school districts create approximately 763,817 tons of waste per year (www.calrecycle.com).
 - Recycling 1 ton of paper saves 17 mature trees, 7,000 gallons of water, 3 cubic yards of landfill space, 2 barrels of oil, and 4,100 kilowatt-hours of electricity — enough energy to power the average American home for five months. (www.epa.gov)
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Fast Facts
GROUP FIVE

Directions: Read each statement and the fast facts about the statement on the back of the card and circle the number that reflects your thoughts or opinion about the statement.

1. Students should buy several sets of school supplies at the beginning of the year, so they always have what they need.

strongly disagree 1 2 3 4 5 6 7 8 9 10 *strongly agree*

Explain why you agree or disagree with the statement by citing evidence to support your opinion.

2. It is okay to buy a new bottle of water each day because the bottles can be recycled.

strongly disagree 1 2 3 4 5 6 7 8 9 10 *strongly agree*

Explain why you agree or disagree with the statement by citing evidence to support your opinion.

Fast Facts
GROUP FIVE

Directions: Use the fast facts below to cite evidence that supports your opinion about each value statement.

1. Fast Facts

- The main reason students need new pens and pencils is because they lose them or break them, not because the ink has run out or the pencil has been sharpened away. Using a pencil case helps students keep track of their supplies, causing them to need less.
- Frequently students have leftover school supplies that can be used for the following year, such as binders, notebooks, and folders.

2. Fast Facts

- In 2002, 93 billion plastic water bottles went into landfills in the US. That is enough plastic bottles to reach the moon and back 38 times (www.earthresource.org).
- One third of water consumed in the United States comes out of a container. This adds up to 45 million new plastic bottles of water consumed daily, with less than 10% of this total being recycled (www.50waystohelp.com).
- Fourteen recycled plastic bottles create enough fiber to make an extra-large T-shirt (www.newenglanddairycouncil.org).
- For all plastics, recycling is much less toxic than making it from new material, however the plastic recycling process itself is still quite toxic. Plastic, unlike metal or glass, can only be recycled a few times (and most only once) before it must go to the landfill (http://www.highcountryconservation.org/toxic_plastics.htm).

Student Reflection

Directions: Describe which of your values changed after talking to a partner and what made you change the value. If your values remained the same, explain why.

1. Did any of your values change after talking with a partner who had a different value?
2. Describe how and why your values changed or why they did not change.
3. Write one value statement about reducing waste using facts to support your statement or belief.